Junior Year 2013 (Thesis year Fall 2013 – Spring 2014)

A Guide to Senior Thesis Planning for Juniors

KEY PEOPLE

1st Reader (thesis “supervisor”)
2nd reader (independent evaluator; may or may not co-supervise)
Thesis Coordinator (enforces deadlines and rules;)
Donald McFarlane (Keck B43) dmcfarlane@kecksci.claremont.edu
IT Czar (online forms, poster uploads and printing, etc.) – Boyle Ke (Keck B41)
bke@kecksci.claremont.edu
Office Czarina: (manages thesis lists and paperwork) – Maria Alfaro (Keck Science Office 110)
malfaro@kecksci.claremont.edu

WEBSITE: www.kecksci.claremont.edu
Senior Thesis (ST) is the capstone component of your major at Keck Science; for many students, ST helps define their scientific interests and may be instrumental in the development of their career plans. ST requires careful and timely planning.

Types of Theses.

Regardless of whether you are a biology, chemistry, physics or “other variant” major, there are three basic types of ST potentially open to you:

One Semester Thesis (191). Taken in either the spring or fall semesters of your senior year. A one semester thesis is NOT a term paper. It is an original analysis of a dataset, compiled from the published literature, from internet archives, or from other sources. In some cases, a one semester thesis may also involve the collection of data. In other cases, by arrangement with your readers, the thesis may take the form of a formal research proposal.

Two Semester Thesis. (188L, followed by 190L). Normally taken Fall AND Spring of your senior year (but see below for an exception…). These theses are commonly referred to as “lab” or “experimental” theses, but need not be done in the lab. They are original analyses of datasets derived from the students’ own work in the laboratory, in the field, or on a computer (e.g. mathematical biology, theoretical physics, chemical modeling, etc.).

Summer research + One semester thesis (189L and 190L concurrently in Fall). In some cases, students may assemble data through lab and field work during the summer between their junior year, and then do follow-up laboratory analysis, sophisticated data analysis, etc. during the Fall semester of their Senior year. NOTE: This requires careful advance planning with your intended thesis supervisor in the Spring of your Junior year.

Occasionally, a student will begin a 2 semester experimental thesis in January of his/her Junior year (registered for 188L), and finish it in the fall of his/her senior year (registered for 190L). This requires a lot of advance planning with the thesis supervisor in the Fall of the Junior year.

Thesis is considered a full course load, i.e. at least 10 hours per week, but often much more. You must budget your time accordingly. Two semester theses will appear on your transcript as two separate courses, with separate grades for Fall and Spring semesters.

Note: A student who begins a two-semester thesis, but in the opinion of his/her first reader has not made adequate progress by late in the first semester will receive an ‘incomplete’ for the first semester and be switched to a one-semester thesis, due in late January.

The Role of Faculty.

Senior thesis is administered by a Thesis Coordinator. The Coordinator oversees deadlines, and enforces “the rules”. Individual senior theses are overseen by a “First Reader” who is the student’s primary source of “scientific” guidance. For laboratory theses, the first reader will typically provide the lab space and other facilities. The first reader is responsible for approximately half of the students overall grade. Each thesis student will also have a second reader, who provides an independent evaluation of the
work, worth approximately 20% of the overall grade. First or second readers may be Keck Science faculty, or they may be outside readers (faculty at other Claremont Colleges, or occasionally, other institutions entirely) – but at least one reader must be a Keck Science faculty member. If a student requires an outside reader, it is his/her responsibility to make the necessary arrangements and communicate and coordinate with both the first reader and the Thesis Coordinator.

Senior thesis students are also required to attend at least 6 scientific seminars during the semester (both semesters, for two-semester theses), and make presentations of their work (an oral progress report at the end of the first semester of a two-semester thesis, and a poster presentation at the conclusion of both one and two-semester theses).

Selecting a Project.

There are two ways to arrive at a suitable project:

1) A student may have a specific, well-developed interest that derives from previous academic experiences at Keck Science, or during Study Abroad, or from summer research experiences. In this case, the student should contact Keck Science faculty in the general discipline and inquire as to whether anyone is willing to supervise the proposed project.

2) A student may have a general interest, such as “molecular biology”, or “conservation biology” but no specific project in mind. In this case, the student should consult the “Keck Science Faculty Research Interests” book kept in the Keck Science office, and/or the individual faculty web pages, for available projects (http://www.kecksci.claremont.edu/Faculty/ReseachInterest.asp and http://www.kecksci.claremont.edu/Faculty/facultyContact.asp)

Note: Faculty are under no obligation to accept any particular student or project, and some faculty will receive more applicants than they have space or time to supervise. It is in your own interests to contact potential first-readers as early as possible.

