

PubH 8403-001
Research Skills in Biostatistics
Fall 2015

Credits:	1
Meeting Days:	Wednesday
Meeting Time:	2:30-3:20pm
Meeting Place:	Mayo A-434 (main Biostat conference room)
Instructor:	Bradley P. Carlin, PhD
Office Address:	A-464 Mayo Building, MMC 303, 420 Delaware Street SE, Minneapolis, MN 55455
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Office Hours:	Wednesday, 4:30-5:30pm

I. Course Description

This course introduces doctoral students in Biostatistics to research skills necessary for writing and defending a dissertation, and more generally for a career in research. Format and course topics will vary from week to week, as described below. Students will be given assignments to reinforce skills presented in class. The class meeting time (immediately before seminars) was chosen to facilitate subsequent seminar attendance, since learning how to both give and listen to scholarly talks is itself a research skill.

II. Course Prerequisites

Stat 8101-02 and admission to the PhD program in Biostatistics. The course is meant to be taken the fall before the PhD written exam is to be attempted, so "Schedule 2" students would typically wait to enroll until their second year in the program.

III. Course Goals and Objectives

Upon successful completion of the course, students will be well-versed in the basic tools needed to transition from a bachelors/Masters mentality (where mere mastery of a variety of coursework is sufficient) to a PhD mentality (where instigation, development, presentation, and publication of original research is required). Skills covered will include resume and CV-writing, mathematical word processing, oral and poster presentation skills, computer systems and efficient and responsible use of high-speed multicore processors, choosing a thesis area and advisor, scientific writing, an introduction to grant writing and research ethics, and a variety of other research survival skills.

IV. Methods of Instruction and Work Expectations

Methods of instruction will be through in-class lectures and presentations, homework assignments, and hands-on practice with the various software packages utilized. Prof. Carlin will attend every class (except where indicated below), but will typically be assisted by one or more "faculty facilitators" who will co-lead the day's discussion, occasionally with Prof. Carlin acting as moderator of a panel discussion.

V. Course Text and Readings

There is no required text for the course, but readings and websites will be provided as needed. This will include (but not be limited to) Burton et al. (2006, *Statistics in Medicine*) on design of simulation studies in medical statistics, Baggerly and Coombes (2009, *Annals of Applied Statistics*) and two accompanying articles in *The Cancer Letter* on the reproducible research scandal at Duke University, Gelman et al. (2002, *The American Statistician*) on graphical displays, and Gould et al. (1999, *Biometric Society - ENAR*) on preparing effective presentations. Handouts will also be generously provided, including basic information on the R language and how it can be efficiently utilized on the division's multicore machines.

VI. Course Outline/Weekly Schedule

Week 1 (9/9): Survival tips and strategies for success; introduction to research, searching PubMed (www.pubmed.gov). Faculty facilitator: **Carlin**; guest presenter: **Del Reed**, public health specialist at the Biomed Library

Week 2 (9/16): Designing and implementing simulation studies in R; reproducible research (**assignment**: design and implement your own simulation study in R). Faculty facilitator: **Wolfson**

Week 3 (9/23): Using the division's high-performance computers. Faculty facilitator: **Koopmeiners, Guan**; guest presenter: **Greg Thompson**, CCBR computing staff

Week 4 (9/30): Using the division's high-performance computers (cont'd) and using the university's supercomputing facility (**assignment**: implement your simulation study on one of these two computer systems). Faculty facilitators: **Wu, Zhang**; guest presenter: **Nancy Rowe**, MSI

Week 5 (10/7): Working with clinical and other non-biostatistical investigators. Faculty facilitators: **C Le, Lock, Luo, Vock** [NOTE: Carlin absent this day]

Week 6 (10/14): How to choose a dissertation topic and advisor. Faculty facilitators: **Carlin, Rudser**

Week 7 (10/21): Research ethics and responsibility, plagiarism (assigned reading before the lecture: Baggerly and Coombes, July 2010 *Cancer Letters*). Faculty facilitators: **Basu, Connett**

Week 8 (10/28): LaTeX for advanced word processing (**assignment**: create your CV in LaTeX). Faculty facilitator: **Carlin**

Week 9 (11/4): Oral and poster presentation skills; using LaTeX, Beamer, or TexPoint for oral presentations (**assignment**: create a Beamer or TexPoint document describing your simulation results); creating your own R package. Faculty facilitators: **Hughes, Ho**

