

Graduate Level Research Methods
HLP 6535 'Class number' 2315
Spring 2019 (ALL ONLINE)

Course Syllabus

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(please contact me when possible through CANVAS, it comes to my regular campus address)

OFFICE HOURS: For resident students taking the ONLINE COURSE, email to make a live appointment. For non resident students, if you have specific questions or you would like to schedule a phone/Zoom/Skype interview, also email me for an appointment.

Description and Overall Objectives of the Course:

This introductory course in research design and methods is oriented to prepare graduate MS level and early Ph.D. students to begin to think quantitatively about how to solve research problems, whether they are in science, medical professions, business, politics or any professional position. The skills you learn in this course should carry over to some aspect of your life after leaving UF, no matter what you do. For Ph.D. students going into science the course should prepare you for the tools for entering into the world of research and being able to be functional in a research environment. For M.S. students the course should provide you with sufficient background and statistical approach to be able to read scientific and medical literature, understand quantitative approaches to problems and to act ethically in the workplace.

Students will be exposed to the basic analytical, graphical and statistical methods used to generate and interpret data, and will demonstrate their knowledge of the course materials by analyzing and interpreting research data from professional journals, from practice data that you are given and by planning your own independent research projects over the course of the semester.

Students will learn how to utilize a free, very advanced statistical software, available for download at the University IT department (SAS JMP). All students will learn to develop literature searching tools using a variety of available library databases and will employ the online bibliographic software (ZOTERO) for preparation of references and bibliography for your scholarly documents. Additional EXCEL skills are added to round out your training, skills that will be useful to you throughout your life and will open job opportunities for you that you would not be eligible for.

All of the class content will be delivered by Canvas. Most of the lecture material will be delivered using online lectures and quizzes <http://elearning.ufl.edu/>. Each week there will be several 20-40 minute online lectures and/or workshops and usually some kind of class assignment involving data analysis.

Tentative Course Schedule

Note: The following is a tentative class schedule. These are subject to change but you will be informed each week as to the specific material you are responsible for each week. The midterm and final weeks will be adhered to but the actual time of the exam will be agreed to by online discussion.

Week	Week of		Topics Covered
1	7-Jan	13-Jan	Class orientation, How to approach scientific problems, Origins of Creativity
2	14-Jan	20-Jan	Using Pubmed and other Databases, Describing data populations,
3	21-Jan	28-Jan	Describing variability in populations, using Zotero, Introduction to SAS JMP, how to read a scientific paper
4	28-Jan	3-Feb	Comparing normally distributed populations, Comparing populations that are not normally on non normally distributed, Workshop on Aims and project developme
5	4-Feb	10-Feb	Comparing samples of nominal data, Linear regression, introduction to scientific discourse and problem solving
6	11-Feb	17-Feb	Midterm 1 Workshop on correct citation of scholarly work/plagiarism
7	18-Feb	24-Feb	Introduction to experimental design, linear data trasformation
8	25-Feb	3-Mar	Non linear Regression, Workshop on Using excel for Graphics, Care and Handling of Data workshop
	4-Mar	10-Mar	SPRING BREAK
9	11-Mar	17-Mar	Introduction to ANOVA one way and two way, Workshop on calculation of ideal sample size, Type I and Type II errors
10	18-Mar	24-Mar	Workshop on Testing Validity, ANOVA II, repeated measures.
11	25-Mar	1-Apr	Outline of experimental plan workshop
12	2-Apr	8-Apr	Midterm 2 Complete instructions for final research paper assignment, Workshop on Bioethics of Human Research/ Introduction to Logistic regression
13	9-Apr	15-Apr	Introduction to Qualitative/Descriptive research, Workshop on the Publishing Industry
14	16-Apr	21-Apr	Introduction to Meta-analysis, bioethics part II, Sensitivity and Specificity
15	22-Apr	24-Apr	Short week Review material/ catch up
	25-Apr	26-Apr	READING DAYS
	27-Apr	3-Apr	FINAL EXAM DAYS DATE to be announced.

Grading:

Grades will be determined by the composite of 4 primary sources:

A: -30% ONLINE OR TAKE HOME ASSIGNMENTS: will be determined on the basis of weekly take home exercises that are provided on the CANVAS. Approximately 12-15 take home assignments will given throughout the semester that are comprised of exercises on EXCEL or JMP or other kinds of online quizzes. I generally eliminate the bottom 2 scores at the end of the semester. The remaining scores are averaged for the final grade. These assignments, along with reading assignments, have been targeted to require an average of 3 h of outside work per week. Some weeks may require more or less than that.

