

Purdue University
Department of Biochemistry
BCHM 421
R for Molecular Biosciences
Syllabus
Spring 2021

Instructor: Dr. Pete E. Pascuzzi
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Hours: WF, 4 - 5 via WebEx, other times by appointment.

Teaching Assistant: Matt Russon
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Hours: MH, 11 - 12 via WebEx, other times by appointment.

COURSE OBJECTIVES

Students will acquire, clean, explore and analyze biological data sets with R. Lectures and example data sets will show the link between data and complex biological phenomena through human observation or instrumentation. Students will learn how to organize data sets to optimize clarity and analytic possibilities while minimizing errors with examples drawn from the literature or biological databases. These skills will be taught in the light of enabling reproducible research through clear documentation of data sets and analyses. Relevant concepts from statistics will be reviewed, but it is assumed that students are familiar with basic statistical analyses.

LEARNING OUTCOMES

- Explain how complex biological phenomena are captured as data.
- Organize data sets by observations and variables using appropriate data types.
- Acquire, clean, and manipulate data sets and files programmatically.
- Develop data analysis workflows in R with clear documentation.
- Use R to manipulate and analyze DNA sequences.
- Use R to perform gene expression and pathway analysis.

TEXTBOOKS

We will occasionally use textbooks that are available free online. The Library also has many ebooks on R. I have provided two examples below. You may also use online forums such as [StackOverflow](#) to search for solutions. However, read the forum rules carefully before you post questions! R is very popular, so a well-crafted Google search will often reveal multiple solutions for your problems.

[R for Data Science](#), Garret Groolemund and Hadley Wickham

Statistical Inference via Data Science, Chester Ismay and Albert Y. Kim

Hands On Programming with R, Garret Groolemund

Introductory Statistics with R, Peter Daalgard

TIME AND PLACE

The official schedule for the class is below.

Session	Day	Time	Location
Lecture-Lab	WF	1:30 – 3:20	SC 179

BRIGHTSPACE

Brightspace will be used to distribute assignments, post announcements, handle questions, etc. Email should only be used for personal communications, e.g. to request an absence.

ASSESSMENT

Assessment will be achieved with regular quizzes and exercises, a midterm exam and two projects. The final grade will be determined with the following weighting:

Assignments	Grading (points)
Quizzes and short assignments	200
Lab exercises	200
Midterm exam	200
Final project	100
Final exam (semi-cumulative)	200
Class notebook	100
Attendance and participation	0 but monitored

Quizzes will be relatively short. These quizzes use standard Brightspace question formats. Short assignments will include activities like problem sets, software installation, or discussion posts.

Lab exercises are programming assignments. This is NOT a computer science course. You will not be graded on elegant or efficient programming. Rather, you will be graded on accurately completing the assignment.

The Midterm exam will use the Brightspace platform. Question formats will vary but will be similar to the Quizzes.

The Final exam follows the same format as the Midterm exam. It is semi-cumulative in that you must rely on content from across the semester. However, the primary objective is to test you on material from the last half of the class.

The Class Notebook is a document that you will create throughout the semester. Each week, and possibly every day, you must create entries in this Notebook that list, synthesize or apply concepts from the course. This is your opportunity to be creative and have fun with the course content!

Attendance and participation is critical for your success in the course. I am generally generous with excused absences, but you must contact me in advance or provide a medical excuse. I will use attendance when I assign your final letter grade. If you had excellent attendance and participation, I may round your letter grade up, e.g. 896 could be an A, but 895 would still likely be a B.

There are 1000 possible points in this class. The maximum possible points that you can earn for each assessment are listed above. For example, I will assign at least 200 points worth of quizzes. After you earn 200 points for the quizzes, you have maxed out. The quizzes are then essentially optional but will certainly help to prepare you for other exams and exercises.

GRADING SCALE

Score	Grade	Score	Grade
900 points and above	A	600 to 699 points	D
800 to 899 points	B	599 points and below	F
700 to 799 points	C		

EXTRA CREDIT

No extra credit is possible.

OBTAINING EXTRA HELP

Professor Pascuzzi and the teaching assistant, Matt Russon, will do our best to provide extra help as needed. Please take advantage of the virtual office hours or schedule an online meeting.