Week 10 (11/11): Scientific writing. Faculty facilitator: **Hodges** [NOTE: Carlin absent this day]

Week 11 (11/18): Effective teaching. Faculty facilitators: **Telke, L Le, Weber, Reilly**

Week 12 (11/25): **No Class** (*day before Thanksgiving*)

Week 13 (12/2): Scientific writing case study: the dissertation proposal. Faculty facilitator: **Carlin**

Week 14 (12/9): Manuscript submission and review. Faculty facilitators: **Neaton, Pan** [NOTE: Carlin absent this day]

Week 15 (12/16): Introduction to grantwriting (**assignment**: research dissertation research support grants in your area; email me a topic you might choose to write about, and a few sentences about how you would "sell" it to a grant reviewer, both to an expert in your field (biostatistics/bioinformatics) and more broadly (say, an MD researcher)). Faculty facilitators: **Chu, Virnig**

VII. Evaluation and Grading

Students will be given assignments to reinforce skills presented in class. All students must complete all assignments and attend a minimum of 4 divisional seminars in order to earn a grade of "S". Students may provide each other with feedback on some assignments; for example, we will review a version of rubric originally designed at Iowa State University to help provide constructive criticisms on oral presentations.

I take a very dim view of unexcused late assignments, especially in a class like this where most of the work is "take-home." As a general rule, **prior notification is essential** to my accepting a late assignment of any kind. If illness or travel is going to cause you to miss a deadline, don't surprise me -- call or send an e-mail message (as a crazed modern academic, I check my emails, texts, & voice messages constantly).

Course Evaluation

Beginning in fall 2008, the SPH will collect student course evaluations electronically using a software system called CourseEval: www.sph.umn.edu/courseeval. The system will send email notifications to students when they can access and complete their course evaluations. Students who complete their course evaluations promptly will be able to access their final grades just as soon as the faculty member renders the grade in SPHGrades: www.sph.umn.edu/grades. All students will have access to their final grades through OneStop two weeks after the last day of the semester regardless of whether they completed their course evaluation or not. Student feedback on course content and faculty teaching skills are an important means for improving our work. Please take the time to complete a course evaluation for each of the courses for which you are registered.

Incomplete Contracts

A grade of incomplete "I" shall be assigned at the discretion of the instructor when, due to extraordinary circumstances (e.g., documented illness or hospitalization, death in family, etc.), the student was prevented from completing the work of the course on time. The assignment of an "I" requires that a contract be initiated and completed by the student before the last official day of class, and signed by both the student and instructor. If an incomplete is deemed appropriate by the instructor, the student in consultation with the instructor, will specify the time and manner in which the student will complete course requirements. Extension for completion of the work will not exceed one year (or earlier if designated by the student's college). For more information and to initiate an incomplete contract, students should go to SPHGrades at: www.sph.umn.edu/grades.

University of Minnesota Uniform Grading and Transcript Policy - A link to the policy can be found at onestop.umn.edu.

VIII. Other Course Information and Policies

Grade Option Change (if applicable)

For full-semester courses, students may change their grade option, if applicable, through the second week of the semester. Grade option change deadlines for other terms (i.e. summer and half-semester courses) can be found at onestop.umn.edu.

Course Withdrawal

Students should refer to the Refund and Drop/Add Deadlines for the particular term at onestop.umn.edu for information and deadlines for withdrawing from a course. As a courtesy, students should notify their instructor and, if applicable, advisor of their intent to withdraw.

Students wishing to withdraw from a course after the noted final deadline for a particular term must contact the School of Public Health Office of Admissions and Student Resources at sph-ssc@umn.edu for further information.

Student Conduct Code

The University seeks an environment that promotes academic achievement and integrity, that is protective of free inquiry, and that serves the educational mission of the University. Similarly, the University seeks a community that is free from violence, threats, and intimidation; that is respectful of the rights, opportunities, and welfare of students, faculty, staff, and guests of the University; and that does not threaten the physical or mental health or safety of members of the University community.

As a student at the University you are expected adhere to Board of Regents Policy: *Student Conduct Code*. To review the Student Conduct Code, please see:

http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf.

Note that the conduct code specifically addresses disruptive classroom conduct, which means "engaging in behavior that substantially or repeatedly interrupts either the instructor's ability to teach or student learning. The classroom extends to any setting where a student is engaged in work toward academic credit or satisfaction of program-based requirements or related activities."

