

## RESEARCH METHODS

**APK 4050: 10720 ~ 3 CREDITS ~ SPRING 2020**

**INSTRUCTOR:** James Cauraugh, Ph.D.  
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Preferred Method of Contact: Face to face in class or email

**OFFICE HOURS:** Tuesday 4:30 – 6:30 PM; Thursday 3:00 – 4:00 PM in 129 FLG

**MEETING TIME/LOCATION:** 245 FLG, Monday, Wednesday, & Friday, 9<sup>th</sup> period (4:05 – 4:50 PM)

**COURSE DESCRIPTION:** The course provides an understanding of basic research methods and statistical analysis techniques used in applied physiology and kinesiology. Students will demonstrate their knowledge of the course materials by analyzing, interpreting and summarizing research writing in professional journals, and by planning a research study.

**PREREQUISITE KNOWLEDGE AND SKILLS:** APK major with 3, 4, 6 or 7 classification

**REQUIRED TEXT BOOKS: TWO E-BOOKS**

1. Strunk, W., & White, E. B. (2000). *The elements of style* (4th ed.). New York: Macmillan (eBook).
2. Cauraugh, J. H. (2017). *Research Methods: Functional Skills – Second Edition*. ISBN: 978-1-939337-34-4 (eBook).

**COURSE FORMAT:** Mondays and Wednesdays are days for lectures, interactions, and active learning. This process involves students answering questions, solving problems, and discussing science topics. Prepared students read the required *Research Methods*

eBook and integrate the information into their interests in APK. Expect to be asked at least one question a day. Fridays are individual learning days and journal tasks.

**COURSE LEARNING OBJECTIVES:** By the end of this course, students should be able to:

1. Identify and apply the steps involved in the scientific method
2. Critique research articles and determine the quality of publications
3. Evaluate experimental designs and choose appropriate statistics to analyze data
4. Visually and verbally present experimental designs, data, and findings
5. Formulate a research question, generate a research hypothesis, and design a study to address the question
6. Identify issues related to methodology and discuss guidelines to improve scientific rigor and reproducibility
7. Discuss issues related to research ethics and responsible conduct of human and animal research
8. Outline the processes related to manuscript reviews, writing, authorship, and journal impact factors
9. Conduct a literature search and manage references

## COURSE AND UNIVERSITY POLICIES:

**ATTENDANCE POLICY:** Class attendance is expected. Even though no points are earned for attending class, students who are able to answer questions on specific concepts discussed in lectures do well in this course.

**PERSONAL CONDUCT POLICY:** UF students are bound by *The Honor Pledge*, which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at UF, the following pledge is either required or implied: **“On my honor, I have neither given nor received unauthorized aid in doing this assignment.”**”

The Honor Code (<http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions.

Students in Research Methods will exhibit behaviors that reflect highly upon themselves and our University. Furthermore, you are obliged to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult the professor in this class.

**EXAM MAKE-UP POLICY:** Students will take four examinations on the scheduled dates. If an emergency arises on an exam date, then a make-up exam must be scheduled as soon as possible. Requirements for make-up exams, assignments, and other work in this course are consistent with university policies that can be found in the online catalog at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

**ACCOMMODATING STUDENTS WITH DISABILITIES:** Students requesting accommodation for disabilities must first register with the Dean of Students Office (<http://www.dso.ufl.edu/drc/>). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the professor when requesting accommodation. You must submit this documentation before taking exams. Accommodations are not retroactive; therefore, students should contact the office early in the semester. Arrangements will be made for taking exams in consultation with the professor.

**COURSE EVALUATION:** Students providing feedback on the quality of instruction is important. Please complete a course evaluation online near the end of the semester at <https://ufl.bluera.com/ufl/>

## GETTING HELP:

### *Health and Wellness*

- U Matter, We Care: If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) or 352 392-1575
- Counseling and Wellness Center: <https://counseling.ufl.edu/>, 352-392-1575
- Sexual Assault Recovery Services (SARS) - Student Health Care Center, 392-1161
- University Police Department, 392-1111 (or 9-1-1 for emergencies)  
<http://www.police.ufl.edu/>

### *Academic Resources*

- E-learning technical support, 352-392-4357 (select option 2) or e-mail to [Learning-support@ufl.edu](mailto:Learning-support@ufl.edu). <https://lss.at.ufl.edu/help.shtml>
- Career Connections Center, Reitz Union, 392-1601. Career assistance and counseling. <https://career.ufl.edu/>
- Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.
- Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. <http://teachingcenter.ufl.edu/>
- Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. <http://writing.ufl.edu/writing-studio/>

- Student Complaints On-Campus: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/> On-Line Students Complaints: <http://distance.ufl.edu/student-complaint-process/>

**Informational Items**

1. Official UF holiday; no classes or exams:
  - a. Martin Luther King Jr. Day, Monday, January 20, 2020
  - b. Spring Break, March 2 – 6, 2020
  - c. Reading Days, Thursday and Friday, April 23 & 24: no Final Exams or papers due

**GRADING:**

	<u>Points</u>
Science Journals (12 entries)	4
<i>Exam 1: February 5, Wednesday</i>	25
<i>Exam 2: February 26, Wednesday</i>	23
<i>Exam 3: April 1, Wednesday</i>	23
<i>Exam 4: April 27, Monday</i>	25
(Comprehensive Final: 10:00 AM – 12:00 PM)	—
<b>Total</b>	<b>100</b>

Before each exam, we will discuss the exact format.

