Introduction to R for Environmental Sciences

ENR 8600

2 credit hours, Pass/Fail Option Only
Autumn 2017, Wednesdays 1:45 – 3:45
Locations: 123 Williams Hall in Wooster, video-linked to 333 Kottman Hall in Columbus

Course Instructors:
Steve Culman, 130 Williams Hall, Wooster, culman.2@osu.edu, 330-263-3787
Kai Zhao, 131 Williams Hall, Wooster, zhao.1423@osu.edu, 330-263-3722
Bob Gates, 383 Kottman Hall, Columbus, gates.77@osu.edu, 614-292-9571

Course Description: This is a practical, hands-on course intended to give students a broad overview and introduction to R, a language and environment for statistical computing and graphics. This course is not a statistical course in R, but rather an introduction to the R environment and how to work with R efficiently. It will only provide a brief overview of some statistical analyses, but will complement the Quantitative Methods for Environment and Natural Resources course (ENR 8780), which covers many common statistical analyses in environmental science.

Course Objective: Students will become familiar and more proficient with importing, exporting, manipulating, graphing and programming data in R.

Requirements: Students should be familiar with basic concepts of data management, manipulation and analyses. Students will need to bring a laptop with the current version of R already installed. R and installation instructions can be found here: https://cran.r-project.org/

Grades: Grading will be pass/ fail only. Problem sets will be assigned at each working lab, giving students the opportunity to become more familiar with functions learned over the past few weeks and testing students’ command of the material.

At the end of the semester, students will present a new package or set of tasks and solutions using their own data or data they will soon collect. Depending on class size and interest, these could be group presentations. Presentations will last 15-20 minutes and must include a new method or novel approach not covered in previous classes. The presentation would ideally be relevant to the student’s own research and data situation. Students will anonymously evaluate each other’s presentations based on content and quality. Passing grades will be assessed from these evaluations and from the working lab problem sets with instructors the making the final decision of a pass or fail grade.
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<tr>
<th>Week (Date)</th>
<th>Topics</th>
<th>Instructor(s)</th>
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<tbody>
<tr>
<td>Week 1 (Aug 23)</td>
<td>Installing R, packages, CRAN; Importing and exporting data; Defining classes of R objects; Where to get help (resources)</td>
<td>Culman</td>
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<td>Week 2 (Aug 30)</td>
<td>R basics; Indexing and subsetting dataframes; Dealing with missing data; R framework</td>
<td>Zhao</td>
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<td>Week 3 (Sept 6)</td>
<td>Tidy data and data structure in R: tidyR package</td>
<td>Gates</td>
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<td>Week 4 (Sept 13)</td>
<td>Introduction to the dplyr package for data manipulation</td>
<td>Culman</td>
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<td>Week 5 (Sept 20)</td>
<td>Working Lab 1</td>
<td>Gates (and Zhao)</td>
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<td>Week 6 (Sept 27)</td>
<td>More dplyr and Intro to ggplot2 for graphs</td>
<td>Culman</td>
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<td>Week 7 (Oct 4)</td>
<td>ggplot2: geoms, layers, aesthetics</td>
<td>Zhao</td>
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<td>Week 8 (Oct 11)</td>
<td>More advanced ggplot2 functions</td>
<td>Culman</td>
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<td>Week 9 (Oct 18)</td>
<td>Working Lab 2</td>
<td>Culman (and Zhao)</td>
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<td>Week 10 (Oct 25)</td>
<td>Advanced programming and functions in R</td>
<td>Zhao</td>
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<td>Week 11 (Nov 1)</td>
<td>Brief overview of selected statistical analyses – Distributions, F-tests, T-tests, ANOVA, non-parametric alternatives, linear models</td>
<td>Gates</td>
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<td>Week 12 (Nov 8)</td>
<td>Working Lab 3</td>
<td>Zhao (and Gates)</td>
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<td>Week 13 (Nov 15)</td>
<td>Student-lead special topics</td>
<td>Student-teams</td>
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<td>Week 14 (Nov 22)</td>
<td>No Classes – Thanksgiving Break</td>
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**Academic Misconduct**

Academic integrity is essential in maintaining excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University’s Code of Student Conduct, and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the University’s Code of Student Conduct and this syllabus may constitute “Academic Misconduct.”

The Ohio State University’s Code of Student Conduct (Section 3335-23-04) defines academic misconduct as: “Any activity that tends to compromise the academic integrity of the University, or subvert the educational process.” Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the University’s Code of Student Conduct is never considered an “excuse” for academic misconduct. Please review the Code of Student Conduct and, specifically, the sections dealing with academic misconduct.

**Disability**

Students with disabilities that have been certified by the Office for Disabilities Services will be appropriately accommodated, and should inform the instructor as soon as possible of their needs.