GEOG. 5161: RESEARCH DESIGN IN PHYSICAL GEOGRAPHY (Spring 2009)

Class meets 4:00 to 6:50 Tuesdays in Gugg. 201e

First meeting is Jan. 13

Instructor: Tom Veblen

Office Hours: Tu 2:30-3:30 or by appointment; Guggenheim 201. Please email for an appointment: veblen@colorado.edu

INTRODUCTION

This course is the second semester in the sequence of required courses for first-year graduate students. The overall goal of the second semester is for students to define specific research questions and develop a research strategy for their masters thesis or doctoral dissertation. We will discuss research methodologies in a general context, but this is not a course on experimental design or specific research techniques. Those subjects are highly specific to sub-disciplines and are treated in numerous other courses in the sub-disciplines and in the techniques area (e.g. quantitative methods, remote sensing, GIS). Instead, the methodological component of this course deals with more general aspects of research approaches in physical geography and their relationships to broad issues in scientific methodology. The course emphasizes practical aspects of getting started in a research career and a broad range of career development topics including ethical issues in conducting and communicating research.

The principal written product of this semester will be a research proposal produced in the format of a proposal for a funding agency. Consequently, the amount of reading assigned in this course is relatively modest to allow you sufficient time to concentrate on developing your own research proposal. Early in the semester you need to agree on a research topic with your advisor and on a reading list appropriate for that topic.

We will begin the semester with a consideration of the theories or models which are most closely related to your thesis or dissertation topics. The following several weeks will consist of workshops on the writing of grant proposals, strategies for publishing research results, and practice in the oral communication of research results.

In the middle of the semester there will be presentations by faculty on research frontiers in various sub-disciplines of physical geography. The guest faculty presentations will focus on important current research directions in the various subfields of physical geography, and provide an opportunity for physical geography students to become familiar with research conducted by faculty working in areas outside of the student’s speciality. The presentations are intended to both inform the non-specialist about contemporary developments in each subfield and to assist students specializing in that subfield to refine their research questions.

The final section of the course will consist of student presentations and discussions of
drafts of their individual research proposals. Students will receive peer reviews of their research proposals to aid them in the final version of the proposal.

The success of the course obviously depends on each student’s identification of an area of research and of specific research questions early in the semester. I expect that there will be a substantial range in the specificity of students’ research plans during their first year in the program, but everyone should have a research proposal completed by the end of this semester. It is essential that you seek an appropriate level of advice from your faculty advisor, especially during the early part of the semester, to help you define your thesis topic.

Background Reading:

R.H. Haines-Young and J.R. Petch. 1986. Physical Geography: Its Nature and Methods. Harper and Row, London. I will only assign a couple of chapters from this text, but I recommend that you use it as a general reference on philosophy of science as applied to physical geography. Although this book is out of print, there are photocopies in the filing cabinet next to the faculty mailboxes.

Forum on Methodology in Physical Geography, Annals of the Association of American Geographers 89: 677-778. This is a useful source on the diversity of methodologies applied to physical geography. A few of the papers will be assigned and discussed.

Required Text:


Grading:

Written critiques, short writing assignments, and class participation 30%
Oral (15-minute) professional paper presentation 10%
Oral presentation on research proposal 10%
Written research proposal 50%

COURSE SCHEDULE

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Discussion Topic: Defining a Suitable Thesis or Dissertation Topic

Assignment (due Jan. 13): 1) a < one page written statement that describes your thesis or dissertation plan; tentatively define the research problem or question and identify its
significance to your sub-field. Be prepared to briefly (5 minutes) discuss how your tentative research topic will be a potential contribution to your sub-field (e.g. conceptually, methodologically, in terms of new data, a new application, etc.). If appropriate, also comment on its practical significance and potential broader impacts for society. 2) Be prepared to briefly summarize the main points from selected articles assigned in History and Theory by the physical geography guest faculty. advisees of the guests will be invited first to summarize the relevant articles in biogeography, geomorphology, etc.


1/20 Environmental Research in the Context of Policymaking and Advocacy: Theory

Assignment (due Jan. 20): In addition to reading the papers listed below, try to locate a formal statement of a professional society's position on advocacy, and bring this to class with you. Professional societies- AAG, AMS, AGU, AIBS, and ESA- have somewhat different views on this; thus, it might be interesting to compare positions.


1/27 Environmental Research in the Context of Policymaking and Advocacy: Practice

Assignment: This will be a role playing exercise based on a U.S. Congressional committee hearing on an environmental research issue in your area of expertise. For the three topics listed below, one student will play the role of expert witness and two will play the role of congressional policy staffers representing contrasting interests (e.g. timber industry vs. conservation groups or climate change activists vs. petroleum industry or recreational fishing industry vs. hydroelectric power industry). (I'll fill in if we don't have enough students for two staffers per topic.)

