

GMS 6848: Ensuring Rigor and Reproducibility in Clinical and Translational Research (1 credit hour; online)

SEMESTER: Summer B 2019

FORMAT: Online, Synchronous (through Canvas)

CREDITS: 1

COURSE WEBSITE: TBA

INSTRUCTOR:

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COURSE PREREQUISITES: GMS 6861 (Applied Biostatistics I), or equivalent

COURSE OVERVIEW:

This course introduces the principles and practices required to conduct rigorous and reproducible research across the translational spectrum. Rigor and reproducibility are quite appropriately receiving greater emphasis across all levels of research, and are receiving greater attention from scientific journals and funders of research alike. At the National Institutes for Health (NIH), rigor and reproducibility are being promoted in their guidance to grant applicants as well as grant reviewers

(<https://grants.nih.gov/reproducibility/index.htm>). The NIH is in fact implementing policies “requiring formal instruction in scientific rigor and transparency to enhance reproducibility for all individuals supported by institutional training grants, institutional career development awards, or individual fellowships.”

(<https://grants.nih.gov/grants/guide/notice-files/NOT-OD-16-034.html>). Thus, it is essential that researchers understand best practices in research to ensure rigor and reproducibility of their research. In this course, students learn these best practices, including sound study planning and design, consideration of all relevant biomedical variables, sound data management practices, statistical considerations and techniques, and transparency in reporting research results.

COURSE OBJECTIVES:

Teaching methods include readings, lecture (including audio and slides), online forum discussion, and assessment. Upon successful completion of this course, students should be able to:

- Understand the importance of rigor and reproducibility in research across the translational spectrum.
- Identify key characteristics, strengths, and weaknesses of various study designs necessary to ensure scientific rigor
- Recognize key biomedical variables necessary for a given research question
- Implement best practices in data collection and management
- Select appropriate data analysis techniques to ensure reproducible results
- Report and present results from a research study in a fully transparent manner

COURSE SCHEDULE (TENTATIVE):

Week	Dates (2019)	Topic	Readings	Quiz	Assignment
1	7/1-7/5	Introduction; General overview/motivation on rigor and reproducibility in research	TBD	1	Initial Assignment due 7/15 (11:59pm EST)
2	7/8-7/12	Study design considerations across the translational spectrum	TBD	2	
3	7/15-7/19	Selecting all relevant biomedical variables	TBD	3	
4	7/22-7/26	Data collection and management: best practices	TBD	4	
5	7/29-8/2	Analyzing data to ensure reproducibility	TBD	5	Final Assignment due 8/10 (11:59pm EST)
6	8/5-8/9	Transparency in research reporting	TBD	6	

TEXTBOOKS/READING MATERIALS:

A scientific publication will be assigned to read each week; each publication will be chosen to highlight the content of that particular module and will be discussed in the weekly discussion forum.

The following are suggested general reference materials; however, they are not required.

References:

- Williams M., Curtis M., Mullane K. *Research in the Biomedical Sciences: Transparent and Reproducible* (1st edition). Elsevier, 2017 ([available October 20, 2017](#)).
- Popper K. *The Logic of Scientific Discovery* ([available online](#)).
- Guidelines for Transparency and Openness Promotion (TOP) in Journal Policies and Practices. https://osf.io/ud578/?_ga=1.211230620.829898984.1435325845
- Nature Editorial. Journals Unite for Reproducibility. <http://www.nature.com/news/journals-unite-for-reproducibility-1.16259>
- Nature Special Article Collection. [Challenges in Irreproducible Research](#).
- Collins, FS, Tabak, LA. Policy: [NIH plans to enhance reproducibility](#). Nature. 505, 612–613. (30 January 2014)
- McNutt M. [Reproducibility](#). Science. 343, 229 (17 January 2014)
- Clayton JA. [Studying both sexes: a guiding principle for biomedicine](#). FASEB J. Vol.30, No.2, pp:519-524. (February 2016).

COURSE REQUIREMENTS: A computer with high-speed Internet connectivity and a working webcam and microphone, as well as access to statistical software, are required.

COURSE COMMUNICATIONS:

General course questions should be posted to the discussion board on Canvas. We will respond to discussion posts within 24 hours during the work week (48 hours over the weekend). Private or grade related questions should be sent to us via the email function in Canvas. The e-learning canvas site follows the rules and regulations of FERPA. Using the email function in Canvas, select both instructors and any teaching assistants as recipients, and include the course mnemonic (GMS XXXX) in the subject line (to facilitate a more timely response).

ATTENDANCE:

Success in this **course** is dependent on your active participation and engagement throughout the **course**. As such, students are required to complete all assignments by the due date, and to actively participate in class discussions posts.

OFFICE HOURS:

Online “office hours” will be held on a weekly basis throughout the term via Canvas. We also are available via email. For those who wish to meet via phone/web conference, please email the instructors to arrange a time.

GRADE COMPOSITION:

Initial Assignment: Reproduction of a published study (with data): 40 points / 20%

Weekly Discussion Participation (online discussion of a publication): 60 pts/30% (10 pts/5% each week)

Weekly Quizzes: 60 pts/30% (10 pts/5% each)

Final Assignment: Manuscript Methods and Results sections (using original data): 40 pts / 20%

Weekly Discussion:

Each week, students will be asked to read one scientific publication that highlights the content for that particular module/week. A discussion forum on Canvas will be available each week. Students will be asked to provide meaningful discussion to the forum at least once during that week by commenting on various aspects of the publication or responding to others’ comments. A discussion guide will be provided by the instructors each week to focus the discussion. A grading rubric will be made available for grading of participation in each week’s discussion forum.

