Graduate Level Research Methods
HLP 6535 'Class number' 18892
Sect 1F25 Fall 2018
Course Syllabus

Classroom: FLG 224 1864 Stadium Rd
Class time: Mondays Periods 2-4 8:30 – 11:30
(Note: Most weeks we will meet for only 1 hour, to be determined by class preference. The rest of the course will be online material)

Instructor: **Thomas Clanton, Ph.D.**
Professor and Chair: Department of Applied Physiology & Kinesiology
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Email: tclanton@hhp.ufl.edu

Office Hours: Most Mondays during class time, or by email appointment.
Email questions or appointments are generally answered promptly. Prefer you email me through CANVAS.

Please note that approximately 2 hours per week will be online material and 1 hour of in class discussion and workshops.

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 or clinical laboratory. For M.S. students the course should provide you with sufficient background 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 to effectively use EXCEL software for data manipulation, graphics and statistical analysis. Grad 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. Having both EXCEL skills and skills in generating bibliographies and scholarly documents will be useful to you throughout your life and will open job opportunities for you that you would not be eligible for.

Two thirds 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 one or several online lectures and usually some kind of class assignments and assessments within Canvas. Because of the extent of online material (this is a flipped class), on most weeks, there will be only one hour of formal classroom interaction. You are expected to attend these sessions and participation will be counted towards your grade.

Tentative Course Schedule

Class Schedule		Fall Semester 2018 Research Methods Grad Level			
Day	**Date**	**Week #**	**Topic Schedule: NOTE: Subject to change**	**2nd Hour Topic**	**3rd hour Topic**
Monday	27-Aug	Week 1	How to approach Scientific Problems	Origins of Creativity	How to choose a research project to work on
Monday	3-Sep	Labor Day Holiday		Using Pubmed and Other Databases	Download JMP: Ex 1. Using JMP
Monday	10-Sep	Week 2	Describing data populations: Descriptive stats	Describing Variability in populations.	The Science of building an argument
Monday	17-Sep	Week 3	Comparing Normally distributed populations	Using ZOTERO	Review of a Research Paper in Class
Monday	24-Sep	Week 4	Comparing populations not normally distributed	Correct Citation of scholarly work workshop	
Monday	1-Oct	Week 5	Midterm Exam	Comparing populations of nominal and ordinal variables	Overview of Experimental Design 1
Monday	8-Oct	Week 6	Overview of Experimental Design 2	Workshop on Aims-hypothesis and Title development	Review of Research Paper in Class
Monday	15-Oct	Week 7	Introduction to linear regression	Workshop on Sensitivity and Validity testing	Discussion of Projects in class
Monday	22-Oct	Week 8	Care and handling of Data worksop-ethics	Linear Transformation of Data - Graphics	Manuscript review
Monday	29-Oct	Week 9	Descriptive-Qualitative Research 1	Descriptive-Qualitative Research 2	Problem solving session-review for midterm
Monday	5-Nov	Week 10	Midterm Exam	Nonlinear regression approach	Outline of Experimental Plan workshop
Monday	12-Nov	Veterans day Holiday		Introduction to ANOVA I	Workshop on Bioethics of Human Research
Monday	19-Nov	Week 11	ANOVA II -AN COVA and Repeated Measures	ANOVA II Logistic Regression	In class discussion of Projects
Monday	26-Nov	Week 12	Introduction to Meta-analysis Review	Workshop on the Writing and publishing industry	Manuscript Review
Monday	3-Dec	Week 13	Calculating sample size	Introduction to Principle Component Analysis	Review for Final Exam-Problem Solving Session
Sunday	7-Dec	Deadline for Research Plan Submission			
Wed	12-Dec	3-5 PM	Final Exam (comprehensive)		

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). Some of this will be online, but at least one hour per week we will meet. Therefore, an important part of your grade will be determined via class discussion and attendance for specific in-class or online activities. Essentially all students will start with full credit and will lose credit only with unexcused absence or lack of preparation for class.

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. (We may decide to have the final open book, we will discuss in class). 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, 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:

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/ugrad/current/regulations/info/grades.aspx

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:

Though I do not often take attendance, I expect students to show up, particularly if there is a participation project or discussion that day. You will be excused from class if you have a legitimate reason to be gone. All I ask is that you send me an email before class starts as to why you need to miss the class. Please don't come

if you are sick. That email is dated and I can keep a record of it. Please note: the University has specific reasons that are acceptable for missing class are listed at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx:
Briefly, "In general, acceptable reasons for absence from or failure to participate in class include illness, serious family emergencies, special curricular requirements (e.g., judging trips, field trips, professional conferences), military obligation, severe weather conditions, religious holidays and participation in official university activities such as music performances, athletic competition or debate. Absences from class for court-imposed legal obligations (e.g., jury duty or subpoena) must be excused. Other reasons also may be approved."
In recent years I have heard excuses like: "I had to miss class because someone left me at the beach over the weekend", "I had such a bad hangover" (does not constitute sickness), "I just am not a morning person", "I had to leave early this week because I bought my flight to go home a month ago." These or similar excuses won't work for me.

To be excused from exams you will require a note from the doctor or from a University official who has required that you work in some other capacity for the University 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 at a later time.

If you feel need for taking advantage of the University counseling services or mental health services, please call 392-1575 http://www.counseling.ufl.edu/cwc/Default.aspx

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

In general I do not discourage you from having cell phones or computers in class, in fact I very much encourage you to bring your computer to follow along with the workshops and assignments. However, please put your phone on "silent" or airplane mode during class and do not answer the phone or respond to a text message during class. If whatever you are doing is disturbing the class or me, I will ask you to leave.

I am tolerant of special needs. So, come to me if you feel you need extra help or extra time to completing 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 will be discussed extensively in class but students are expected at this level to know what plagiarism is and how to avoid it. If you are in doubt as to what plagiarism is, please visit the UF website: http://web.uflib.ufl.edu/msl/07b/studentplagiarism.html

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.

Please review the UF Honor Pledge Code for students https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/ which specifies a number of behaviors that are in violation of the code and possible sanctions. 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 UFs 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 <u>skills</u>:

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.