Scientific Thinking: Research Design and Methods
International Edition
Summer 2019

Instructor Information
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Office Hours: by appointment

Type of Class Arrangement: G or H

Course Language: English and/or Spanish

Course Description
This course explores how science generates new knowledge, how to evaluate the applicability of research results in your professional work, and how to assess whether science-based claims are justified. The international version of this class includes a module on aspects relevant to conducting cross-cultural and comparative studies with humans in the social sciences, and a hands-on workshop on How to successfully publish your academic work international journals. No prerequisites are listed for this class.

Course Goals
- Improve your ability to determine the degree to which you can apply reported research findings in your professional work, including needs assessment, program planning, and evaluation;
- Prepare you to create reliable research findings in order to reach science-based conclusions, including research, needs assessment, program planning, and evaluation; and
- Enhance your ability to assess science-based claims in order to make decisions in your personal and professional life.

Course Objectives -- After completing this course, you will be able to:
1. Identify and use scientifically credible sources of information in your professional work;
2. Evaluate the empirical evidence and conclusions reached in applied research about social problems, issues and needs with an emphasis on internal and external validity and explanatory power;
3. Assess the degree to which sampling procedures described in the research, program planning, and evaluation literature are appropriate and likely to produce reliable and useful research findings and conclusions;
4. Create your own sampling protocols with a focus on needs identification and program evaluation;
5. Interpret and evaluate the rigor of the qualitative and quantitative data analysis procedures reported in the research, needs assessment, program planning, and evaluation literature;

6. Select appropriate analytic procedures for your own needs assessments, program planning and evaluation;

7. Assess the strengths and weaknesses of research designs in the research literature that we use to inform practice, including the literature regarding needs assessments, program planning and evaluation of interventions like educational programs; and

8. Select appropriate designs, based on the nature of the research question, to use in your own work, with a focus on needs assessment, program planning, and evaluation.

What I Have Learned about Success in This Course

- Prior training with research methods, particularly as an undergraduate, is not critical to success because research **design** and research **methods** differ greatly.

- Some background in research methods **may** help you gain command of the **language of research.**

- You **do not need prior experience or knowledge of statistics or any other form of data analysis** to succeed in this course, although you need some familiarity with very basic statistical concepts like the mean, the standard deviation, and significance. If you do not have this familiarity, consult the following resources:

  ➤ http://www.statisticshowto.com/statistics-basics/

  ➤ https://www.mv.helsinki.fi/home/jmisotal/BoS.pdf

  ➤ http://www.abs.gov.au/websitedbs/a3121120.nsf/home/statistical+language+-+measures+of+spread

  ➤ https://www.khanacademy.org/math/probability/data-distributions-a1/summarizing-spread-distributions/a/range-and-interquartile-range-worksheet

  ➤ http://www2.le.ac.uk/offices/ld/resources/numerical-data/variability

- My experience is that **class standing is not a predictor of success in this class**. Contrary to popular belief, grades in this class tend to be fairly high.

- Students who **fall behind** on assignments are **unlikely** to succeed in the class. This is particularly true in the Distance Education setting.

- Students who do **not consult with me when they are confused** are **unlikely** to succeed in the class.

Approach and Expectations

Pay attention to the specific performance criteria for every assignment. It is impossible to perform well on assignments if you do not understand the evaluation criteria. I provide a list of the performance criteria you need to achieve to receive full points for every assignment. While there are similarities, the criteria *differ for different assignments. Examine the performance criteria BEFORE you start the assignment.*

Focus on thinking, not reciting rote answers or repeating what others have said or written, including what I say and write. Your performance in this course focuses on your ability to apply the concepts that we address during the course. Devoting time, attention and thought to your assignments is critical to success. I expect you to develop and demonstrate analytical and critical thinking skills during this course. Both are central to science and are prerequisites for using science to develop new knowledge and to apply effectively the knowledge generated by science. In practical terms, this means that I am **NOT** looking for rote answers to the questions I ask. Rather, I want to see that you can apply the concepts that we discuss to analyze and evaluate research studies and to develop your own studies, including needs assessments, program planning, and evaluation. Simply repeating what you hear or read will earn 0 points for most evaluation criteria.

I do not grade by page length. Almost every year, I end up telling students to spend **less** time on my assignments. If you read efficiently (which we will practice), use all of the materials I provide, and practice "thinking before writing," you will be able to respond much more quickly and effectively to my questions. It's quality, not quantity.

Use, cite and reference the research design literature. This is a graduate course. I assume that you have enrolled in this course because you want to acquire the knowledge and skills needed to conduct your own research or evaluation and apply research findings in a professional capacity. I use a combination of assigned readings, self-directed exploration of the literature and classroom activities to try to create an environment in which you can gain the critical skills and knowledge you need. Taking advantage of these opportunities is your responsibility. I expect you to provide evidence in the form of citations in assignments and class participation that you have used the resources, including the texts, my lecture material, our class activities, and materials that you find for yourself, to maximize your learning experience.

