

CLIM 997 Doctoral Qualification - Syllabus

Catalog Course Description

Students develop a project that demonstrates their potential to do scientific research. Each student either proposes a research project, or submits an original manuscript that is suitable for a peer-reviewed scientific journal in the subject area of Climate Dynamics. Grading is based on an oral presentation and written work. Offered by Atmospheric/Oceanic/Earth Sci. Limited to two attempts.

3 credits.

1 Relationship to Climate Dynamics Doctoral Program

Eligibility A CLIM student who starts in Fall is expected to take CLIM 997 in Spring of their second year. A CLIM student who starts in Spring can elect to take CLIM 997 in the Spring of their second or third academic year.

Candidacy The final grade in CLIM 997 is assigned by the instructor based on faculty feedback. A satisfactory grade (B or higher) indicates that the student meets expectations for a doctoral candidate and can continue in the Climate Dynamics PhD program. For unsatisfactory grades, see section on “Advancement to Candidacy” below.

2 Course Format

The primary activity in this course is to work on a research project in consultation with an academic advisor. During the semester, the CLIM 997 instructor will meet with students on a semi-regular basis to offer guidance and to discuss best practices for conducting scientific research, writing good proposals/papers, and interacting with other scientists.

Course grade is based on (1) a Final Document and (2) a Final Presentation. Students can choose one of two options:

- **Proposal:** Student submits a Final Document that presents a convincing proposal for a publishable scientific paper. The Final Document should contain original research from the student and be no more than 4000 words, excluding references, figure captions, and tables.
- **Manuscript:** Final Document may be a manuscript at the submission level of a peer-reviewed journal, or could be revised into such level after straightforward revisions. The word limit should be consistent with the intended journal.

The Final Document is likely to be part of the student’s doctoral dissertation. The relation of the above documents to grading is discussed below in the section “Expectations and Grading”.

Two Panel Meetings The student presents a proposal or research article to two *independent* Faculty Review Panels. Each panel comprises different members of the AOES Climate Dynamics faculty (each are “clean slates”). Students are encouraged to show their strongest work each time and are not constrained by what they proposed in previous panel meetings. Students will receive written feedback

after each panel meeting and are expected to use this feedback to improve subsequent presentations. Students should recognize that a different panel may react differently (positively or negatively) to the same material. Performance in panel meetings does not count towards the final grade.

During each panel meeting, students have 15 minutes to present their work, and up to an additional hour and 15 minutes to answer questions from the panel and engage in constructive discussions. The student is expected to answer critical questions about their project, which may include questions about basic physical concepts. Students submit presentation slides one day before their panel meeting. Each panel member completes an evaluation form that will clearly communicate any concerns about the student's project. A CLIM 997 moderator schedules and administers all presentations and meets with the student shortly after each panel to share faculty evaluation forms and discuss takeaways.

Final At the end of the semester, the student submits a Written Document and gives an oral Final Presentation to the entire Climate Dynamics faculty. The written document is due ten days before the Final Presentation, and presentation slides are due one day before the Final Oral presentation. The student presentation is 25 minutes long, followed by 20 minutes of Q & A. Students will be evaluated in part by how they use Panel suggestions to improve their projects. Immediately after the final presentation, faculty meet privately for discussion (see Expectations and Grading below).

3 Proposal Generation Process

Students should work with their advisors to formulate paper ideas that will likely be part of their doctoral dissertation. The student may incorporate work that was done in the Climate Dynamics program prior to the qualifier. Projects based largely on work performed before entering the Climate Dynamics PhD program (e.g., a student's MS degree and associated publications) are not allowed. Students supported by research grants may propose projects based on the grant's project description, but the student is expected to make independent contributions to the project and, most importantly, to be able to defend the ideas without undue assistance from the advisor. If the student project is a research proposal, it should include original research results obtained as a student in the Climate Dynamics program. If the student project is a draft of a publishable paper, this draft can be submitted as the final document for the course.

