GEOL 590 s01: Reproducible Data Analysis, Spring 2017

University of Tennessee, Knoxville

COURSE SECTION: 001
MEETING TIME AND PLACE: EPS 405
COURSE CREDIT HOURS: 3.0 except with permission of instructor

Faculty Contact Information

Instructor: Dr. Andrew D. Steen
Office Hours: by appointment
Office Location: EPS 201
Email Address: asteen1@utk.edu
Office Phone: (865) 974-4014, but really, email is a much better way to contact me.

Course Description/Information:

This course aims to teach introductory principles of reproducible data analysis using the R statistical platform. No prerequisites are required, however students should be engaged in active research in order to benefit maximally from the class.

Value Proposition:

Students will learn to more efficiently and reproducibly analyze their own data, leading to faster analysis times, deeper analyses, and fewer mistakes.

Student Learning Outcomes/Objectives:

Successful students will demonstrate the following skills:

- Demonstrate basic facilities with R (command-line analysis and functional programming)
- Demonstrate understanding of principles of data analysis, which are beneficial in any software platform
- Produce generalizable software to perform analyses relevant to their research

Programmatic Outcomes / Department Goals:

This course will contribute to students' ability to carry out data analysis in the service of scientific research.

Learning Environment:

Class will involve lectures and a heavy component of peer education. Students will work in teams of 3-4 throughout the semester to teach one another.

Course Communications:

I will use my github site, http://github.com/adsteen/GEOL590_2017, to post lecture notes, tasks, and other documents. Some documents may also be posted on the course Blackboard site. Outside of class hours, email is the best way to contact me. I will seek to respond to email within 24 hours, not counting holidays and weekends.

How to Be Successful In This Course:

STUDENT RESPONSIBILITY:

1. Go to class. Arrive on time. If you will regularly struggle to get to class on time, let Dr. Steen know.
2. Bring a laptop. If this is a challenge, contact the instructor immediately to work out a solution.
3. Read assigned text before the class they're about.
4. Be respectful of students and the instructor.
5. Focus on class activities during class time.
6. Actively contribute to the classroom intellectual environment.
7. Abide by the UT Honor Code.

INSTRUCTOR RESPONSIBILITY:

1. Prepare enlightening lectures and classroom activities.
2. Evaluate students promptly, fairly and equitably.
3. Respectfully challenge students to reach their potential.
4. Maintain a constructive classroom environment. This may include asking disruptive / non-contributing students to leave the classroom.
5. Behave according to University codes of conduct.

Texts/Resources/Materials:

STRONGLY RECOMMENDED TEXTBOOKS:

- Wickham (2015) Advanced R. CRC Press: Boca Raton, FL. ~$60 on Amazon.
- Wickham and Grolemund (2017) R for Data Science. O'Reilly: Sebestapol, CA. This text should be available in hardcopy in January. Available for free at http://r4ds.had.co.nz/

LESS-STRONGLY RECOMMENDED TEXTBOOKS:

- Chacon (2014) Pro Git. Apress. Available for free at https://git-scm.com/book/en/v2
- Wickham (2015) R Packages. O'Reilly.

Required Equipment:

A laptop with R (version 3.3.2 or greater), RStudio (version 1.0 or greater) and a text editor installed.

Course Resources:

The course Blackboard site will be used.

Course Requirements, Assessments, and Evaluations:

Classroom attendance is not required but it is ***strongly*** encouraged.

GRADES WILL BE WEIGHTED AS FOLLOWS:

- Task completion: 70%
- Final Project: 30%

GRADES:

A	A-	B+	B	B-	C+	C	D	F
≥93	(93-90]	(90-86]	(86-83]	(83-80]	(80-76]	(76-70]	(70-60]	<60

The instructor reserves the right to curve grades upwards at his discretion. Grades on any assignment may be appealed to the instructor, who may choose to re-grade the entire assignment.

Major Assignments and Exams (names and due dates)

- The final project is due April 28.

Course Feedback:

Dr. Steen welcomes direct feedback from students at all time: in class or out of class; in person, via email, or anonymously by unsigned note left in my mailbox. I cannot see this course from a students' perspective, so I rely on your input to teach the best class possible. As with all University of Tennessee classes, students will be asked to provide feedback via SAIS forms. *Students will also have the opportunity to meaningfully influence the direction of the class, especially by determining the form of the final project*.

