

# GMS 6848: Ensuring Rigor and Reproducibility in Clinical and Translational Research

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**SEMESTER:** Summer A, 2020  
Classes Begin: May 11, 2020  
Classes End: June 19, 2020

**FORMAT:** Online, Synchronous (through Canvas)

**CREDITS:** 1

**COURSE WEBSITE:** CANVAS GMS 6848

## **INSTRUCTORS:**

Matthew J. Gurka, PhD  
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Online Office Hours (through Zoom in Canvas): Mondays 8-9pm

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Online Office Hours (through Zoom in Canvas): Fridays 1-2pm

**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, recorded 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
- Understand the importance of selecting appropriate data analysis techniques to ensure reproducible results
- Report and present results from a research study in a fully transparent manner

## COURSE SCHEDULE:

Week	Dates	Topic	Quiz/Exam	Due Date (11:59 EST)
1	5/11-5/15	Introduction; General overview/motivation on rigor and reproducibility in research	Quiz 1	5/17
2	5/18-5/22	Study design considerations across the translational spectrum	Quiz 2	5/24
3	5/25-5/29	Selecting all relevant biomedical variables	Quiz 3	5/31
4	6/1-6/5	Data collection and management: best practices	Quiz 4	6/7
5	6/8-6/12	Analyzing data to ensure reproducibility	Quiz 5	6/14
6	6/15-6/19	Transparency in research reporting	Final Exam	6/18

## COURSE LOGISTICS:

- Weekly module materials along with recorded lectures will be posted to the course Canvas site by noon (12:00pm) on Mondays.
- Weekly quizzes will also become available on Canvas on Mondays at noon (12:00pm), and are due the following Sunday at 11:59pm. **Note: The Final Exam has a different schedule to ensure timeliness of final grades.**
- Regular office hours are noted in this syllabus for Dr. Gurka (Mondays 8-9pm) and Ms. Filipp (Fridays 1-2pm).
  - These office hours will be held via Zoom within the Canvas site.
  - Office hours will be recorded and uploaded to the Canvas site.
  - **Dr. Gurka's initial office hours (Monday May 11 8-9pm) will provide an overview of the course.**
- The final exam will be available on Canvas on Monday June 15 at 6am and is due via Canvas Thursday June 18 11:59pm EST.

**COURSE REQUIREMENTS:** Students are expected to actively engage in weekly discussions, complete readings posted to Canvas, view recorded lecture slide decks with paired audio, and complete weekly quizzes and a final exam. A computer with high-speed Internet connectivity, ability to read/review/edit Microsoft files, ability to read/review pdf files, and a working webcam and microphone are required to effectively complete all course components.

## TEXTBOOKS/READING MATERIALS:

A selection of scientific publication(s) and article(s) 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. Students are responsible for any content from the assigned readings posted in the weekly module folder. Quizzes may cover any course content covered in assigned readings, and lectures.

The following are suggested *general reference materials*; however, they are not required. Those available in a digital format are posted on Canvas in the course resources folder.

## REFERENCES:

- Williams M., Curtis M., Mullane K. *Research in the Biomedical Sciences: Transparent and Reproducible* (1<sup>st</sup> edition). Elsevier, 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](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 COMMUNICATIONS:**

General course questions should be posted to the discussion board on Canvas. We will respond to discussion posts within 24 hours during the workweek (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 pneumatic, GMS6848, 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 quizzes 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 Zoom within Canvas. We also are available via email. For those who wish to meet individually via phone/web conference, please email the instructors to arrange a time.

### **GRADE COMPOSITION:**

Students’ final grades will be determined via a variety of assessments, specifically: weekly discussions, quizzes, and a final exam.

<b>Assessment Description</b>	<b>Points Possible</b>	<b>% of Grade</b>
<b>Weekly Discussion Participation</b>		
<ul style="list-style-type: none"><li>Contribution to discussion of assigned weekly publication(s) via Canvas online forum</li><li>Students are required to actively engage in <u>four separate discussion sessions</u></li></ul>	<b>40 pts</b> (i.e. 10 pts each)	20%
<b>Weekly Quizzes</b>		
<ul style="list-style-type: none"><li>There will be weekly quizzes administered online via Canvas; 5 in total</li></ul>	<b>100 pts</b> (i.e. 20 pts each)	50%
<b>Final Exam</b>		
<ul style="list-style-type: none"><li>Evaluation of course content and critique of a Scientific Publication</li><li>Due 06/18/2020 11:59pm EST</li></ul>	<b>60 pts</b>	30%
<b>Total Points Possible:</b>	<b>200 pts</b>	<b>100 %</b>

### **WEEKLY DISCUSSIONS:**

Each week, students will be asked to read one or more articles that highlights the content for that particular module/week. On Mondays, a prompt will be posted to the weekly discussion forum which draws on lecture content and course reading material for that week’s module. Students will be assigned discussion groups; these discussion groups will be assigned at the beginning of the course. Students are expected to provide a meaningful contribution within their discussion group (in the form of providing at least one meaningful comment on various aspects of the articles, asking a provocative question to the group, and/or responding to others’ questions) **in four of the six weeks of the course**. It is highly encouraged to engage every week if you are able! Discussions will ‘close’ at the end of the week, Sunday 11:59pm EST (**except for Week 6, which will close on Thursday June 18<sup>th</sup> at 11:59pm**). You may not go back and contribute to a previous discussion in subsequent weeks to receive credit.

### **QUIZZES:**

There is an online quiz associated with the first 5 modules of 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 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. Quizzes are administered via Canvas and students should take the quiz in an environment with a dependable internet connection. **Quizzes cannot be retaken** and unanswered questions will receive a score of zero points.

### **FINAL EXAM:**

The final exam will be a combination of short-answer style and multiple-choice questions, and will utilize a scientific publication (or excerpts) to evaluate the depth of understanding of course concepts presented throughout the course. In general, students will be asked to critically review the provided manuscript or excerpts and consider the quality, rigor, and transparency of the research. Further, they will identify whether or not it is possible to replicate the study, based solely on the methods described in the publication, and address the appropriateness of the chosen study design. They will be asked to identify the strengths and weaknesses of each section of the manuscript and where the researchers did or did not provide sufficient detail to ensure their work was rigorous, transparent, and reproducible. This exam will evaluate the students' ability to draw on major course topics and apply them to published research.

DUE: Thursday 06/18/2020 11:59pm EST

### **WEEK 6 ADJUSTMENTS:**

To facilitate timely grading, week 6 will have expedited submission deadlines which apply to the discussion forum and final exam. All week 6 materials will be due on Thursday June 18<sup>th</sup> at 11:59pm.

### **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>.

### **GMS 6848 GRADING SCALE:**

<b>Total Points Earned</b>	<b>% of Total Points Earned</b>	<b>Letter Grade</b>	<b>Grade Point Equivalent</b>
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 substantial 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.

## UNIVERSITY OF FLORIDA POLICIES

**UNIVERSITY POLICY ON ACCOMMODATION OF 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 professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

### **GETTING HELP:**

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

- [learning-support@ufl.edu](mailto: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.