- *Use* means indicate what ideas or concepts or conclusions in a specific resource that you relied upon – that you *used the material* in some way. I do not want the long list of citations with no indication of how you used the material to develop your own conclusions like this one: "Several authors (Jones, 2013; Smith, 2004; Williams, 2001) discuss random sampling." What was it that you learned and applied from Jones, from Smith, and from Williams? *Be specific and explain how you used the resource.* Example: "I considered Smith's comments about the role of sample size in random sampling, which I found somewhat confusing. Jones' explanation of the differences between a true random sample (what I believe Smith means) and the best achievable standard for a random sample (the pragmatic answer as Jones calls it) helped me understand how to determine a sample size that is achievable and still provides a good basis for generalization of results."

- *Cite* means that you place a citation in the body of your response using APA style. Be very careful to give full credit to authors when you "borrow" their ideas. Cite the author. You probably know that you need to provide authors name, date of publication and *page number* when you quote an author. However, paraphrasing – just changing a few words or saying "more or less" exactly what an author said also requires use of the page numbers. Even general references to an author's ideas require citation. Your continued enrollment in this course indicates your pledge to comply with all UF policies, including UF policies regarding plagiarism. UF takes this very seriously and the UF graduate school and all graduate departments have stringent plagiarism policies. If you are unaware of those policies and of the basic definition of plagiarism, go to http://graduateschool.ufl.edu/personnel-and-policy/mentoring. If in doubt – cite and cite fully including page numbers.

- *Reference* means that you provide a full reference to the original work at the end of the assignment. Include all the materials that you cite. If you are not familiar with APA style, you probably need to buy the style manual since most sciences use this format. You can take a tutorial on APA style at http://www.apastyle.org/learn/tutorials/basics-tutorial.aspx. I see one common error very often having to do with journal versus internet citation form. (1) Only use the APA style for *internet documents* if the material you cite is in html form and is therefore *subject to change over time*. In this case, you have to provide the URL and the date you downloaded the information. This is because html documents change over time. (2) Do *NOT use this format when you download a journal article*. Use the journal citation form.
Journal articles – whether you get them in hard copy from a physical location in the library or download the electronic copy from the publisher – *do not change over time.*

Go beyond required readings. It is critical that you explore the body of literature about research design beyond required readings to complete assignments. I base my evaluation of your performance, in part, on the degree to which you provide evidence that you have taken responsibility for your own learning experience and that you are actively seeking out all of the resources possible to make the learning experience as profound and meaningful as possible. You will see that this is a performance criterion for most assignments. Some students routinely lose 20% of the points on an assignment because they fail to meet this performance criterion. I do not tell you how many references to include. For some assignments, the answer might be five or six items and for others ten or twelve, and for others two. You have consulted "enough" literature about research design *when you can demonstrate that you fully understand and can apply the concepts at issue to your own work*.

Participate fully in class. You should read the material in the texts or other assigned readings **before** class. I base my comments in class and the class exercises on the assumption that you already know the material in the assigned readings. Our class activities, including my comments, will build upon and extend your competence in each topical area. **If you cannot participate in the on-line discussion every Thursday from 6:00 to 7:30 PM EST, you will be able to complete on-line exercises to earn points for class participation.** However, I strongly encourage you to participate in the on-line discussions because students who do so perform better in the class. There is no substitute for direct contact with the instructor and

other students and an opportunity to get your questions answered in person.

Required Materials and Readings
Most of the additional readings for the course consist of research journal articles that can be accessed through the library databases, often free of change. Some are chapters of books of mine that I have placed on e-reserve. I also provide a list of suggested readings for most topics. These will be useful in completing the assignments.

Grading Philosophy and Approach
My goal is for every student to earn an A in this course. I expect to see increased mastery of the concepts and ideas that we discuss as we progress through the course. Therefore, expectations grow as the semester progresses and what was an acceptable or adequate response on an early assignment will most likely **not** be acceptable on a later assignment. I will provide comments for every assignment, in addition to a numerical score. My intent is to help you recognize both the weaknesses *and* the strengths in your submissions – which will help you improve performance on future assignments. However, I have two sections in this class and my time is limited. I'm sure I will end up concentrating more on telling you how to improve than congratulating you on the things you did well. Please accept my apology for the "biased" nature of the comments you will probably get.

Late Submission Policy
I reserve the right to refuse to accept work submitted after the due date. I will award zero (0) points for any assignment that is submitted after the due. All due dates are given at the class web site.

Where to Find Reference Materials
Most disciplines support several journals. You need to learn to use **research journals.** Many journals report research, but there are important differences between them in terms of the audience for which they are intended. A research journal means just what it says. The primary audience for the material is other researchers. These journals are of the quality that you will use throughout your graduate experience and your employer after graduation will expect you to know these journals in your area of expertise and use them regularly. Whatever your undergraduate experience, relying on popular web sites is **not acceptable** in graduate school or in professional work.