ACADEMIC MISCONDUCT

Academic misconduct of any kind will not be tolerated in any course offered by the Department of Biochemistry. For specifics, please refer to [Purdue's Regulations Governing Student Conduct](#)

Any incidence of academic misconduct will be reported to the Office of the Dean of Students. Academic misconduct may result in disciplinary sanctions including expulsion, suspension, probated suspension, disciplinary probation, and/or educational sanctions. In addition, such misconduct will result in punitive grading such as:

- receiving a lower or failing grade on the assignment, or
- assessing a lower or failing grade for the course

Punitive grading decisions will be made after consultation with the Office of the Dean of Students. Please note reported incidences of academic misconduct go on record for reference by other instructors. Further, a record of academic misconduct is likely to influence how current/future situations are handled.

To provide you with an unambiguous definition of academic misconduct, the following text has been excerpted from “Academic Integrity: A Guide for Students”, written by Stephen Akers, Ph.D., Executive Associate Dean of Students (1995, Revised 1999, 2003), and published by the Office of the Dean of Students in cooperation with Purdue Student Government, Schleman Hall of Student Services, Room 207, 475 Stadium Mall Drive West Lafayette, IN 47907-2050.

Purdue prohibits “dishonesty in connection with any University activity. Cheating, plagiarism, or knowingly furnishing false information to the University are examples of dishonesty.” [Part 5, Section III-B-2-a, Student Regulations] Furthermore, the University Senate has stipulated that “the commitment of acts of cheating, lying, and deceit in any of their diverse forms (such as the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during examinations) is dishonest and must not be tolerated. Moreover, knowingly to aid and abet, directly or indirectly, other parties in committing dishonest acts is in itself dishonest.” [University Senate Document 72-18, December 15, 1972]

More specifically, the following are a few examples of academic dishonesty which have been discovered at Purdue University.

- substituting on an exam for another student
- substituting in a course for another student
- paying someone else to write a paper and submitting it as one’s own work
- giving or receiving answers by use of signals during an exam
- copying with or without the other person’s knowledge during an exam
- doing class assignments for someone else
- plagiarizing published material, class assignments, or lab reports
- turning in a paper that has been purchased from a commercial research firm or obtained from the internet
- padding items of a bibliography
- obtaining an unauthorized copy of a test in advance of its scheduled administration
- using unauthorized notes during an exam
- collaborating with other students on assignments when it is not allowed
- obtaining a test from the exam site, completing and submitting it later
- altering answers on a scored test and submitting it for a regrade
- accessing and altering grade records
- stealing class assignments from other students and submitting them as one’s own
- fabricating data
- destroying or stealing the work of other students

Plagiarism is a special kind of academic dishonesty in which one person steals another person's ideas or words and falsely presents them as the plagiarist's own product. This is most likely to occur in the following ways:

- using the exact language of someone else without the use of quotation marks and without giving proper credit to the author
- presenting the sequence of ideas or arranging the material of someone else even though such is expressed in one's own words, without giving appropriate acknowledgment
- submitting a document written by someone else but representing it as one's own

CLASS ATTENDANCE

Attendance Policy during COVID-19: Students should stay home and contact the Protect Purdue Health Center (496-INFO) if they feel ill, have any symptoms associated with COVID-19, or suspect they have been exposed to the virus. In the current context of COVID-19, in-person attendance will not be a factor in the final grades, but the student still needs to inform the instructor of any conflict that can be anticipated and will affect the submission of an assignment or the ability to take an exam. Only the instructor can excuse a student from a course requirement or responsibility. When conflicts can be anticipated, such as for many University-sponsored activities and religious observations, the student should inform the instructor of the situation as far in advance as possible. For unanticipated or emergency conflict, when advance notification to an instructor is not possible, the student should contact the instructor as soon as possible by email, through Brightspace, or by phone. When the student is unable to make direct contact with the instructor and is unable to leave word with the instructor's department because of circumstances beyond the student's control, and in cases of bereavement, quarantine, or isolation, the student or the student's representative should contact the Office of the Dean of Students via email or phone at 765-494-1747. Our course Brightspace includes a link on Attendance and Grief Absence policies under the University Policies menu.

