

Syllabus & Course Information

R Workshop in Biology (Bio 3100)

Fall 2018

Course Master:

Dr. Jonathan Myers, Associate Professor of Biology,
jamyers@wustl.edu, 314-935-3167, McDonnell 409
Help sessions: By appointment
Laboratory website: myersecologylab.com
Biology faculty page: wubio.wustl.edu/myers

Instructor:

Dr. Chris Shaffer, Biology Lecturer/DNA Facility Coordinator,
shaffer@biology.wustl.edu, 314-935-5078, McDonnell 112
Help sessions: Monday 12:00–1:00 p.m. or by appointment

Assistant to the Instructor:

Chris Catano, Ph.D. Student, chcatano@gmail.com, 314-935-8396, McDonnell 418
Help sessions: Thursday 1:00–2:00 p.m. or by appointment

Course Description:

Biologists in all areas increasingly find that they have the need and opportunity to work with large data sets. The goal of this 1-credit course is to provide students with an opportunity to gain skills in data analysis and presentation using R, a free software environment for statistical computing and graphics (<http://www.r-project.org>). Topics include an introduction to basic programming in R, data types and manipulation, graphics, hypothesis testing and statistics, and applications to various fields of biology ranging from ecology to genomics. The course format will consist of ten, two-hour workshops that include a brief introduction to key concepts in R and applications in biology, followed by interactive, hands-on tutorials.

Prerequisites:

Concurrent or prior course in statistics (Math 2200 or Math 3200 recommended) or permission of instructor.

Class meeting time & location:

The course consists of ten, two-hour workshops. We will meet on Wednesdays from 10:00-12:00 p.m. (Section 1) and 3:00–5:00 p.m. (Section 2). Classes will be held in the Natural Sciences Learning Center Computer (NSLC) Lab in Life Sciences 117.

Blackboard course website:

The course website will be on Blackboard (bb.wustl.edu). The website will contain the current course schedule, assignments, class meeting slides, an online grade book, reading material, and important course announcements. Unless instructed otherwise, you will upload all assignments to Blackboard. You should check the course website on a regular basis, and to help stay up-to-date on the course, we recommend setting the option to receive an email when we post



Image Credit – R Without Fear:
Applied R for Biologists
(www.transmittingscience.org)

announcements. You can access help for Blackboard by clicking on “Help” at bb.wustl.edu or by contacting WU Student Technology Services (sts.wustl.edu).

Assessment:

The grade you earn in this course will be based on the following components:

100 points	Weekly R tutorials (10 total; 10 points each; 72% of final grade)
28 points	Semester-long in-class participation and attendance (20% of final grade)
<u>12 points</u>	<u>Mini-projects (2 total; 6 points each; 8% of final grade)</u>
140 points	Total

The following scale will be used to assign final course grades. If you are taking this course Credit/No Credit, you must receive a C+ or better to receive credit.

A+	97%	B+	87-89%	C+	77-79%	D+	67-69%	F	0-59%
A	93-96	B	83-86%	C	73-76%	D	63-66%		
A-	90-92	B-	80-82%	C-	70-72%	D-	60-62%		

The goal of the R tutorials is to develop and demonstrate mastery of R concepts and tools. The tutorials will start out relatively simple at the beginning of the semester and become more challenging as the course progresses. You will begin the assignments in class and continue working on them outside of class if necessary. To pass the course and qualify for a grade you must submit at least 9 of the weekly R tutorials. To receive an A or A+ in the course you must complete at least one of the mini-projects.

Assignment due dates:

The due date for uploading R tutorials to Blackboard will be 11:59 p.m. on the Monday following Wednesday sessions.

Semester-long in-class participation and attendance:

We expect you to attend and **actively** participate in all class meetings by voicing your opinions and asking questions. You are responsible for all material covered in class whether or not you attend. If you anticipate that you must be absent from a class for a legitimate reason, please contact the instructors before your absence.

As part of each R tutorial, we will ask you to provide information on the amount of time that it takes you to complete the tutorial (including the exercises). This feedback helps the instructors improve the tutorials over the course of the semester and improve the course for future semesters. To receive full credit for in-class participation, you must provide this information for all of the R tutorials (10 total, 1 point each; 35% of your participation and attendance grade).

Late work:

To be fair to all students and to the instructor who is responsible for grading, **no late work** will be accepted after the item is due. To avoid losing data and to help you develop a sound workflow for data analysis and management, you are required to keep copies of all work, save your work **frequently**, and store back-up copies in **multiple locations**. We will not consider technology excuses such as lost, missing or stolen data.

