Syllabus – R Seminar

ENTM798V
Fall 2020

Course Overview and Organization

The R Statistical Environment has fundamentally changed how scientists manage, analyze, and share data. The power and flexibility of R open myriad opportunities. The downside of this power is that it creates a daunting barrier to entering the R universe. The purpose of this course is to help you break down those barriers so you can effectively use R in ways that transform and elevate your research.

Through a combination of lecture, hands-on demos, and increasingly independent exercises, you will learn the fundamentals of using R. You will gain experience with approaches for handling, plotting, and analyzing data in ways that are repeatable and transparent. This is NOT, however, a statistics class. Rather, you will learn to get your data into R, get it in the right format for your chosen analysis, to get your results out, and document your workflow for yourself and the greater scientific community. When you take your statistics courses you will be able to focus on the statistical concepts because you will be fluent in the reproducible vocabulary and grammar of R.

- The seminar is designed for graduate students or advanced undergraduates who are meeting R for the first time.
    - Students who are just designing their research can benefit by understanding how to collect and manage their data from the outset.
    - Students who already have data will jumpstart their ability to process and analyze their data.
- Slightly more advanced students with some R experience can bolster their skills.
- Truly advanced R users seeking in-depth instruction on specific types of analyses or high-level programming techniques will likely not benefit much. Such students will find a better fit in one of the many other great courses in statistics or advanced programming.

Learning Outcomes

Through hands-on practice you will become proficient in basic data handling. Completing all the assignments will give you the tools and skills needed to

- read and write commands to process and analyze data leveraging the basic philosophy of data handling in R.
- assemble your commands into scripts following best practices that meet standards of repeatability and transparency in data analysis required by journals and funding agencies.
- implement best practices for graphical display of your data.
- find new packages for your area of research, assess their utility, and use them effectively.
- master the art of solving R issues through interaction with online R user groups and forums.

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Dr. Dan Gruner
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Class Meets
Tuesdays
2:00 p.m. – 2:50 p.m.
Virtually via Zoom

Office Hours
TBD based on student schedules & by appointment

Course Communication
We will typically communicate via email and suggest you do the same to reach us.

Resources

Course materials will be provided on elms.umd.edu

Topics

Class will meet every Tuesday through the semester, except on November 3 (election day). During this time, we expect to cover the following topics in 7 weeks, followed by 8 sessions for student-led presentations. The topics and their order are not set in stone because we will be flexible to needs of the class and opportunities that arise during this semester. Your feedback will be sought continuously to adjust the content of the seminar.

- Intro to the R Environment, R packages
- Striving for reproducibility and tidy data
- Data wrangling
- Basic and advanced data structures in R
- Graphics with ggplot2
- Using loops and apply
- Writing your own functions
- R Markdown and Git for version control

Activities, Learning Assessments, & Expectations for Students

Presentation of a Package or visualization –

Pairs of registered students will present a tutorial on a topic related to an R package or workflow of their choosing. As a result of the presentation, other students will understand when and how to use the package or workflow. Consult with Drs. Neel or Gruner to find a suitable topic that will extend your skills and educate your classmates.

Participation in Class –

Active participation is expected throughout the semester. We recognize that engagement is more challenging in a virtual environment. Thus, we will provide asynchronous opportunities to learn and practice R coding. Engagement with synchronous and asynchronous class activities is expected of all students.

Grades

Final letter grades (including +/- descriptors) will be determined based on participation in class and on leading a presentation. For a graduate seminar such as this, you will get out what you put in.

Campus Policies

It is our shared responsibility to know and abide by the University of Maryland's policies that relate to all courses, which include the following topics:

- Academic integrity
- Student and instructor conduct
- Accessibility and accommodations
- Attendance and excused absences
- Grades and appeals
- Copyright and intellectual property

Please visit https://academiccatalog.umd.edu/graduate/policies/academic-record/ for the Office of Graduate Studies' full list of campus-wide policies and follow up with me if you have questions.

Course-Specific Policies

We expect you to keep your video on while in our synchronous zoom session and to refrain from multi-tasking for unrelated activities. Seeing each other's faces is helpful for increasing the semblance of human contact. If you are not speaking, we ask that you mute yourself to limit distracting noises. If you have critical communication to attend to, please excuse yourself and return when you are ready. If you expect to miss a class please notify us in advance.

Names/Pronouns and Self Identifications

The University of Maryland recognizes the importance of a diverse student body, and we are committed to fostering inclusive and equitable classroom environments. We invite you, if you wish, to tell us how you want to be referred to both in terms of your name and your pronouns (he/him, she/her, they/them, etc.) in your ELMS profile and/or your Zoom profile. The pronouns someone indicates are not necessarily indicative of their gender identity. Visit trans.umd.edu to learn more.

Additionally, how you identify in terms of your gender, race, class, sexuality, religion, and dis/ability, among all aspects of your identity, is your choice whether to disclose (e.g., should it come up in classroom conversation about our experiences and perspectives) and should be self-identified, not presumed or imposed. We will do our best to address and refer to all students accordingly, and we ask you to do the same for all of your fellow Terps.