**GRADING SCALE:**

Letter Grade	Total Points Required to Earn Each Letter Grade
A	≥ 93
A-	90
B+	89
B	83
B-	80
C+	79
C	73
C-	70
D+	69
D	63
D-	60
E	≤59

Please note that no extra credit is available for this course. Previous students who submitted 12 science journal entries and scored well on the four exams accumulated enough points to excel.

UF's catalog provides detailed information regarding current UF grading policies: <https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>. Requests for exceptions to these grading policies may be interpreted as an honor code violation and will be addressed accordingly.

## WEEKLY COURSE SCHEDULE: READING SCHEDULE AND CONTENT

Exam questions are based on the two eBooks: *Research Methods: Functional Skills* (2<sup>nd</sup> ed.) and *The Elements of Style*. Thus, no PowerPoint slides are posted for the course.

*Note: the content for any exam may change depending on class interactions and apparent course progress.*

Strunk, W., & White, E. B. (2000). *The elements of style* (4th ed.). New York: Macmillan (eBook).  
Read the whole book for writing questions on the first two exams.

See the Science Journal file: specific tasks required for the weekly Journal Entries (1 – 12).

Week	Date	<i>Research Methods: Functional Skills</i> (2 <sup>nd</sup> ed.); Chapter	Content
1	Jan. 6, Monday	Syllabus	Course Overview
	Jan. 8, Wed.	Preface	Approach to Science & Picture Day
	Jan. 10, Friday	Steven Johnson: <i>Where good ideas come from</i>	Science Journal Entry: 1
2	Jan. 13, Mon.	Chapter I. Introduction	Type of Research: Causal Effects
	Jan. 15, Wed.		Science, Experimental Design, Variability, & Statistics
	Jan. 17, Friday	Margaret Heffernan: <i>Dare to disagree</i>	Science Journal Entry: 2

3	Jan. 20, Mon.	No class	Martin Luther King, Jr. Day
	Jan. 22, Wed.	<b>Chapter II.</b> Experimental Design	Independent Variables, Main Effects, & Interactions
	Jan. 24, Friday	Shawn Achor: <i><b>The happy secret to better work</b></i>	Science Journal Entry: 3
4	Jan. 27, Mon.	<b>Chap. III.</b> Exper. Design: Criteria & Five Designs	Designs Vary by Three Criteria; Exper. Designs & Statistical Analyses
	Jan. 29, Wed.		Visually Displaying Two-way Interactions
	Jan. 31, Friday	Greta Thunberg: <b>Speech Given at the UN Climate Action Summit 2019</b>	Science Journal Entry: 4
5	Feb. 3, Mon.	<b>Chap. III.</b> Exper. Design: Criteria & Five Designs	Confirm One-way & Two-Way Designs, Main Effects, & Interactions
	<b>Feb. 5, Wed.</b>	<b>Exam 1: 25 points</b>	
	Feb. 7, Friday	Search PubMed (US National Library of Medicine) and Plan a Study	Science Journal Entry: 5
6	Feb. 10, Mon.	<b>Chapter IV.</b> Hypothesis Testing & Statistical Significance	Statistical Significance, One-tailed & Two-tailed Tests
	Feb. 12, Wed.	<b>Chapter V.</b> Sections 5.1 – 5.7	Null & Alternative Hypotheses; Truth Table
	Feb. 14, Friday	Create an EndNote Library and Write an Abstract for Your Planned Study	Science Journal Entry: 6
7	Feb. 17, Mon.	<b>Chapter V.</b> Section 5.1	Pearson Product Moment Correlation & <b>Exchange Journals</b>
	Feb. 19, Wed.	<b>Chapter V.</b> Sections 5.2 – 5.4	F test (F ratio), F Table Critical Values, & ANOVA Summary
	Feb. 21, Friday	Bob Sallis: <i><b>Exercise as Medicine</b></i>	Science Journal Entry: 7