B: -10% CLASS PARTICIPATION. Science is dialogue and an important part of the education in being or thinking like a scientist or professional is to learn to be comfortable asking questions and participating (even when you think you don't have anything to say). Most of this will be online discussion which I will explain as we go. Essentially all students will start with full credit and will lose credit only with lack of preparation for class and for scheduled online interactions.

C: -30% RESEARCH DESIGN Each student will develop an independent research project, with a complete research design on the topic of their choice. We will be working on this project throughout the semester, from the first few weeks, so it should be an outcome of work you have done throughout the semester. For students who are actively doing research, it is advisable that they work with their advisors to determine a suitable subject to explore for this purpose.

D: -30% EXAMS (3 exams). The midterms will cover all material to the week before the exam and the final will be comprehensive but OPEN BOOK. Questions for midterms will be multiple choice based on conceptual material and problem solving, with less emphasis on memory. Grades for these exams may be scaled, depending on the type and difficulty of the exam administered. I like to generate challenging exams which allows me to scale the scores to a median of 90 (a B), if needed.

FINAL GRADE: Though Canvas will keep track of your raw grades and will allow you to compare against other students. However, your final grade is not at all accurately determined by CANVAS. Please don't pay attention to it. At the end of the course, I will calculate a final score as a fraction of the total 100 points available in each category. That is:

$$\text{Final Score} = . A*30\% + B*10\% + C*30\% + D*30\%.$$

Final grades will be rounded off to the closest integer, and the final letter grade will be determined using the common grading scale that includes minus grades, as follows:

Letter Grade	Grade Point	Percentage
A	4.0	94 - 100%
A-	3.7	90 - 93%
B+	3.3	87 - 89%
B	3.0	83 - 86%
B-	2.7	80 - 83%
C+	2.3	77 - 79%
C	2.0	73 - 76%
C-	1.7	70 - 72%
D+	1.3	67 - 79%
D	1.0	60 - 66%
F	0.0	0 - 59%

In general, students who perform the work that is asked and come to me for help when they are having problems can expect to earn a good grade. The class requires diligence and keeping up with the assignments on a weekly basis. Those who work hard and master the material will do well. **However, I do not recommend that you get behind or miss assignments.** There is a lot of work in this class and it can be unforgiving.

Please refer to the current regulations regarding UF grading policy for more information:

<https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

Students with Disabilities:

Students requesting classroom accommodation must first register with the "Dean of Student's Office" The Dean of students Office will then provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation."

Policy on Missing Class or Exams and Classroom Demeanor:

To be excused from exams you will require a note from the doctor or from an official at the University or your place of employment who has required that you work in some other capacity at that specific time. Your request to be excused needs to reach me by email BEFORE the exam and I will investigate it and make a decision PRIOR to the exam.

For more information on University rules for attendance: see <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

If you feel need for taking advantage of the University counseling services or mental health services, please call 392-1575 <https://counseling.ufl.edu/>

The University Police can be contacted at 392-1111 or 911 for emergencies.

I am tolerant of special needs. So, contact me if you feel you need extra help or extra time in exams, or extra time to complete an assignment.

Policy on Ethics and Plagiarism

One of the most important components of this course is learning the ethical conduct of science and scholarship. Topics such as plagiarism and bioethics will be discussed extensively in class but students are expected at this level to know what plagiarism and cheating are and how to avoid them. If you are in doubt as to what plagiarism or appropriate conduct is, please visit the UF website Student Honor code.

<https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>

Plagiarism is defined by the University as

A Student must not represent as the Student's own work all or any portion of the work of another. Plagiarism includes but is not limited to:

- 1. Stealing, misquoting, insufficiently paraphrasing, or patch-writing.
- 2. Self-plagiarism, which is the reuse of the Student's own submitted work, or the simultaneous submission of the Student's own work, without the full and clear acknowledgment and permission of the Faculty to whom it is submitted.
- 3. Submitting materials from any source without proper attribution.
- 4. Submitting a document, assignment, or material that, in whole or in part, is identical or substantially identical to a document or assignment the Student did not author.

