Rigor and Reproducibility in Social and Behavioral Health Sciences
Course Number – POP HLTH 650 (Special Topics)

Instructor: Katherine Schaumberg
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Meeting Time: 4-5 MW; March 20-May 5 2023
Location: HSLC 1220
Instructional Mode: In-person
Credits: 1
Hours: This course will meet in-person for 1-hour, 2x/wk for an 8-week period,
                             with an additional 2 hours outside of the classroom for every class
                             period. Additional details regarding student work expectations are
                             detailed below
Interaction: The instructor will provide direct instruction, direct feedback on student
                             work, and information about course content. Direct instruction will be
                             biweekly, and feedback on student work as outlined in the syllabus.
Instructor Availability: Individual meetings with the instructor are available to schedule on
                             Calendly. https://calendly.com/katherine-schaumberg/30min . If you
                             would like to meet and are unable to find an available time that works
                             for you within a 7-day period, please contact the instructor.

Course Description
This course will provide an overview of the open science movement in the social and behavioral
health sciences, discuss methods to optimize rigor and reproducibility in data management and
analysis, and include practical applications of these methods. Students will learn ways to
improve reproducibility in their scientific research, including: development of reproducible code,
management of tidy data, curation of metadata, collaboration with others in a version-control
environment, maintaining data privacy while sharing data, and developing accessible repositories
for scientific projects. Students will use skills in this course develop procedures and pipelines
that can form the bedrock of their scientific work

Requisites
Students should have basic competency using RStudio (equivalent to an introductory workshop).
Students should be able to import and export data, assign variables, and complete basic data
manipulation in R prior to enrollment. No advanced statistical or coding skills are necessary.

Several short courses are offered for low or no cost at UW through UW-libraries , the Data
Science Hub , and the SSCC. Several introductory workshops and materials for learning the
basics of the R programming language are also available for free online [e.g. Introduction to R

(Duke U), [Introduction to R](#) (HBC Training), [Learn R: Introduction](#) (codeacademy), [R for Social Scientists](#) (Data Carpentries) …. along with many other youtube tutorials and online demos].

Course Learning Outcomes

At the completion of this course, students will be able to:

Undergraduate	Graduate
Describe the origins of the open science movement in social and behavioral health sciences	
Identify key reasons for improving rigor and reproducibility in social and behavioral health sciences	
Describe the differences between pre-prints, pre-registration, registered reports, open data, and open analytics in scientific publishing, including the benefits and limitations of each approach	
	Create an analytic pre-registration using OSF
Identify barriers to engagement in best practices for rigorous and reproducible science and describe ways to overcome barriers	
Create approachable, useful, and readable metadata for a scientific project	
Explain principles of data cleaning and use R for basic data cleaning	
	Write a reproducible scientific paper using the 'bookdown' R package
Publish a tidy repository of analytic code using GitHub	
Collaborate on version-controlled repositories with others	

Readings, Lectures and Discussion
Course readings are outlined in the syllabus. Brief (20-30 minute) lectures will be posted for each class on Canvas. Students should complete readings and watch lectures in preparation for class discussion. Class will include a 30-minute discussion of readings and lectures, followed by 30-minutes of applied practice. Students will be 'on point' to lead discussion once during the course.

Homework
Weekly homework is due on Canvas at 11:59pm, Central Time, each Friday evening. Each individual will have 4 'late days' to be used at any time during the course without penalty. After the fourth total late day (across all assignments), late homework will receive a grade of 0.

Pre-Registration
Graduate students in pairs will complete pre-registration on OSF of an analysis using a class dataset.

Final Paper
The final paper will be completed in teams, which will include developing a working paper using the **bookdown** R package and engaging in collaboration with their team on GitHub. The paper will be based on an OSF pre-registration of a class dataset. The working paper should include a 1-paragraph introduction with at least two references, a 1-2 paragraph method section which includes information on data scoring and scores data appropriately with R code provided in the repository, a 1-paragraph results section with, at minimum, one sensible statistical test, one table

and one figure, and a reference section which is populated via Zotero integration. The project should knit to an academic paper in html using R Markdown with the **bookdown** package, and the resulting paper should be published in the GitHub repository using gh-pages. You should also provide a version of your R Markdown file which will knit to PDF using the **rticles** package. I will evaluate contributions of each student by viewing the commit history of the project on GitHub – it is expected that graduate students will contribute to the project by 1) building and maintaining the github repository, 2) managing pull requests, 3) maintaining the bibliography and Zotero integration, 4) maintaining YAML headers and package integrations in the 'index' file, 5) writing the results section, and 6) assisting in the introduction and methods sections, as necessary. Undergraduate students are expected to contribute to the introduction and method sections, along with adding references.

Grading

Undergraduate

Homework	40%
Journal Discussion and Participation	30%
Final Paper*	30%

Graduate

Homework	30%
Pre-registration	10%
Journal Discussion and Participation	30%
Final Paper*	30%

*Final Paper requirements and expectations differ for undergraduate and graduate students, see above

The grading scale will be: 93-100 = A, 88-92 = AB, 83-87 = B, 78-82 = BC, 70-77 = C, 60-69 = D.

Course Website, Learning Management System & Digital Instructional Tools

Course information and resources will be available on Canvas.

Individuals meetings with the instructor will be hosted via Zoom.

Required Textbook, Software & Other Course Materials

Campus provides students with technology guidelines and recommendations for instruction. Students should consult these resources prior to the start of the semester. Students will need to use Git and R throughout the semester

- GitHub : See instructions on how to register a GitHub account and install git on your machine.
- R-studio & R: Install the latest version of R and R studio. If you already have R and RStudio installed, ensure that you are running the latest version.

