

16:375:501 Environmental Science Analysis

Description: This course is designed to offer students an introduction to the management and mining of environmental data, primarily chemical and biological data collected at both contaminated sites and unimpacted locations. We will focus on datasets that are intermediate in size: large enough that they cannot be handled using a simple spreadsheet, but not so large that they require extensive computing power. Topics covered will include Microsoft Access, database structures, multiple linear regression, non-linear curve fitting, time series analysis, spatial relationships, and factor analysis. You will also learn some beginner coding in R. Students will complete a project analyzing and mining their own datasets.

Prerequisites: None, but students are expected to be proficient with Microsoft Excel. Don't worry if you have no experience with coding. This course is introductory level!

Structure: This is an asynchronous course, meaning that we do not 'meet', not even via the web. Therefore, you decide when to do the work. To prevent you from procrastinating too much, you will have an assignment due each week for the first 12 weeks. To provide even more incentive to keep up to date, I will deduct 10 points from late assignments for each week that they are late. On the other hand, if you turn in any attempt at the homework on time, you will get at least one chance to revise it. To try to build some sense of community, I will organize the class into teams to work together on assignments and I encourage you ask your fellow students for help.

Textbook: None. I have worked hard to ensure that all the software you need for this class is free. You will need a computer (to which you have authorization to install software) and an internet connection. A webcam is nice for virtual meetings with me, but not necessary. Students who have a mac or who have any other issues can access almost everything they need on the PCs in the Instructional Computing Lab (ENR room 323) or using the [Rutgers virtual PCs](#).

Office hours: I will have both virtual (via Zoom) and real, human (room 348 ENR building) office hours. Times to be announced. If my hours don't work for you, just let me know and we can make an appointment at another time. I recognize that many of you are working at real jobs. There should never be a need for you to come to campus for this course.

Course site: The course site is on [Canvas](#). Most of the videos are hosted on youtube. Course content will be shared among students, so you will upload it to a shared google drive using your scarletmail account.

Grading:

1. There are no exams, including no final exam.
2. Twelve weekly assignments are worth 100 points each. (Week one has two assignments worth 50 points each). Collectively they are worth 1200 points, or 60% of the course grade. Some of these assignments are related to the final paper and will help you complete it on time. If you turn in some attempt at the homework on time, you will get at least one opportunity to revise. This policy is designed to keep you on pace with the workload without stressing you out.

- The Final Paper is worth 800 points or 40% of the course grade. You will write a research paper using the techniques discussed in class for creating, managing, and mining databases for insights into environmental process. I encourage you to use your own data and make this assignment useful to you, i.e. part of your thesis/dissertation/critical essay, etc. The final paper should include an introduction to your topic, a methods section, results from your data mining including figures and tables, and a discussion interpreting your results. As long as you turn it in early enough, you will get infinite opportunities to revise until I turn in my grades before Christmas.

PLAGARISM: Plagiarism is taking credit for someone else’s work whether deliberately or unintentionally. This includes but is not limited to turning in all or part of an essay written by someone other than yourself (a friend, an internet source, etc.) and claiming it as your own, and including information or ideas from research material without citing the source. **You will receive an automatic 0 for plagiarized work, and may be reported to the Office of Academic Integrity.**

Modules

This course focuses on doing, not on knowing. Step one, I introduce a new data analysis tool. Step two, I give you an example data set and let you practice doing this technique. Step three, you apply this technique to your own data.

Week	Topic
1	Intro to the course
2	Find some data!
3	Data quality and metadata
4	Making and querying databases
5	Multiple linear regression in R and Excel
6	Time series analysis
7	Non-linear curve fitting in R and Excel
8	Stepwise regression in R
9	Factor analysis (PCA and PMF)
10	Abstract and literature review for final project are due
11	Simple maps in Google Earth Pro and R
12	Do something new in R
Remainder of semester	Work on final project, Due in December (exact date TBA)

ACADEMIC INTEGRITY

The university's policy on Academic Integrity is available at <http://academicintegrity.rutgers.edu/academic-integrity-policy>. The principles of academic integrity require that a student:

- properly acknowledge and cite all use of the ideas, results, or words of others.
- properly acknowledge all contributors to a given piece of work.
- make sure that all work submitted as his or her own in a course or other academic activity is produced without the aid of impermissible materials or impermissible collaboration.
- obtain all data or results by ethical means and report them accurately without suppressing any results inconsistent with his or her interpretation or conclusions.

- treat all other students in an ethical manner, respecting their integrity and right to pursue their educational goals without interference. This requires that a student neither facilitate academic dishonesty by others nor obstruct their academic progress.
- uphold the canons of the ethical or professional code of the profession for which he or she is preparing.

Adherence to these principles is necessary in order to ensure that

- everyone is given proper credit for his or her ideas, words, results, and other scholarly accomplishments.
- all student work is fairly evaluated and no student has an inappropriate advantage over others.
- the academic and ethical development of all students is fostered.
- the reputation of the University for integrity in its teaching, research, and scholarship is maintained and enhanced.

Failure to uphold these principles of academic integrity threatens both the reputation of the University and the value of the degrees awarded to its students. Every member of the University community therefore bears a responsibility for ensuring that the highest standards of academic integrity are upheld.

STUDENT WELLNESS SERVICES

Just In Case Web App <http://codu.co/cee05e>

Access helpful mental health information and resources for yourself or a friend in a mental health crisis on your smartphone or tablet and easily contact CAPS or RUPD.

Counseling, ADAP & Psychiatric Services (CAPS)

(848) 932-7884 / 17 Senior Street, New Brunswick, NJ 08901 / www.rhscaps.rutgers.edu/

CAPS is a University mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professional within Rutgers Health services to support students' efforts to succeed at Rutgers University. CAPS offers a variety of services that include: individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community and consultation and collaboration with campus partners.

Violence Prevention & Victim Assistance (VPVA)

(848) 932-1181 / 3 Bartlett Street, New Brunswick, NJ 08901 / www.vpva.rutgers.edu/

The Office for Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling and advocacy for victims of sexual and relationship violence and stalking to students, staff and faculty. To reach staff during office hours when the university is open or to reach an advocate after hours, call 848-932-1181.

Disability Services

(848) 445-6800 / Lucy Stone Hall, Suite A145, Livingston Campus, 54 Joyce Kilmer Avenue, Piscataway, NJ 08854 / <https://ods.rutgers.edu/>

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a

disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation:
<https://ods.rutgers.edu/students/documentation-guidelines>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at:
<https://ods.rutgers.edu/students/registration-form>.

Scarlet Listeners

(732) 247-5555 / <http://www.scarletlisteners.com/>

Free and confidential peer counseling and referral hotline, providing a comforting and supportive safe space.