Quizzes:

There is an online quiz associated with each module that students will complete throughout the course. Quizzes will be posted to the module on Mondays; students will need to complete the quiz by the following Sunday (the quiz must be completed by Sunday at 11:59pm EST). Each module’s quiz will consist of focus on the course content covered in that particular module. Each quiz will consist of 10 multiple choice questions intended to assess depth of understanding of the material; students will have 30 minutes once they begin the quiz to complete it. Students are strongly encouraged to find a time when they complete the quiz without interruption, as there will not be an opportunity to pause the quiz once the student begins taking it.

Initial Assignment:

The initial assignment will be provided on the first day of the first week of class; it will consist of a publication and the data set that was used in the publication. In general, students will be asked to replicate the results of the publication based solely on the methods described in the publication. If students cannot replicate the results, an explanation for why they could not replicate will be expected. Detailed instructions will be provided with the assignment, along with a grading rubric.

Final Assignment:

The final assignment will utilize the same data set provided in the beginning of class. Students will be expected to analyze the data, providing their own version of the methods and results section of the manuscript. Assessment will focus on the rigor and transparency of these portions of the manuscript. Detailed instructions and a grading rubric will be provided.

Assignment Rules:

- Your assignment must be turned in no later than 11:59 pm EST on the day that it is due.
- Late assignments will NOT be accepted, Quizzes are open for completion days before the due date, and instructions for the two assignments will be provided at the beginning of the course. Please plan accordingly.
- No handwritten assignment. All assignments need to be submitted electronically either via Canvas (will be clarified at the beginning of the course).
- DO NOT COPY OTHERS' ASSIGNMENTS. There is zero-tolerance for academic dishonesty. The one who copies the assignment will receive 0 point; and the one who is copied will get only 50% of the points that he/she should have received.
- You can work with others (e.g., discuss, consult, etc.) on an assignment. If you work on an assignment with other students in the course, you are required to list their names when you turn in the assignment. Plagiarism will receive 0 points.
- Searching for a solution on the web—and then submitting it as your answer for an assignment—will be considered a violation.

ATTENDANCE POLICY:

Please note all faculty are bound by the UF policy for excused absences. For information regarding the UF Attendance Policy see the Registrar website for additional details:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

Grading scale:

<u>Total Points Earned</u>	<u>% of Total Points Earned</u>	<u>Letter Grade</u>	<u>Grade Point Equivalent</u>
186	> 93	A	4.0
180-185	90-92	A-	3.67
174-179	87-89	B+	3.33
164-173	83-86	B	3.00
160-163	80-82	B-	2.67
154-159	77-79	C+	2.33
146-153	73-76	C	2.00
140-145	70-72	C-	1.67
134-139	67-69	D+	1.33
126-133	63-66	D	1.00
120-125	60-62	D-	0.67
< 120	< 60	E	0.00

For more detail on letter grades and related University of Florida policies, please see the Grades and Grading Policies at <http://gradcatalog.ufl.edu/content.php?catoid=6&navoid=1219#grades>.

Make-up policy: Students are allowed to make up work only as the result of illness or other unanticipated circumstances. In the event of such emergency, documentation will be required in conformance with University policy. Work missed for any other reason will earn a grade of zero.

UF POLICIES:

University policy on accommodation 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 instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

University policy on academic misconduct: Academic honesty and integrity are fundamental values of the University community. Students should be sure that they understand the UF Student Honor Code at <http://www.dso.ufl.edu/students.php>. You are expected and required to comply with the University's academic honesty policy (University of Florida Rules 6C1-4.017 Student Affairs: Academic Honesty Guidelines, available at <http://regulations.ufl.edu/chapter4/4017.pdf>). Cheating, plagiarism, and other forms of academic dishonesty will not be tolerated. Note that misrepresentation of the truth for academic gain (e.g., misrepresenting your personal circumstances to get special consideration) constitutes cheating under the University of Florida Academic Honesty Guidelines

Netiquette – communication courtesy: All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions, and chats. The first instance of clearly rude and/or inappropriate behavior will result in a warning. The second instance will result in a deduction of five percentage points from your overall grade. The third instance will result in a drop of a letter grade (A to B, A- to B-, and so on). <http://teach.ufl.edu/wp-content/uploads/2012/08/NetiquetteGuideforOnlineCourses.pdf>

Online Faculty Course Evaluation Process

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu>. Constructive feedback will be utilized to make improvements to the course for future iterations. Evaluations are typically open during the last two or three 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/results/>.

GETTING HELP:

For issues with technical difficulties for E-learning in Canvas, please contact the UF Help Desk at:

- learning-support@ufl.edu
- (352) 392-HELP - select option 2
- <https://lss.at.ufl.edu/help.shtml>

Any requests for make-ups due to technical issues must be accompanied by the ticket number received from LSS when the problem was reported to them. The ticket number will document the time and date of the problem. You must e-mail your instructor within 24 hours of the technical difficulty if you wish to request a make-up/extension. Other resources are available at <http://www.distance.ufl.edu/getting-help> for:

- Counseling and Wellness resources
- Disability resources
- Resources for handling student concerns and complaints
- Library Help Desk support

Should you have any complaints with your experience in this course please visit <http://www.distance.ufl.edu/student-complaints> to submit a complaint.