Teaching & Learning Data Transparency Statement
The privacy and security of faculty, staff and students' personal information is a top priority for UW-Madison. The university carefully evaluates and vets all campus-supported digital tools used to support teaching and learning, to help support success through learning analytics, and to enable proctoring capabilities. View the university's full teaching and learning data transparency statement.

Privacy of Student Records & the Use of Audio Recorded Lectures Statement

Lecture materials and recordings for this course are protected intellectual property at UW-Madison. Students in this course may use the materials and recordings for their personal use related to participation in this class. Students may also take notes solely for their personal use. If a lecture is not already recorded, you are not authorized to record my lectures without my permission unless you are considered by the university to be a qualified student with a disability who has an approved accommodation that includes recording. [Regent Policy Document 4-1] Students may not copy or have lecture materials and recordings outside of class, including posting on internet sites or selling to commercial entities, with the exception of sharing copies of your personal notes as a notetaker through the McBurney Disability Resource Center. Students are otherwise prohibited from providing or selling their personal notes to anyone else or being paid for taking notes by any person or commercial firm without the instructor's express written permission. Unauthorized use of these copyrighted lecture materials and recordings constitutes copyright infringement and may be addressed under the university's policies, UWS Chapters 14 and 17, governing student academic and non-academic misconduct.

How to Succeed in This Course
Begin homework early in the week such that you are able to seek assistance and inquire about concerns in advance of the Friday evening due date. I will respond to questions regarding homework assignments on the Canva discussion board within 24 hours.

Keep your R packages and installations up-to-date during the course, such that everyone's software plays well with others.

Bring a charged laptop to class with appropriate software installations, as described above

Additional student resources are linked below:

- *University Health Services*
- *Undergraduate Academic Advising and Career Services*
- *Office of the Registrar*
- *Office of Student Financial Aid*
- *Dean of Students Office*
- *Graduate Student Services*

Course Evaluations
Students will be provided with an opportunity to evaluate this course and your learning experience. Student participation is an integral component of this course, and your confidential feedback is important to me. I strongly encourage you to participate in the course evaluation.

Digital Course Evaluation (AEFIS)
UW-Madison uses a digital course evaluation survey tool called AEFIS. For this course, you will receive an official email two weeks prior to the end of the semester, notifying you that your course evaluation is available. In the email you will receive a link to log into the course evaluation with your NetID. Evaluations are anonymous. Your participation is an integral component of this course, and your feedback is important to me. I strongly encourage you to participate in the course evaluation.

Students' Rules, Rights & Responsibilities

Student privacy rights are described in FERPA: more information about FERPA.

Diversity & Inclusion Statement
Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals. The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world.

Academic Integrity Statement
By virtue of enrollment, each student agrees to uphold the high academic standards of the University of Wisconsin-Madison; academic misconduct is behavior that negatively impacts the integrity of the institution. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these previously listed acts are examples of misconduct which may result in disciplinary action. Examples of disciplinary action include, but is not limited to, failure on the assignment/course, written reprimand, disciplinary probation, suspension, or expulsion.

Accommodations for Students with Disabilities Statement
The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (UW-855) require the university to provide reasonable accommodations to students with disabilities to access and participate in its academic programs and educational services. Faculty and students share responsibility in the accommodation process. Students are expected to inform faculty [me] of their need for instructional accommodations during the beginning of the semester, or as soon as possible after being approved for accommodations. Faculty [I], will work either directly with the student [you] or in coordination with the McBurney Center to provide reasonable instructional and course-related accommodations. Disability information, including instructional accommodations as part of a

student's educational record, is confidential and protected under FERPA. (See: McBurney Disability Resource Center)

Academic Calendar & Religious Observances

Week	Topics Covered	Readings	Lectures	Homework
1	**Intro to Rigor and Reproducibility**	Rigor and reproducibility for data analysis and design in the behavioral sciences	Course intro	HW1: Basic R Refresher
	Reproducibility in Scientific Computing	Good Enough Practices in Scientific Computing Reproducibility and Replicability in a Fast-Paced Methodological World	Intro to R Markdown	
2	**Intro to the class dataset**	Tidy Tuesday README and dataset README	Intro to the class data	HW2: R Markdown and the Markdown language
	Git going with GitHub	Happy Git and GitHub for the useR: 1-19	Github Demo	
3	**Pre-registration**	Using OSF to Share Data: A Step-by-Step Guide	Navigating pre-registration	HW3: GitHub Repository set-up
	Access to Open Science	Open science, communal culture, and women's participation in the movement to improve science Open science isn't always open to all scientists		
4	**Documentation and Metadata**	Protocol Writing in Clinical Research	Managing your metadata	OSF pre-registration due*
5	**Data Cleaning and Tidy Data**	Tidy Data Scorekeeper Documentation	Scorekeeper	HW4: Tidy Data

6	**Data Sharing, Privacy, and Consent**	[Guide to Social Science Preparation and Archiving](#) [Data sharing and privacy issues in neuroimaging research: Opportunities, obstacles, challenges, and monsters under the bed](#)	Working with the IRB	HW5: Data Dictionary
	Collaboration with Git	[Happy Git and GitHub for the user:](#) 20-33	Pull request demo	
7	**Intro to Bookdown and Reference Integration in R Markdown**	[Bookdown: Authoring books and technical documents with R Markdown](#)	Bookdown Demo Reference Integration	--
8	**Final Paper Workgroups**	--	--	Final Paper Due on the last day of classes

*Graduate Students Only