Some Important Points

• Placement into a comps option is based on a proposal that you must submit by Monday, October 15 to either Gretchen Hofmeister or Wendy Zimmerman. A proposal is required for both the Group Comps option and the Long Paper option. Use the last page of this document as a cover page for your proposal.

• Students opting for the Long Paper option must have a topic and a faculty advisor on board before submitting their proposal.

• Group Comps will be meeting during period 5A winter term.

• Because a significant portion of the work in comps carries over into the spring term, you must be enrolled at the college during winter and spring term. If you plan to not be enrolled at the college spring term you must opt for the long paper option and complete all comps requirements before the end of winter term.

• Six total credits will be awarded for Comps (CHEM 400). Five credits are taken in the winter and one credit is taken in the spring. If you are not going to be enrolled at the college spring term you must opt for the long paper and notify the faculty so arrangements can be made for a six-credit comps during winter term.

• Long Paper writers should register for CHEM 400.01. Group Comps participants should register for CHEM 400.02 (Marion Cass), CHEM 400.03 (Dani Kohen & Dave Alberg), or CHEM 400.04 (Gretchen Hofmeister) depending on their placement by the chemistry faculty.

Option I: The Long Paper

Two versions of the Long Paper are possible. The first involves a literature topic of your choosing, while the second would be available to those who have done research and want to write a paper that includes and expands on that research. Register for CHEM 400.01 no matter which version of the Long Paper you opt for.

Literature Topic Long Paper. Those of you choosing this option will select a topic of personal interest on which you will write a paper of 20 to 30 pages in length (with an absolute limit of 40 pages which includes all figures, illustrations, footnotes, endnotes, references, acknowledgements, etc). You must submit a proposal to the department describing your topic. A long paper proposal should include one page of text on the proposed topic with two attached original articles from the literature. You will also need to have a faculty advisor willing to work with you on your project before you submit your proposal. If you’re unsure whom you should approach to be a faculty advisor, contact your academic advisor or the Chemistry Comps Director for advice. Be sure to include the Comps Proposal Cover Page at the end of this document with your proposal.

This option involves considerable library work in becoming familiar with the primary literature of your topic. Typical papers might have 5-10 primary literature articles that you have analyzed in great detail. The paper is not merely a library report but is designed to involve you in the topic as a critical scientist. Personal judgments, criticisms, and suggestions for future directions will play an important role in an excellent paper. The paper will go through several revisions. Given how busy everyone gets at Carleton, it is crucial to treat this as a formal commitment, to start it early and schedule regular times during the week to make progress.

Formal Requirements:

1. Weekly meeting. You and your advisor will schedule a meeting time each week to discuss your topic and to monitor your progress.

2. The second reader. One other faculty member must read your paper. You should think about whom this second reader should be and select (with advice from your primary mentor) your second reader early in the process. After the project has been outlined and has some focus, you should plan to meet with the two faculty readers, so that both are familiar with your plan and topic. The second reader
should be provided with drafts of your paper-in-progress on the same schedule as you have arranged with your advisor.

3. **The closed discussion.** Your project will conclude with a 45 to 60 minute closed discussion with your two faculty advisors and will cover the material discussed in your paper. You also have the option of presenting a public seminar on your topic. If you do choose to give a general public talk, then you will also have the choice on whether to include the public talk as part of the evaluation in Comps. Please talk to your advisor once your project has started about how to make these choices.

4. After the completion of your closed discussion you will have three copies of your final draft bound (Central Services) and provide one copy to the Department Office, and one copy to each of your readers.

**Research Project Long Paper.** This option is available to those of you who have been or are presently involved in research projects. It is intended to provide an opportunity for you to extend the scope of your necessarily limited laboratory accomplishments to a broader perspective, quite like that of the "Literature Topic Long Paper" option. The requirements and structure of the experience of the “Research Paper” are the same as for the “Literature Topic Paper”. This is also true of the proposal you are required to submit (see above).

The Research Long Paper is not a huge lab report. It is a research paper, utilizing the literature and laboratory work to explore a topic, part of which you have become familiar with through your research. The paper resulting from this option is also presented for discussion with two faculty members early in Spring Term as described above for the "Long Paper" option. In addition, you also have the option of presenting a general public seminar, as described above.