Timetable

There will be an Organizational Meeting for Juniors held late in the Fall semester and repeated early in the spring semester.

You must ALSO register your thesis arrangements, using the online form accessed at: http://www.kecksci.claremont.edu/Thesis/

This applies even if you are abroad – there are internet connections even in the Amazon!

Note: On-line registering your thesis with Keck Science is quite separate from, and a NECESSARY prelude to, normal college course registration.

DEADLINE for on-line Keck Science registering of thesis options is Friday, January 24, 2014. (See Appendix 2)
Grading.

Grading procedures are listed in appendix 1 of this document.

Study Abroad

If you plan on being off-campus in the Spring of your Junior year, you may wish to make preliminary plans for thesis in the preceding Fall.

Some Examples of Theses

J. Aleman-Zometa (PZ 2007) Winter foraging behavior of white-crowned sparrows. (Dr. Guthrie)

H. Bagshaw (CMC 07) Two mutations in the C-terminus of the yeast DEAH-Box protein Prp43 abolish its function in pre-mRNA splicing in vivo. (Dr. Tang)

J. Bradley (CMC 07) Behavioral thermoregulation of *Sceloporus occidentalis* (Dr. Preest)

A. Gordon (SC 07) Identifying odorant binding protein expression in female vs. male *Anopheles gambiae* heads using Western blotting. (Dr. Justice).

C. Kolb (SC 07) Analysis of correlations in concentrations of ambient particulate matter analyzed by a particle-into-liquid sampler ion chromatography system. (Dr. Purvis-Roberts)

J. Miller (CMC 07) Population densities of poison-dart frogs in a regenerating tropical forest as measured by the Hayne estimator. (Dr. McFarlane) (may be downloaded at: http://costarica.kecksci.claremont.edu/pdf/Thesis%20-%20Jennie%20Miller%20-%202007.pdf)
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Appendix 1: Grading and Requirements

### Senior Research in (Science) 188L

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<thead>
<tr>
<th>Requirement</th>
<th>Percentage</th>
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<tr>
<td>Participation (seminar summaries)</td>
<td>5%</td>
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<tr>
<td>Oral presentation</td>
<td>25%</td>
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<tr>
<td>Effort (1st reader)</td>
<td>25%</td>
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<tr>
<td>Semester end progress report (1st reader)</td>
<td>20%</td>
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<td>Semester end progress report (2nd reader)</td>
<td>25%</td>
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### Senior Thesis in (Science) 190L, 191

<table>
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<td>Effort (1st reader)</td>
<td>25%</td>
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<tr>
<td>Written thesis (1st reader)</td>
<td>25%</td>
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<tr>
<td>Written thesis (2nd reader)</td>
<td>20%</td>
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<tr>
<td>Poster</td>
<td>25%</td>
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### Participation:

You are required to attend at least **six (6)** seminars in science, each semester of thesis program registration, of the many that are offered throughout the Claremont Colleges. If you are registering for a two-semester summer research thesis (189L and 190L), you are required to submit 6 seminar summaries in the second semester (190L) only regardless of which semester it is completed. There are a variety of seminar programs in biology, chemistry and physics. For six of these, write a one page summary of the talk. Give these to your first reader by the deadline listed on the Thesis website (“Calendar”).

### Meetings with Thesis Readers:

Your readers are responsible for submitting your grade, so it is your responsibility to meet regularly with them and keep them informed about your progress.

### Thesis Program Communications:

Regularly check the bulletin board outside the Administration office (Keck 110). Information on seminars and other useful information will be posted here and around Keck. Also check with your research advisor as to upcoming meetings.

### Satisfactory Work and an Admonition:
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Thesis is usually one-fourth of your academic load and you should expect to devote 10-15 hours per week to the effort. Successful field or laboratory work often requires significant amount of continuous effort – schedule your work week accordingly.

Students doing two semester theses will be graded on their first semester work. A thesis project may be terminated and/or converted to a one semester thesis if, in the judgment of the thesis readers, inadequate effort has been made and successful completion is unlikely.

Animals:

Any and ALL theses involving experimental work with animals (including fieldwork) require formal approval from the KSD Animal Care and Use Committee, which in turn is bound by complex legal regulations. Consult the AUC website (https://kecksci.claremont.edu/bio/animalcare) for details and forms. The deadline for turning in these forms is early in each semester – check the “Thesis Calendar” for specific dates. There are no exceptions – miss the deadline and you cannot use animals in your research.

Experimentation involving Humans:

Experimentation involving humans requires the approval of the appropriate “Human Subjects Research Committee” - see your first reader as soon as possible.