4 Expectations and Grading

The Final Document and Presentation should provide evidence of the student's ability to:

- critically understand the relevant scientific literature
- physically understand the scientific problem
- analyze large data sets
- understand and explain an open scientific question
- present and defend a research plan to advance scientific knowledge
- explain ideas to other scientists
- improve ideas based on feedback from other scientists.

Grades are assigned as follows:

- B- or below: does not meet expectations described above, and does not pass the qualifier.
- B,B+: meets expectations described above, and submits a **proposal**.
- A,A+: meets expectations described above, and submits a **manuscript** at the submissions level of a peer-reviewed journal, or a manuscript that could be revised into that level after straight-forward revisions

Process of assigning grades:

1. After final presentation, faculty meets to discuss student performance
2. Each faculty member completes a CLIM 997 Evaluation Form and assigns a letter grade
3. Course moderator assigns final grade based on faculty Evaluation Forms
4. Course moderator submits grade to university

5 Elements of a Successful Proposal or Paper

Oral panel presentations are very short (15min), so the student must pare down information to essentials and rehearse the talk before presenting. A good proposal or paper answers the following questions:

- What are you trying to do? Articulate your objectives without jargon.
- How is it done today, and what are the limits of current practice?
- What is new in your approach and why do you think it will be successful?
- Who cares? If you succeed, what difference will it make?
- For proposals: what resources are required? How long will it take?

For the final document, a good format¹ for answering these questions is

Title: brief, reflects paper content, avoids jargon, symbols, formulas and abbreviations.

Abstract: summarizes purpose and methodology of research in ≤ 250 words.

Introduction: states scientific question, explains importance, cites relevant previous work.

Proposed Work: description, how it will answer the scientific question, how it differs from previous work. Includes enough details to show exactly what will be done and why it is a good plan.

Accomplished Work: describe research results, including methods and significance.

Advisor should be cited as “advised by” and should not appear as a co-author on presentation or written report.

¹Based on NSF Guide to Proposal Writing

6 Faculty Roles

course instructor: organizes and moderates meetings/panels/Final Presentation, assigns final grade for each student in class.

student academic advisor: consults with student about project.

AOES climate dynamics faculty: Except as prevented by unavoidable schedule conflicts, all Climate Dynamics faculty are expected to (1) attend two days of panel meetings, (2) read the Final Document from each student and (3) attend the Final Presentation and subsequent faculty meeting. Faculty will fill out an evaluation form after each panel and submit the form to the CLIM 997 instructor,

7 Advancement to Candidacy

A grade of B or higher indicates the student meets expectations for a doctoral candidate and can continue in the Climate Dynamics PhD program. A grade of B- or lower is unsatisfactory and indicates that the student performed below the level expected of a CLIM doctoral candidate. However, the final decision of whether a student remains in the Climate Dynamics PhD program lies with the CD director, who makes the decision based on performance in CLIM 997, consultation with student's advisor and the instructors of CLIM 997, and performance in Core Climate courses. If a student cannot continue as a doctoral candidate, the student has the opportunity to request a second chance.

8 After passing CLIM 997

Dissertation Committee: Student should form a dissertation committee by the end of the following summer and thereafter enrolls in CLIM 998 Doctoral Dissertation Proposal.

Submit Paper: Students who continue in the doctoral program are expected to submit a paper to a peer-reviewed journal, and to the dissertation committee, by the Spring semester following the qualifier. If this deadline is not met, then the student submits a progress report to the thesis committee at the end of each semester until the paper is submitted. In all cases, student must satisfy the submission requirement before submitting and defending a dissertation proposal.

Proposal Defense By the end of the student's third year, the student is expected to present a Dissertation Proposal to their thesis committee. The dissertation proposal will generally be an extension of the CLIM 997 proposal.

Advancement to Doctoral Candidacy Once a dissertation committee approves the dissertation proposal and the student completes all non-dissertation program requirements, the student is formally advanced to doctoral candidacy and thereafter enrolls in CLIM 999.