8	Feb. 24, Mon.	<b>Chapter V.</b> Section 5.5 – 5.6	Multiple Comparison Procedures: Post hoc analyses
	<b>Feb. 26, Wed.</b>	<b>Exam 2: 23 points</b>	<i>F</i> test ( <i>F</i> ratio), <i>F</i> Table Critical Values, & ANOVA Summary
	Feb. 28, Friday	Hans Rosling: <b><i>The best stats you've ever seen</i></b>	Science Journal Entry: 8
9	<b>March 2 – 6</b>	<b>Spring Break: No Classes</b>	
10	March 9, Mon.	Go over Exam 2	
	March 11, Wed.	<b>Chapter V.</b> Statistical Decisions: Parametric & Nonparametric Approaches (5.1 – 5.7)	<i>F</i> test & <i>t</i> Test Assumptions: When parametric & nonparametric Tests?
	March 13, Fri.	<b><i>The Price of Cool: Juul Vaping</i></b>	Science Journal Entry: 9
11	March 16, Mon.	<b>Chapter V.</b> Sections 5.8 – 5.14	Gaussian Distribution, Randomization, Parametric & Nonparametric Tests
	March 18, Wed.	<b>Chapter VIII.</b> Experimental & Quasi-Experimental Designs	Threats to Internal and External Validity
	March 20, Fri.	<b><i>How to win acceptances by psychology journals: 21 tips for better writing</i></b>	Science Journal Entry: 10
12	March 23, Mon.	<b>Chapter VIII.</b> Experimental & Quasi-Experimental Designs	Threats to Internal and External Validity
	March 25, Wed.	<b>Chapter VII.</b> Writing Suggestions	Practice Detecting Internal Validity Threats & Writing Critical Reviews
	March 27, Fri.	<b><i>America's New Tobacco Crisis: The Rich Stopped Smoking, the Poor Didn't</i></b>	Science Journal Entry: 11
13	March 30, Mon.		Review
	<b>April 1, Wed.</b>	<b>Exam 3: 23 points</b>	
	April 3, Fri	Dan Ariely: <b>How to change behavior for the better</b>	Science Journal Entry: 12

14	April 6, Mon.	Go over Exam 3	
	April 8, Wed.	<b>Chapter VI. Ethics &amp; Science</b>	Scientists Pledge, Violations & Consequences, Institutional Review Boards, & Historical Perspectives
	April 10, Fri.		Science Journals: Check Readability Statistics
15	April 13, Mon.	<b>Chapter IX. Covariate Analysis, Meta-Analysis, &amp; Multivariate Analyses</b>	ANCOVA, Meta-Analysis, & Regression
	April 15, Wed.	<b>Chapter X. Cornucopia</b>	Review
	<b>April 17, Fri.</b>	<b>Upload Science Journals to Canvas: 4 points</b>	<b>Save 12 entries in one file and upload</b>
16	April 20, Mon.	Review	
	April 22, Wed.	No lecture	Prepare for Finals
	<b>April 24, Fri.</b>	<b>Reading Day</b>	<b>No class, no projects, and no exams</b>
17	<b>April 27, Mon.</b>	<b>Final Comprehensive Exam: 25 points</b>	<b>10:00 – 11:59 AM</b>

## SUCCESS, MOTIVATIONAL PERSPECTIVE, & OATH FOR SCIENTISTS:

Your Research Methods experiences will be meaningful given that you actively use the information in the *eBook (Research Methods: Functional Skills, Second Edition)* as well as the information presented and discussed in lectures. Enjoy this exposure to the scientific arena. The teaching style of this course is primarily reciprocal interaction with frequent, relevant questions used to practice retrieval of concepts. You must be able to use this knowledge in different situations. Our frequent research interactions will be more enjoyable if you relax and expect that I will ask you at least one question every class. In this flipped classroom, you should read the *eBook* before class and be prepared to speak about scientific concepts while supporting your statements with logical thinking and empirical evidence. Student answers and questions are encouraged at any time during our interactions. Importantly, the information for this course is readily learned when students give sincere efforts and embrace the topics. **Be a student who attains her or his intellectual potential and do well!**

## **OATH FOR SCIENTISTS**

As I embark on my career as a scientist, I willingly pledge that I will represent my scientific profession honorably,

that I will conduct my research and my professional life in a manner that is always above reproach,

and that I will seek to incorporate the body of ethics and moral principles that constitute scientific integrity into all that I do.

I will strive always to ensure that the results of my research and other scientific activities ultimately benefit humanity and that they cause no harm.

With this affirmation, I pledge to acknowledge and honor the contributions of scientists who have preceded me, to seek truth and the advancement of knowledge in all my work, and to become a worthy role model deserving of respect by those who follow me.

Craig, C.R., et.al. *Science* 2003; 299.