However, even among research journals, the scholarly sophistication of the material they contain varies. High impact research journals are internationally recognized. See http://guides.uflib.ufl.edu/content.php?pid=320458&sid=2761617 where the library system explains the impact factor for journals and how to find it. This site also explains how to find other important indicators like the article influence or immediacy index score. High impact journals are always peer reviewed. They report original research findings. They do not accept material published elsewhere. The articles they publish provide an in-depth description of the research design and sampling protocol, the methods of data collection and analysis, and the findings of the research. Both non-profit (professional societies mostly) and for-profit presses publish very good research journals. Most professional societies and for-profit publishers also produce journals for practitioners. They, too, are normally peer reviewed, but they are often

usually less scholarly in nature than the high impact research journals. They often focus on the recommendations that grow out of research, but do not provide a detailed description of the research design, sampling, analytic processes and results. Do not use these journals in this class. Other journals are for a general public readership. You should **not** rely on these publications in this class or in your work as a professional.

How can you identify a research journal? You can always consult with me or other faculty members in your area of interest to identify appropriate journals, but you need to develop the ability to judge the quality of journals yourself. Several characteristics distinguish between high quality journals and other kinds of publications. First, in research journals, the majority of the articles will report original research results. Opinion pieces, reviews and the like will be a minor component in the content of any given issue. Second, the articles will be written for a sophisticated reader. You can see this by the use of technical terms, for example. Perhaps most telling, research reports in these journals explain research design, sampling and methodology in detail. They include a thorough analysis of the results. Third, the research reports focus on the results and implications of the research (the knowledge created) rather than on recommendations for how to apply or use the findings. Finally, the description of the journal (somewhere near the very front) will give clear clues. Look for words like scholarly, cutting-edge, and international interest.

Lower impact journals do not aim their material at such a research audience. The audience might be the family practice doctor rather than the doctor at a research hospital or the school camp counselor rather than the professional whose work focuses on interventions for problematic adolescent behaviors. Articles in these journals often provide only a brief description of research design and methodology. The section about data analysis is usually not well developed and the results are typically in summary form, not detail. These journals often focus on recommendations for applying research findings, not how the research advances knowledge. They often do not provide enough information to make an adequate evaluation of the degree to which their findings are justified or the degree to which they can be applied outside the context in which the study was conducted.

Grading Scale For information on current UF policies for assigning grade points, see
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

A	95 – 100%	**A-**	90-94%		
B+	87-89%	**B**	83-86%	**B-**	80-82%
C+	77-79%	**C**	73-76%	**C-**	70-72%
D+	67-69%	**D**	63-66%	**D-**	60-62%
E	<60%				

Distribution of Grade	Possible Points
Class Preparation & Participation	100
Quizzes	200
Ethics Training	50

Assignment 1: The Research Question & Conclusions	100
Assignment 2/3: Sampling and Data Analysis COMBINED* (150 each)	300
Assignment 4: Experiment	250
Total	1000

ALL SUBMISSIONS DUE AT 8:00 PM ON THE DATE INDICATED

Class Preparation and Participation. I expect you to demonstrate through your comments during class meetings or in postings that substitute for attendance that you have prepared for class. I want you to read the assigned materials *quickly and efficiently to gain a few key ideas,* not the word-by-word with yellow highlighter approach you may be used to using. I provide a study guide for most of the additional required readings available at the weekly website. Look at the study guides *before you read* the material. Literally "look for the answers" to those questions as you read. There are almost always key ideas that I want you to get from an assigned reading. There will be lots of topics and ideas covered in most readings that I simply do not think are important enough to ask about – **skim those sections.** I indicate other specific preparation for class for most weeks.

Assignments. You will complete four assignments. Detailed instructions are provided at the course website.

Quizzes. There are quizzes each week **except** weeks when an assignment is due. These quizzes are based on the required readings. The quiz with the lowest grade will be discarded in the final grade calculation.

Topical Schedule

Modules	Topic
1	Introductions
2	Science & Scientific Reasoning	Theory & Science
3	The Research Questions
4	Assessing the Validity of Scientific Conclusions
5	Types of Samples
6	Implications of Samples for Scientific Conclusions
7	Data Analysis Using Statistics
8	Data Analysis Using Qualitative Techniques
9	Types of Designs
10	Designs with Interventions: True & Quasi-Experiments
11	Cross-Sectional Designs
12	Longitudinal Designs
13	Case Studies
14	Conducting cross-cultural and comparative studies with humans: methodological and ethical considerations.

15	**Hand-on workshop** How to successfully publish your academic work international journals (part 1) • Structure of a manuscript • Formulating research questions • Purpose of the study, rational, and contribution to the body of knowledge • Hypotheses • Background and Literature review
16	**Hand-on workshop** How to successfully publish your academic work international journals (part 2) • Methodology: research design, sample, measurement and instrumentation of variables (validity, reliability and fairness), and analysis • Communicating your results effectively • Conclusion, implications and limitations • Bibliography • How to select target journals and guidelines for publications

Class Policies Attendance and

Make-Up Work
Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx.

Online Course Evaluation Process
Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. These evaluations are conducted online via Qualtrics.

Academic Honesty
As a student in my class, you have committed yourself to uphold the Honor Code, which includes the following pledge: "*We pledge to hold ourselves and our peers to the highest standards of honesty and integrity."* It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel.

Software Use
All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.