The topics of the hearings are:

1. Ecology/biogeography--Logging following wildfire (initial lead: Donato et al. 2006)

2. Climate/global change--The hockey-stick controversy (initial lead: Mann et al. 1999)

3. Hydrology/geomorphology--River restoration and dams (initial lead: Schmidt et al. 1998)

Feel free to suggest an alternative issue, as long as it is of broad societal significance and fits the expertise of the students in this class. Staffers will investigate their respective topics and formulate questions to be addressed by the expert witnesses. Everyone should read the three “lead articles.”
2/3 & 2/10  The Use of Theories and Models in Research Design

Reading: Ch. 8-9 of Haynes-Young and Petch; Shrader-Frechette and McCoy 1994.

Assignment: Select a model or theoretical concept (probably a small part of a theory) which will be important to your thesis or dissertation research. Prepare a 250 to 500 word critique of the model or theory and a 30 minute oral presentation. The goal of the presentation is to provide an opportunity for you to explore some of the conceptual background to your proposed research. In some cases it may be appropriate to treat your presentation as a tutorial on a key concept/model in your field to inform a more general audience. Explain the use and impact of the model in your subfield, and try to identify general questions to which your research will be related. If your research will be on a method (e.g. remote sensing applications) then your presentation might focus on the theory underlying relevant methods. The presentation is not intended to be a summary of the thesis or dissertation proposal that you will present at the end of the semester. Instead, the focus of this presentation is on the body of theoretical or conceptual literature relevant to the research questions you will examine.

2/17  Workshop on the Writing of Research Proposals and Ethics in the Conduct of Research

I will describe the practical aspects of developing a research proposal for a funding agency. We will discuss issues of style and structure of the proposal and, especially, the evaluation criteria of proposals for research funding. We will also consider ethical aspects of writing and reviewing research proposals.


2/24 & 3/3  Workshops on How to Write and Publish a Scientific Paper (including Ethical Considerations in Publishing) and How to Prepare and Present an Oral Scientific Paper


Assignments:

1) Identify approximately 20 journals that publish research results in your subfield and classify them into one of the following three categories: (a) elite journals, (b) highly respected but not elite journals, (c) refereed journals of lesser impact.

2) Use the Science Citation Index (see CU Library ISI Web of Knowledge) to explore citation patterns in your field (including impact factors of your selected journals). Take a
list of 5 or 6 contributors in your subfield and examine how their work is being cited; explore the use of the Hirsch Index. A formal analysis is not required. I just want you to be familiar with citation patterns in your field.

3/10 & 3/17  *Research Frontiers in Physical Geography:* guest faculty for each date will lead seminars on subfields of physical geography.

3/24  No class: Spring Break.

3/31  *Practice in the Oral Presentation of Research Results*

**Assignment:** Prepare a 15-minute formal research presentation according to the instructions for the annual meeting of the Association of American Geographers. Prepare an abstract according to the AAG guidelines. The focus of the exercise is on effective communication rather than the science itself. The presentation should be on completed research in which your goal is to practice communicating research findings as if you were presenting a paper at a professional/scientific conference.

Note: this 15-minute research presentation should not just be a preview of your research proposal that you will discuss at length during a later week.

4/7  *Scientific Methods and Research Approaches in Physical Geography*


4/14 & 4/21  *Term Paper Presentations*

Each student will make a 30-minute presentation based on a draft of his or her thesis or dissertation proposal.

**Assignment:** Write a research proposal which conforms to the guidelines for the NSF Doctoral Dissertation Improvement Awards (see the Geography and Regional Science website). A written draft of the research proposal must be circulated to the entire class at least three days before the date of its presentation to the class. The final, revised version is due May 1.

Each student will write a 1-3 page review of two of the draft proposals (circulate these reviews to the class by April 27). The review will respond to the evaluation criteria of NSF.

4/28  *Mock NSF Panel Discussion*

For each draft proposal, two students will be assigned to briefly summarize and evaluate the proposal and lead a panel discussion of the proposal. Based on that discussion and their own reading of the proposal, each panel member (i.e. each student) will rank the proposal
according to the NSF criteria (excellent, very good, good, fair, poor or no ranking).

**ASSIGNED READINGS**

**Note:** additional readings may be assigned by the faculty leading the sections on research frontiers in biogeography, climatology, geomorphology, and alpine biogeochemistry.


Kirchner, J.W. et al. 2001. Mountain erosion over 10 yr, 10 k.y., and 10 m.y. time scales. *Geology* 29:591-594.


http://www.tos.org/resources/publications/sci_speaking.html


Thompson, J.N. 2005. On being a successful graduate student in the sciences.  Unpublished