Use of Personal Electronic Devices in the Classroom

Using personal electronic devices in the classroom setting can hinder instruction and learning, not only for the student using the device but also for other students in the class. To this end, the University establishes the right of each faculty member to determine if and how personal electronic devices are allowed to be used in the classroom. For complete information, please reference:

<http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html>.

Scholastic Dishonesty

You are expected to do your own academic work and cite sources as necessary. Failing to do so is scholastic dishonesty. Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis. (Student Conduct Code:

http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf) If it is determined that a student has cheated, he or she may be given an "F" or an "N" for the course, and may face additional sanctions from the University. For additional information, please see:

<http://policy.umn.edu/Policies/Education/Education/INSTRUCTORRESP.html>.

The Office for Student Conduct and Academic Integrity has compiled a useful list of Frequently Asked Questions pertaining to scholastic dishonesty: <http://www1.umn.edu/oscai/integrity/student/index.html>. If you have additional questions, please clarify with your instructor for the course. Your instructor can respond to your specific questions regarding what would constitute scholastic dishonesty in the context of a particular class-e.g., whether collaboration on assignments is permitted, requirements and methods for citing sources, if electronic aids are permitted or prohibited during an exam.

Makeup Work for Legitimate Absences

Students will not be penalized for absence during the semester due to unavoidable or legitimate circumstances. Such circumstances include verified illness, participation in intercollegiate athletic events, subpoenas, jury duty, military service, bereavement, and religious observances. Such circumstances do not include voting in local, state, or national elections. For complete information, please see:

<http://policy.umn.edu/Policies/Education/Education/MAKEUPWORK.html>.

Appropriate Student Use of Class Notes and Course Materials

Taking notes is a means of recording information but more importantly of personally absorbing and integrating the educational experience. However, broadly disseminating class notes beyond the classroom community or accepting compensation for taking and distributing classroom notes undermines instructor interests in their intellectual work product while not substantially furthering instructor and student interests in effective learning. Such actions violate shared norms and standards of the academic community. For additional information, please see: <http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html>.

Sexual Harassment

"Sexual harassment" means unwelcome sexual advances, requests for sexual favors, and/or other verbal or physical conduct of a sexual nature. Such conduct has the purpose or effect of unreasonably interfering with an individual's work or academic performance or creating an intimidating, hostile, or offensive working or academic environment in any University activity or program. Such behavior is not acceptable in the University setting. For additional information, please consult Board of Regents Policy:

<http://regents.umn.edu/sites/default/files/policies/SexHarassment.pdf>

Equity, Diversity, Equal Opportunity, and Affirmative Action

The University will provide equal access to and opportunity in its programs and facilities, without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression. For more information, please consult Board of Regents Policy: http://regents.umn.edu/sites/default/files/policies/Equity_Diversity_EO_AA.pdf.

Disability Accommodations

The University of Minnesota is committed to providing equitable access to learning opportunities for all students. Disability Services (DS) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations.

If you have, or think you may have, a disability (e.g., mental health, attentional, learning, chronic health, sensory, or physical), please contact DS at 612-626-1333 to arrange a confidential discussion regarding equitable access and reasonable accommodations.

If you are registered with DS and have a current letter requesting reasonable accommodations, please contact your instructor as early in the semester as possible to discuss how the accommodations will be applied in the course.

For more information, please see the DS website, <https://diversity.umn.edu/disability/>.

Mental Health and Stress Management

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance and may reduce your ability to participate in daily activities. University of Minnesota services are available to assist you. You can learn more about the broad range of confidential mental health services available on campus via the Student Mental Health Website: <http://www.mentalhealth.umn.edu>.

Academic Freedom and Responsibility: for courses that do not involve students in research

Academic freedom is a cornerstone of the University. Within the scope and content of the course as defined by the instructor, it includes the freedom to discuss relevant matters in the classroom. Along with this freedom comes responsibility. Students are encouraged to develop the capacity for critical judgment and to engage in a sustained and independent search for truth. Students are free to take reasoned exception to the views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled.*

Reports of concerns about academic freedom are taken seriously, and there are individuals and offices available for help. Contact the instructor, the Department Chair, your adviser, the associate dean of the college, or the Vice Provost for Faculty and Academic Affairs in the Office of the Provost. *[Customize with names and contact information as appropriate for the course/college/campus.]*

** Language adapted from the American Association of University Professors "Joint Statement on Rights and Freedoms of Students".*

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