Installing and using R on your personal computer:

We recommend that you install R on your personal computer for use outside of class. R can be downloaded for free from: <http://r-project.org/>. You may use your computer or one of the lab computers during the R computer labs. For help with installing R, see the video tutorials on "How to Install R for Mac" and "How to Install R for Windows" on YouTube. If necessary we can help you install R on your computer during office hours. We require that all students use the same default user interface that is included as part of the R installation. Other user interfaces such as RStudio contain more sophisticated features that can help with using R. You are welcome to use RStudio in this course, but the instructors will focus on teaching the basics of R using the standard R console and editor.

Academic integrity:

The academic integrity policy of Washington University in St. Louis states: "Effective learning, teaching and research all depend upon the ability of members of the academic community to trust one another and to trust the integrity of work that is submitted for academic credit or conducted in the wider arena of scholarly research. Such an atmosphere of mutual trust fosters the free exchange of ideas and enables all members of the community to achieve their highest potential. In all academic work, the ideas and contributions of others must be appropriately acknowledged, and work that is presented as original must be, in fact, original. Faculty, students, and administrative staff all share the responsibility of ensuring the honesty and fairness of the intellectual environment at Washington University."

The complete policy and procedures are available at: <http://studentconduct.wustl.edu/integrity/policy>. As a student at Washington University, it is your responsibility to become familiar with, understand, and abide by the standards outlined in this policy before performing any academic work. Ignorance of these policies is not a defense in cases of infringement.

Any person found using unauthorized assistance (including plagiarism, submitting work for more than one class without obtaining permission from all instructors, copying answers from another student's exam, or turning in group work to which you did not contribute) will be forwarded to the Committee for Student Academic Integrity. Students found guilty by the Committee will be given a grade of F for the course and be referred to the Dean for further action.

Laptops and cell phones:

You may bring laptops and phones to class but the sound must be muted. You may use your laptop for class activities such as computer assignments and note taking, but not for unrelated activities such as email, social media (e.g., Facebook, Twitter), text messaging, or web browsing, as these activities are very distracting to the other students and the instructors. You may not use your phone or text message during class. Students who use laptops or cell phones for non-class activities will have points deducted from their participation grade.

Resources to help you succeed:

Academic resources: The Natural Sciences Learning Center (NSLC) (nslc.wustl.edu) located in the Life Sciences building (near the greenhouse) has a computer lab and rooms available for study groups. Cornerstone offers free academic peer mentoring and training in learning skills (cornerstone.wustl.edu).

Accommodations based upon sexual assault: The University is committed to offering reasonable academic accommodations to students who are victims of sexual assault. Students are eligible for accommodation regardless of whether they seek criminal or disciplinary action. Depending on the specific nature of the allegation, such measures may include but are not limited to: implementation of a no-contact order, course/classroom assignment changes, and other academic support services and accommodations. If you need to request such accommodations, please direct your request to Kim Webb (kim_webb@wustl.edu), Director of the [Relationship and Sexual Violence Prevention Center](#). Ms. Webb is a confidential resource; however, requests for accommodations will be shared with the appropriate University administration and faculty. The University will maintain as confidential any accommodations or protective measures provided to an individual student so long as it does not impair the ability to provide such measures.

If a student comes to me to discuss or disclose an instance of sexual assault, sex discrimination, sexual harassment, dating violence, domestic violence or stalking, or if I otherwise observe or become aware of such an allegation, I will keep the information as private as I can, but as a faculty member of Washington University, I am required to immediately report it to my Department Chair or Dean or directly to Ms. Jessica Kennedy, the University's Title IX Director. If you would like to speak with directly Ms. Kennedy directly, she can be reached at (314) 935-3118, jwkennedy@wustl.edu, or by visiting the [Title IX office](#) in Umrath Hall. Additionally, you can report incidents or complaints to the Office of Student Conduct and Community Standards or by contacting WUPD at (314) 935-5555 or your local law enforcement agency. See: [Title IX](#). You can also speak confidentially and learn more about available resources at the Relationship and Sexual Violence Prevention Center by calling (314) 935-8761 or visiting the 4th floor of Seigle Hall. See: [RSVP Center](#)

Bias reporting: The University has a process through which students, faculty, staff and community members who have experienced or witnessed incidents of bias, prejudice or discrimination against a student can report their experiences to the University's Bias Report and Support System (BRSS) team. See: brss.wustl.edu