Course Topics:

(Provisional schedule, to be updated pending class progress)

Unit	Date	Subject	Reading
Intro	1/11	On reproducible data analysis	R4DS Ch 1-2 Millman and Perez in Stodden et al (2014)
	1/13	The command line, scripts, and Integrated Development Environments	
Basic R	1/18 – 1/23	Data structures and simple operations	AR 2
	1/25-1/27	Intro to input/output and literate programming (knitr, markdown, and LaTeX)	R4DS 26-27
	1/30-2/3	Intro to data visualization	Tufte, R4DS 3, R4DS 28
Programming for data analysis	2/6-2/10	Git and GitHub : how and why	Chacon
	2/13-2/17	Subsetting	AR 3
	2/20-2/24	Vocabulary and Style	AR 4-5
	2/27-3/3	Catch-up	
	3/6-3/10	Using functions	AR 6
	3/20-3/24	The tidyverse	R4DS 9-12
	3/27-3/31	Object-oriented code	AR 7-8
	4/3-4/7	Catch-up	
	4/10-4/13	Functional programming and debugging	AR 9-12
Building tools	4/17-4/21	Package creation, testing and performance analysis	AR 16-18 + reading on unit tests
	4/24-4/28	Performance analysis	AR 16-18

Dear Student,

The purpose of this ***Campus Syllabus*** *is to provide you with important information that is common across courses at UT. Please observe the following policies and familiarize yourself with the university resources listed below. At UT, we are committed to providing you with a high quality learning experience. I want to wish you the best for a successful and productive semester.*
Interim Provost John Zomchick

ACADEMIC INTEGRITY

"An essential feature of the University of Tennessee, Knoxville is a commitment to maintaining an atmosphere of intellectual integrity and academic honesty. As a student of the university, I pledge that I will neither knowingly give nor receive any inappropriate assistance in academic work, thus affirming my own personal commitment to honor and integrity."

UNIVERSITY CIVILITY STATEMENT

"Civility is genuine respect and regard for others: politeness, consideration, tact, good manners, gracious-ness, cordiality, affability, amiability and courteous-ness. Civility enhances academic freedom and integrity, and is a prerequisite to the free exchange of ideas and knowledge in the learning community. Our community consists of students, faculty, staff, alumni, and campus visitors. Community members affect each other's well-being and have a shared interest in creating and sustaining an environment where all community members and their points of view are valued and respected. Affirming the value of each member of the university community, the campus asks that all its members adhere to the principles of civility and community adopted by the campus" http://civility.utk.edu/.

EMERGENCY ALERT SYSTEM:

The University of Tennessee is committed to providing a safe environment to learn and work. When you are alerted to an emergency, please take appropriate action. Learn more about what to do in an emergency and sign up for UTAlerts at http://safety.utk.edu. Check the emergency posters near exits and elevators for building specific information. In the event of an emergency, the course schedule and assignments may be subject to change. If changes to graded activities are required, reasonable adjustments will be made, and you will be responsible for meeting revised deadlines.

YOUR ROLE IN IMPROVING TEACHING AND LEARNING THROUGH COURSE ASSESSMENT

At UT, it is our collective responsibility to improve the state of teaching and learning. During the semester you may be requested to assess aspects of this course either during class or at the completion of the class. You are encouraged to respond to these various forms of assessment as a means of continuing to improve the quality of the UT learning experience.

DISABILITIES THAT CONSTRAIN LEARNING:

"Any student who feels he or she may need an accommodation based on the impact of a disability should contact the Office of Disability Services (ODS) at 865-974-6087 in 100 Dunford Hall to document their eligibility for services. ODS will work with students and faculty to coordinate reasonable accommodations for students with documented disabilities." Information on accessibility at UTK is also at http://accessibility.utk.edu

WELLNESS:

The Student Counseling Center is the university's primary facility for personal counseling, psycho-therapy, and psychological outreach and consultation services. http://counselingcenter.utk.edu/ and The Center for Health Education and Wellness engages in prevention and intervention efforts to increase awareness, impact student decision making, and positively influence our university community. The Center manages 974-HELP (also at http://wellness.utk.edu/).