ACADEMIC GUIDANCE IN THE EVENT A STUDENT IS QUARANTINED/ISOLATED

If you become quarantined or isolated at any point in time during the semester, in addition to support from the Protect Purdue Health Center, you will also have access to an Academic Case Manager who can provide you academic support during this time. Your Academic Case Manager can be reached at acmq@purdue.edu and will provide you with general guidelines/resources around communicating with your instructors, be available for academic support, and offer suggestions for how to be successful when learning remotely. Importantly, if you find yourself too sick to progress in the course, notify your academic case manager and notify me via email or Brightspace. We will make arrangements based on your particular situation. The Office of the Dean of Students (odos@purdue.edu) is also available to support you should this situation occur.

PROTECT PURDUE PLAN

The Protect Purdue Plan, which includes the Protect Purdue Pledge, is campus policy and as such all members of the Purdue community must comply with the required health and safety guidelines. Required behaviors in this class include: staying home and contacting the Protect Purdue Health Center (496-INFO) if you feel ill or know you have been exposed to the virus, wearing a mask in classrooms and campus buildings, at all times (e.g., no eating/drinking in the classroom), disinfecting desk/workspace prior to and after use, maintaining proper social distancing with peers and instructors (including when entering/exiting classrooms), refraining from moving furniture, avoiding shared use of personal items, maintaining robust hygiene (e.g., handwashing, disposal of tissues) prior to, during and after class, and following all safety directions from the instructor.

Students who are not engaging in these behaviors (e.g., wearing a mask) will be offered the opportunity to comply. If non-compliance continues, possible results include instructors asking the student to leave class and instructors dismissing the whole class. Students who do not comply with the required health behaviors are violating the University Code of Conduct and will be reported to the Dean of Students Office with sanctions ranging from educational requirements to dismissal from the university.

Any student who has substantial reason to believe that another person in a campus room (e.g., classroom) is threatening the safety of others by not complying (e.g., not wearing a mask) may leave the room without consequence. The student is encouraged to report the behavior to and discuss next steps with their instructor. Students also have the option of reporting the behavior to the Office of the Student Rights and Responsibilities. See also Purdue University Bill of Student Rights.

EMERGENCY PREPAREDNESS

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. To get information about changes in this course consult the class PURR site or e-mail or phone the instructor.

ON-LINE COURSE EVALUATIONS

During the last two weeks of the semester, you will be provided an opportunity to evaluate this course and your instructor(s). To this end, Purdue has transitioned to online course evaluations. On Monday of the fifteenth week of classes, you will receive an official email from evaluation administrators with a link to the online evaluation site. You will have two weeks to complete this evaluation. Your participation in this evaluation is an integral part of this course. Your feedback is vital to improving education at Purdue University. I strongly urge you to participate in the evaluation system.

NON-DISCRIMINATION POLICY STATEMENT

Purdue University's non-discrimination policy will be upheld in this classroom. Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life.

Purdue University views, evaluates, and treats all persons in any University related activity or circumstance in which they may be involved, solely as individuals on the basis of their own personal abilities, qualifications, and other relevant characteristics.

In this course, each voice in the classroom has something of value to contribute. Please take care to respect the different experiences, beliefs and values expressed by students and staff

involved in this course. We support Purdue's commitment to diversity, and welcome individuals of all ages, backgrounds, citizenships, disability, sex, education, ethnicities, family statuses, genders, gender identities, geographical locations, languages, military experience, political views, races, religions, sexual orientations, socioeconomic statuses, and work experiences

For more information, see http://www.purdue.edu/purdue/ea_eou_statement.html

MENTAL HEALTH

Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at (765)494-6995 or <http://www.purdue.edu/caps/> after hours, on weekends and holidays, or by going to the CAPS office of the second floor of the Purdue University Student Health Center (PUSH) during business hours.

ACCESSIBILITY AND ACCOMODATIONS

Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: drc@purdue.edu or by phone: 765-494-1247.

DISCLAIMER

This syllabus is subject to change.