For written assignments, the instructor submits all material to TURNITIN.com, which is designed to determine whether what you have written is original material. Penalties for plagiarism will be enforced in this class. It may have extreme consequences on your grade, depending on the severity of the infraction. Understanding this aspect of scholarship is required to prepare you as professional, in whatever field you choose.

Furthermore, you are obliged to report any condition that facilitates academic misconduct in others. Please contact me directly if you have any concerns about ongoing misconduct.

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course based on 10 criteria. Please do this, it is extremely important. These evaluations are conducted online at <https://evaluations.ufl.edu>. Evaluations are typically open during the last 2-3 weeks of the semester but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu>. Good participation in these evaluations are extremely important for maintaining and improving the quality of coursework at UF. Consider it a privilege to participate in UF's future by doing your evaluations. The outcome of these are used in many ways to make this a better environment for you and future students.

Textbooks, Computers and Software:

There are no formal textbooks for this class. There may be some software requirements depending on what computer you have but these should be very inexpensive. However, for each topic of the class, extensive reference material will be available on CANVAS. In addition, I will often refer to an online text that is excellent at given you practical statistics solutions and examples: The Handbook of Biological Statistics, by John H McDonald, at Delaware University, an outgrowth and supported by the Howard Hughes Medical Institute for Undergraduate Science Education.

Software: Intermittently throughout the course, students will be requested to download software, preferably to a PC computer but all programs are also applicable in some way to MAC, though sometimes cumbersome.

The class will be taught using a Microsoft/Office 2016 or newer format. If you need to, please use the very inexpensive upgrade of your MS Office software that the University provides. You can get the downloads free at <https://it.ufl.edu/services/gatorcloud-microsoft-office-online> or for a small cost you can upgrade using CDs at the bookstore (\approx \$15).

EXCEL: Throughout the course we will use exclusively EXCEL for analysis. EXCEL is always good to know well as it is a bread-and-butter analytical system to get analytical data and graphics quickly in your projects.

ZOTERO: All students will learn and download an online reference manager software program called Zotero (<https://www.zotero.org/>.) It can be used with most browsers and WORD. We will be going through this during workshops in class.

SAS JMP we will use extensively. The software is free for UF students from <https://software.ufl.edu/software.html> You will be able to renew yearly licenses as long as you are a UF student.

Course Objectives:

By the end of the course students should have acquired the following knowledge:

- 1) To understand fundamental principles of philosophy of science, inductive reasoning and hypothesis testing.
- 2) To build effective scientific goals and to generate scientific hypotheses. To understand the basis of critical thinking and building an argument to defend or challenge a “case” or thesis.
- 3) To develop different approaches to solving scientific problems, to designing an experimental plan, including selection of appropriate controls, numbers of subjects needed, etc
- 4) To develop effective techniques for evaluating and finding scientific literature using online databases.
- 5) To develop familiarity with basic problems of research ethics and responsible conduct of human and animal research.
- 6) To learn how to avoid plagiarism and to perform scholarly activities and data analysis in an ethical, accurate and professional manner.

- 7) To develop effective approaches to essential data analysis and statistics, including descriptive statistics, comparison of means, ANOVA, linear and nonlinear regression and multivariate analyses.
- 8) To develop effective scientific writing styles that can communicate your point succinctly and completely in a way that convinces others.
- 9) To learn about the publishing industry, how it works, how academics are evaluated by their publications.

By the end of the course the students should have acquired competency in the following skills:

- 10) Effective use of research databases for searching scientific literature (PubMed, SciFinder, Citation Index, etc.).
- 11) Ability to use reference database programs such as Zotero, Reference Manager, Endnote or equivalent in generating bibliographies for manuscripts and assignments.
- 12) Ability to use EXCEL for producing a variety of scientific graphs, linear and nonlinear regression methods, data fitting, etc.
- 13) Effective use of EXCEL spreadsheets for generating, storing and making calculations on scientific data and doing basic statistics.
- 14) Ability to develop a scientific plan and background using succinct scientific writing and a logical, convincing framework.
- 15) Expertise in utilizing a modern statistical program for data analysis and in solving statistical problems, e.g. SAS JMP
- 16) Ability to a scientific plan and background using succinct scientific writing and a logical, convincing framework.