**Option II: Group Discussion (“Comps Groups”)**

In this Comps experience, groups of four to seven students meet with one or two faculty members for in-depth discussions on specific topics from the recent scientific literature. Groups meet three times a week during period 5A in the winter term, and additional meetings are required during the early part of the spring as well. The students in a group will decide on the direction of the readings, the discussion topics, and the nature of the written and oral assignments during the term. The faculty advisor is meant to be a facilitator who, if things succeed, will remain in the background and will be a discussion peer. Each member is required to participate actively. Active participation includes keeping up with reading assignments selected by the group, preparing presentations or handouts on various topics for the group, actively engaging in discussion and decision making at each meeting, as well as other assignments (e.g. discussion summaries, short papers, preparing a departmental seminar, supplemental library work, etc.). The groups typically form around one scientist’s research, and the project often culminates with that person visiting campus and having lengthy discussions with group members, or with the Comps group visiting the campus and research group of the scientist whose work was studied.

This option, the most popular in recent years, is not for everyone. You must be willing to make a full contribution to the group and Comps must take a high priority among your various activities. Undoubtedly, you will have to find time outside of the regular weekly meetings to work with other group members. Group Comps is probably not a good option if you have other inflexible commitments on your time or if you prefer working and learning on your own. Under these circumstances, it would be better to opt for a Long Paper. Also, you must be enrolled in the college during both the winter and spring terms. If you plan to complete your course work at the end of winter term you cannot do Group Comps. The Group option can be a very educational way to do Comps, but it does require lots of effort by all members of the group for success. The Long Paper is a suitable option for a more individualized Comps experience.

Participation in a group is not assured. The department reserves the right not to select a student for Group Comps if we are not convinced that the student will contribute to the process in an active and positive manner. Selection to Group Comps will be based on your proposal, which is the vehicle for you to express your interest and convince us of your commitment. Your past record as a chemistry major and “citizen” of the chemistry department will also be considered. Be aware that selection to Group Comps is made by the department, as a whole, and selection to Group Comps is decided before the particular group assignments are made.
The Group Option proposal is a carefully prepared typed statement concerning your motivation for doing group comps. Provide any evidence you can offer indicating that you possess the ability and determination to be a fully active participant throughout the process. No discussion of the specific science of any of the group topics should be included. This is a statement of your intent, desire, and ability to participate in a student-motivated, group-learning endeavor. This need not be a lengthy statement and should be kept to no more than one page of text. You should also indicate any group preferences you may have using the Comps Proposal Cover Page found at the end of this document then elaborate on your preferences in your proposal. When possible, we will try to accommodate your group preferences.

Please note that Group Comps will meet during winter term at period 5a. Take this into consideration when making your decisions about Comps, and during registration for your other winter classes. Finally, if you are selected to the group, you will be required to attend a meeting with your advisor near the end of fall term, where expectations for group members are made clear.

Group Comps Topics:

**Group 1: Marion Cass**  
**Subject:** Photoelectrochemistry  
**Chemist:** Nate Lewis

This group would study the published work of Professor Nate Lewis of the California Institute of Technology. Nate has a number of research interests. He is most well known for his work in photoelectrochemistry; studying both the fundamental processes that allow sunlight to be converted to electricity and working to develop new materials to facilitate solar conversion. Here is a link to his web site http://nsl.caltech.edu/natelewis.html. You can look at his Research Page (to explore the six different research areas that he works on with his group) and the Energy Page which highlights his passion for supporting and developing sustainable energy technologies. Nate has served as a science advisor to several U.S. administrations and he has spoken about sustainable energy technologies around the world. If all goes well, Nate will visit Carleton on May 1 and 2. In addition to working with the comps group and giving a Departmental Seminar on May 2, he will give a lecture on Global Energy Needs and Sustainable Energy Technologies in the Distinguished Speaker Series on Global Climate Change.

**Group 2: Dani Kohen and Dave Alberg**  
**Subject:** Biophysical Chemistry  
**Chemist:** Steven Boxer

This group will focus on the work of biophysical chemist Steven Boxer, from Stanford University. Professor Boxer’s group is currently pursuing three main research projects.
1. Using femtosecond fluorescence and transient absorption spectroscopy, among other techniques, his group is studying the mechanism of light-driven long-distance electron transfer in photosynthetic systems.
2. His group studies electrostatics in proteins, and how electrostatics affects function.
3. His group’s third major research area involves the engineering of lipid bilayers as mimics for cell surfaces, to be used as tools in biotechnology.
You can read more about his group’s research in more detail on his website: http://www.stanford.edu/group/boxer/.
Professor Boxer will visit Carleton to meet with the comps group on Thursday and Friday, April 25-26.