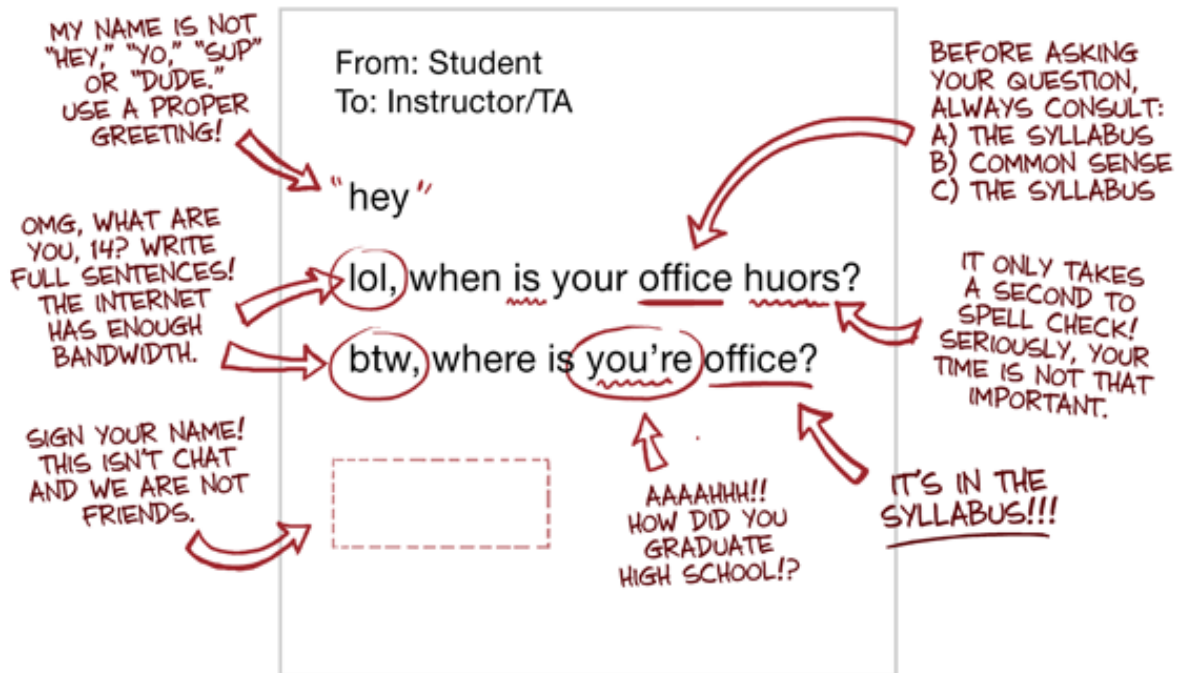
Mental health: Mental Health Services' professional staff members work with students to resolve personal and interpersonal difficulties, many of which can affect the academic experience. These include conflicts with or worry about friends or family, concerns about eating or drinking patterns, and feelings of anxiety and depression. See: shs.wustl.edu/MentalHealth

Technology: Computer labs are available in Olin Library, the NSLC, and other locations around campus. R will be installed on all computers in the NSLC for your use during and outside of labs.

Contacting us: Please feel free to email, call us, or to stop by office hours. Please allow 48 hours for email responses and do not wait until the last minute (e.g., after 5:00 p.m. or a weekend) to contact us, as we may be unavailable to reply. When e-mailing us, please strive to use professional email etiquette. For example, use clear subject lines, use a salutation to open your email, sign off with your full name, and avoid using informal phrases or words such as

“Hey” or textspeak; the PhD Comic below provides excellent examples of how not to compose an e-mail to us.

HOW TO WRITE AN E-MAIL TO YOUR INSTRUCTOR OR T.A.



WWW.PHDCOMICS.COM

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Course Schedule
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Please note that the schedule and topics are subject to change.

Workshop	Date	Topic:	Workshop Leader
1	8/29	Introduction to R & R Objects	Dr. Chris Shaffer
2	9/5	R Objects, Data Types & Functions	Dr. Chris Shaffer
3	9/12	R Operators & Indexing	Dr. Chris Shaffer
4	9/19	Graphics in R	Dr. Jonathan Myers
5	9/26	Importing, Summarizing & Exporting Data	Dr. Chris Shaffer
6	10/3	Loops & Re-Sampling	Dr. Sebastián Tello
7	10/10	Statistical Tools in R I – ANOVA, linear regression, t-tests	Chris Catano
	10/17	No class - Week of Fall Break	
8	10/24	Statistical Tools in R II – Logistic regression, non-parametric statistics, randomization tests	Chris Catano
9	10/31	Applications in Ecology	Dr. Jonathan Myers
10	11/7	Applications in Genomics	Dr. Chris Shaffer