Penalties for Late Theses:

i. One grade point reduction (i.e., A to A-) for theses turned in up to 24 hours late.
ii. Two grade point reductions (i.e., A to B+) for theses turned in from 24 to 72 hours late.
iii. Three grade points (i.e., from A to B) for theses turned in from 3 days to one week (5 days) late.
iv. Additional full letter grade (three grade points) for each subsequent week (5 days) of lateness (or part thereof).
# APPENDIX 2:

## SENIOR THESIS PLANNING FORM (JUNIOR YEAR)

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<thead>
<tr>
<th>NAME</th>
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<th>MAJOR</th>
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I would prefer to complete (select one):

- A two-semester LABORATORY or FIELD-BASED thesis, starting in the Fall and finishing in the Spring of my senior year (188L + 190L).
- A two-semester LABORATORY or FIELD-BASED thesis, starting in the Summer and finishing in the Fall of my senior year (189L + 190L).
- A one-semester LABORATORY or FIELD-BASED thesis in the Fall or Spring of my Senior year.
- A one-semester NON-LABORATORY-BASED thesis in the Fall or Spring of my Senior year.

My preference for the faculty member(s) to advise my thesis is:

I have already had a chance to discuss my thesis options with the following faculty member(s):

LABORATORY or FIELD- BASED Theses ONLY:

My motivation for wanting to do a LABORATORY or FIELD-BASED thesis is:
APPENDIX 3:

Senior Thesis Evaluation Rubric
(Minor variations exist for the different majors)

**Originality (in conception, design, and/or implementation of project)**
- **Superior** – Project incorporated a very high degree of student originality.
- **Good** – Student has shown greater-than-average originality.
- **Average** – Student originality satisfactory but average for a JSD thesis.
- **Inadequate** – Student has shown a lack of originality in his/her thesis.

**Technical Competence/sophistication.**
- **Superior** – Student has acquired a high level of technical competence.
- **Good** – Student has acquired an above-average level of technical competence.
- **Average** – Student has acquired an average, but adequate, level of technical competence.
- **Inadequate** – Student has not reached an average level of technical competence for the subject matter.

**Effort**
- **Superior** – Student has invested a very high degree of time and effort, (>>8 hrs week)
- **Good** – Student has invested time and effort appropriate to a full course credit
- **Marginal** – Little evidence of time and effort appropriate to a full course credit
- **Inadequate** – Investment of time and effort significantly below that expected of a full course.

**Quality of Written Thesis**
- **Superior** – Each main idea is supported by detailed data or reasoning. All details are related to topic.
  - Complete, correct documentation of a wide variety of sources.
- **Good** – Details and/or data in some paragraphs may be sketchy; details may be insufficient to reach conclusions. All details are related to topic. Complete documentation of a variety of sources.
- **Marginal** – Details may appear to be listed rather than integrated into coherent flow; some details are irrelevant. Marginal documentation of sources; some key sources may be missing.
- **Inadequate** – Half or more of conclusions/main ideas are not supported by details. Half or more details cited are irrelevant. Inadequate documentation of inadequate sources.
APPENDIX 4:

KGI Team Masters Projects as Senior Theses.

Students at CMC, Pitzer and Scripps who are majoring in a scientific field are eligible to apply to participate in a Team Masters Project (TMP) at KGI. A TMP is a collaborative research project in which one or two undergraduates join with several graduate students at KGI to try to solve an applied problem posed by a sponsoring organization, such as a corporation. TMPs can be counted as a one-semester thesis or can extend over an entire academic year and may be counted as a two-semester thesis within Keck Science. The research is supervised by two faculty members, one each from KGI and Keck Science, and the project team is usually headed by a post-doctoral student at KGI. Some projects involve issues of confidentiality and proprietary information, and Keck Science students work with the faculty supervisors of the project to find appropriate ways to meet Keck Science thesis requirements while maintaining the required level of confidentiality. TMPs are especially appropriate for students who anticipate careers in applied research or in technical industries.

Keck Science students who participate in a TMP are expected to contribute substantially as a member of the project team and to the final written report prepared by the team. Keck Science students do not have to also write a separate thesis document, but must fulfill all other requirements of thesis students including a poster presentation and attendance at research seminars.

Students interested in being considered for a TMP must contact Professor Gretchen Edwalds-Gilbert for information about applying. An effort is made to match students with particular projects based on mutual interests and needs, but it is not always possible to place a Keck Science applicant into a TMP. It is wise for TMP applicants to make contingency plans for fulfilling their thesis requirement in some way other than through a TMP.

NOTE: Keck Science deadlines are usually earlier than KGI deadlines; it is your responsibility to ensure that you meet Keck Science deadlines.