**Group 3: Gretchen Hofmeister**  
**Subject:** Organometallics in Organic Synthesis  
**Chemist:** John Hartwig

One of the most fundamental challenges in organic synthesis is the selective incorporation of a functional group into unfunctionalized alkanes. The Hartwig group has primarily focused on transition metal catalyzed amination reactions, in which an amine functional group substitutes for H or adds across a C=C double bond. His work includes detailed mechanistic analysis of the reactions that are discovered in his laboratory. As a result, his work contributes to our fundamental understanding of how these processes take place. You can visit the group’s website at http://www.scs.uiuc.edu/hartwig/. We are fortunate to have John’s
visit coincide with his time as the Gassman lecturer at the University of Minnesota during the week of April 14-18. Therefore, in addition to the seminar he will give at Carleton, the group will travel to the U to hear some of his lectures earlier in the week and visit with him in the Twin Cities.

**Departmental Policy on Distinction**

As a preamble to the department’s policy on distinction, please keep in mind that distinction in Comps does not really matter much when it comes to your future plans. Whether your plans include joining the work force, graduate school, medical school, or a service or volunteer job, distinction in Comps will have little impact. What matters most is your overall record at Carleton and your recommendation letters. In fact, many decisions about your future may be made before anyone knows who got distinction. Nonetheless, you may decide to make it a personal goal to strive for distinction, and we support this goal.

Distinction in Comps is a difficult issue for chemistry majors and faculty, particularly with our department’s group Comps option. This issue is less sticky if you do a long paper involving library work or research. Since a long paper is an individual effort, a Comps advisor who sees a quality paper and oral presentation can easily determine the source of the effort and recommend distinction. In the group format, however, these decisions may not be as clear cut. Of course, distinction in group comps, like distinction on an individual paper, requires an unusual understanding of the material and the demonstrated ability to communicate your knowledge and understanding to others. The group experience particularly focuses on communication. Some attributes which make a group work well include cooperation, collaboration, teaching, listening, planning together, and celebrating achievements of understanding or, in other words, being a good colleague. Some of these characteristics, in some circumstances, may be odds with the attributes that could lead to individual accomplishment. In addition, faculty advisors do not always have a complete understanding of how the group truly operates, especially as the group becomes more independent and does a lot of work outside of the scheduled meeting times. In this case, a student who is perhaps less verbal during discussions with the faculty member but is actually the "backbone" of the group outside the formal discussions may be overlooked by the advisor when deciding whom to recommend for distinction. These complications in awarding distinction to members of a discussion group tend to lead to fewer distinctions compared to individual options.

To achieve distinction in Comps, whether it be for work done in a discussion group or an individual project, keep in mind the following sage advice of an esteemed faculty member:

* A lot of hard work does not distinction make

In other words, creativity, synthesis, unusual understanding, presentation of new proposals, and integration of disciplines are some of the hallmarks of an outstanding Comps effort. Students who get distinction are often not trying for distinction; instead they are just interested in learning due to their own intellectual satisfaction. A faculty member can recognize when these qualities are coming together to create an outstanding Comps product. If a Comps advisor sees these qualities in your project he or she will recommend you to the department for distinction in Comps. A discussion of all the candidates for distinction will follow in a department meeting until a consensus is reached.

If you have decided to set the personal goal of achieving distinction on your Comps, please talk to us and especially to your Comps advisor to get a better feeling of how we think about distinction. We are certainly happy to discuss this topic with you now so that there will be no misunderstandings at the end of the comps process next spring.
Name:____________________________________________________________

Select a Comps Option:

☐ Long Paper  ☐ Comps Group

If you have selected the Long Paper option, list below your topic and the advisor who has agreed to work with you on your comps. Attach to this form a one-page description of your proposed topic and two articles from the primary literature that relate to your topic.

If you have selected the Comps Group option, rank your preferences of comps group below (1-most desired, 2-second choice, 3-ok). Attach a short statement describing your motivation and desire to participate in group comps. In your statement also explain the preferences you have indicated.

Rank

_____ Group 1: Marion Cass
   Subject: Photoelectrohemistry
   Chemist: Professor Nate Lewis

_____ Group 2: Dani Kohen and Dave Alberg
   Subject: Biophysical Chemistry
   Chemist: Professor Steven Boxer

_____ Group 3: Gretchen Hofmeister
   Subject: Organometallics in Organic Synthesis
   Chemist: Professor John Hartwig