**Research Methods: APK 4050, Section 10720**  
**Science Journal: Watching, Reading, Thinking, and Writing**

**Spring 2020 Semester Schedule for Fridays:**  
**TED Talks, YouTube, Searching, and Reading Articles**

- Lectures are given on Monday and Wednesday
- Fridays are individual learning days
- **Twelve activities are scheduled for Fridays this semester**
- Use your new RM knowledge while **Watching, Reading, Thinking, and Writing**
- Writing and thinking about science and RM outside of the class room is productive
- Here is an example of an interesting science journal entry on movement control after watching a video of elegant movements

How do we initiate, control, and terminate movements? Various movements such as walking, riding a bike, driving a car, writing, and exercising seem automatic with no apparent thought going into the exact sequence of movements before or during execution. When driving a car, I automatically push the clutch down, release the brake, turn on the ignition, and release the clutch. Seldom do I stall at traffic lights or fail to push the clutch in at the right time. Yes, today's cars are easier to drive than the stick shift I first drove on a back road. The required movements and car's response appear natural now. How did I reach an automatic phase of learning with the clutch and gas? How do motor control and neuroscience researchers investigate these types of learning and control questions?

Create one science journal file and save each entry. In March, you will send your file with your first six journal entries to a classmate for reading and a cursory review. At the same time, you will read a set of six journal entries written by a classmate. The evaluation criteria are writing style and organization. **To earn the full four points, you must complete three phases: (a) do journals 1 – 6, save in one file, and send them to a classmate for review, while you review her/his entries, (b) do journal entries 7 – 12, and (c) upload your science journal file with 12 entries at Assignments in Canvas by Friday, April 17, 2020.**

1. January 10: Summarize a TED Talk (Ideas Worth Spreading)
  - a. Steven Johnson: **Where good ideas come from**  
[http://www.ted.com/talks/steven\\_johnson\\_where\\_good\\_ideas\\_come\\_from](http://www.ted.com/talks/steven_johnson_where_good_ideas_come_from)
2. January 17: Summarize a TED Talk
  - a. Margaret Heffernan: **Dare to disagree**  
[http://www.ted.com/talks/margaret\\_heffernan\\_dare\\_to\\_disagree](http://www.ted.com/talks/margaret_heffernan_dare_to_disagree)
3. January 24: : Summarize a TED Talk
  - a. Shawn Achor: **The happy secret to better work**  
[http://www.ted.com/playlists/171/the\\_most\\_popular\\_talks\\_of\\_all](http://www.ted.com/playlists/171/the_most_popular_talks_of_all)  
(Number 17 on list of 20 most popular talks of all time)

4. January 31: Summarize a YouTube Talk
  - a. Greta Thunberg, Climate Activist: **Speech Given at the UN Climate Action Summit 2019**
  - b. <https://www.youtube.com/watch?v=KAJsdgTPJpU>  
September 23, 2019
  - c. What are you doing to save Mother Earth?
  - d. How could you decrease your carbon emissions?
  
5. February 7: : Search PubMed (US National Library of Medicine) and plan a study
  - a. Select a topic that interests you
  - b. What is the purpose of your study?
  - c. How is your purpose different from the literature?
  - d. Generate a research hypothesis
  
6. February 14: Create an EndNote Library and write an abstract
  - a. Compile a reference list of five articles on your topic
  - b. Download five articles into your EndNote library
  - c. Write an Abstract (500 words or less) on your topic
  
7. February 21: Summarize a YouTube Talk
  - a. Bob Sallis, former ACSM President: **Exercise as Medicine**  
[https://www.youtube.com/watch?v=luPzvjY55\\_8](https://www.youtube.com/watch?v=luPzvjY55_8)
  
8. February 28: Summarize a TED Talk
  - a. Hans Rosling: **The best stats you've ever seen**  
[http://www.ted.com/playlists/171/the\\_most\\_popular\\_talks\\_of\\_all](http://www.ted.com/playlists/171/the_most_popular_talks_of_all)  
(Number 15 on list of 20 most popular talks of all time)
  
9. March 13 : Summarize Jan Hoffman's *New York Times* article, November 16, 2018
  - a. **The Price of Cool: Juul Vaping**
  - b. *PDF is attached*
  
10. March 20: Summarize Sternberg's writing suggestions
  - a. **How to win acceptances by psychology journals: 21 tips for better writing**
  - b. *PDF is attached*
  
11. March 27: Summarize William Wan's *Washington Post* article, June 13, 2017
  - a. **America's New Tobacco Crisis: The Rich Stopped Smoking, the Poor Didn't**
  - b. *PDF is attached*
  
12. April 3: Summarize a TED Talk
  - a. Dan Ariely: **How to change behavior for the better**  
[https://www.ted.com/talks/dan\\_ariely\\_how\\_to\\_change\\_your\\_behavior\\_for\\_the\\_better#t-42425](https://www.ted.com/talks/dan_ariely_how_to_change_your_behavior_for_the_better#t-42425)

**April 17:** Upload your science journal file with 12 entries at Assignments in Canvas