Fall 2018

MCDB 1171

Drug Discovery I

Instructors:
Pamela Harvey, PhD
Maureen Bjerke, PhD

Contact Information for Instructors:

Sections 3, 4, 5:
Pamela Harvey, PhD
E-Mail: pamela.harvey@colorado.edu
Office: 303-735-3245
Mobile: 617-501-4175
Office Hours: Fridays 1-3 pm, location TBA

Sections 1, 2, 6:
Maureen Bjerke, PhD
E-Mail: maureen.bjerke@colorado.edu
Office: 303-735-3245
Mobile: 303-917-3204
Office Hours: Tuesdays, 10 am – 12 pm, location TBA

Professional Research Assistant
Erin Snyder
erin.l.snyder@colorado.edu

Overview

Students will participate in a research project related to the research of Dr. Corrie Detweiler (http://mcdbiology.colorado.edu/labs/detweiler/). The aim of the project is to identify novel antibiotics by evaluating effectiveness of compounds in cultured bacteria (*Salmonella*). Students will culture bacteria and screen compounds from a library obtained from the National Cancer Institute.

Course Objectives

The overriding goal of MCDB 1171 is to provide students with experience in a number of common molecular biology concepts and research techniques including approaches to screening for new therapeutics, statistical analyses, and presentation of data to the scientific community. Unlike laboratory exercises that are designed to reinforce concepts that accompany lecture topics, there is no certainty that any one particular project will succeed, which reflects the inherent risks of novel research.

We aim for students to achieve the following course objectives:

1. Understand how the data contributes to the research being performed in the Detweiler lab and also to drug discovery in general,
2. Obtain experience in bacteriologic culture methods,

Experimental Milestones

- Production of a reliable standard curve using protein as a measure of pipetting technique
- Perform antibiotic titration using Salmonella as a second measure of pipetting technique
- Dilute Salmonella culture to 96 well plate
- Expose Salmonella to a set of antibiotic candidates
- Quantify survival compared to negative controls
- Calculate average and standard deviation of potential hits
- Validate candidate compounds

3. Participate in drug screen experiments to identify compounds with potential therapeutic value,
4. Statistically evaluate experimental data and interpret significance of results,
5. Present data to faculty members, peers, and the public during a research poster session,
6. Understand and be able to describe previous research on chosen compound(s),
7. Understand and be able to describe how the data relate to previous research.

Curriculum Overview

Topics covered in MCDB 1171 include:

1. Methods of novel therapeutic discovery,
2. Model organism review- strengths, weaknesses, and making good choices,
3. Salmonella biology,
4. Macrophage biology and mechanisms of *Salmonella* infection,
5. Antibiotics and evolution of antibiotic resistance,
6. Medicinal chemistry,
7. Drug discovery and clinical trials,
8. Bioethics, biostatistics, and data reporting,
9. Scientific method and experimental design,
10. Presentation and defense of scientific data.

Required Materials

Students are not required to purchase materials for this course. All reading materials will be provided at no cost on Canvas. Safety equipment, reagents, and disposables are purchased by the course using student fees.

Teaching Assistant Contact Information:

Section -011, Mondays & Wednesdays 10 am – 11:50 am
Diana Flores diana.flores@colorado.edu
Cindy Fu xinyi.fu@colorado.edu

Section -012, Mondays & Wednesdays 1 pm – 2:50 pm
Andy Walowitz andrew.walowitz@colorado.edu
Marissa Martin-Wegryn mama4099@colorado.edu

Section -013, Mondays & Wednesdays 3 pm – 4:50 pm
Erin Kneeskern erin.kneeskern@colorado.edu
Jack Schutz josc7905@colorado.edu
Marisela Gonzalez-Cruz mago5967@colorado.edu

Section -014, Tuesdays & Thursdays 10 am – 11:50 pm
Daniel Ahrens daniel.ahrens@colorado.edu
Michaela Nelsen michaela.nelsen@colorado.edu

Section -015, Tuesdays & Thursdays 12 pm – 1:50 pm
Daniel Ahrens daniel.ahrens@colorado.edu
Jack McLeod jack.mcleod@colorado.edu

Section -016, Tuesdays & Thursdays 2 pm – 3:50 pm

Katie Franks katie.franks@colorado.edu
Emily Oddo emily.oddo@colorado.edu

Evaluation

Grading is calculated based on assignments submitted throughout the semester, laboratory work, and presentation and defense of research. Note that 52.5% of the final grade is derived from cumulative assignments submitted during the last two weeks of class (exam #2, lab notebook, poster session, specific aims page).

All assignments must be submitted electronically through Canvas. **No paper or email submissions will be accepted.** Always be sure to receive and save confirmation of submission from Canvas in case there are problems with the submission. Without this confirmation, the assignment will be graded as late.

Lab participation 10%

Evaluation of participation is based on qualities that make a student a desirable lab member. For example: maintenance of a clean and orderly workspace, contribution to group projects, quality of collaboration, engagement in lecture and activities, attendance, and promptness in lab. **Cell phone use is strictly prohibited in lab**, so use of cell phones will reduce the participation grade.

Quizzes & Critical Thinking Assignments 45%

Quizzes are assigned once per week and are completed on Canvas. Questions are randomized, and two attempts are allowed with the highest grade prevailing. Quizzes are 50% cumulative, 25% new content material, and 25% new lab material.

Midterm Exam 10%

One cumulative exam is administered that covers weeks 1-13. The exam will be administered during the main lecture period. There is no final exam for this course.

Lab notebook 10%

Students are required to follow the guidelines provided in class for maintaining laboratory notebooks. Each component of the lab notebook is graded for every laboratory procedure performed in the lab. Two unannounced spot checks will be performed during the semester; each spot check is 25% of the final lab notebook grade. Documentation for the independent project represents 50% of the final lab notebook grade.

Poster Session 15%

Students present their research in groups at the fall 2018 CURE Symposium (www.CUREsymposium.org). The symposium will be held on Monday, December 10, 5:30-8:30 pm at the University Memorial Center Glenn Miller Ballroom. Grading is based on quality of proposed study (20%), preparation of the poster (25%) and instructor/TA/peer assessment (55%).

Specific Aims Page 10%

At the end of the semester, students prepare a "specific aims" page, a common format for presenting a summary of a grant proposal. Grading is based on a rubric discussed in class. Specific aims pages may be submitted individually or as a group.

NOTE: 35% of the final grade is determined in the last two weeks of class.

Numerical Grade	*Letter Grade*
≥ 92.5	A
≥ 90.0	A-
≥ 87.5	B+
≥ 82.5	B
≥ 80.0	B-
≥ 77.5	C+

≥ 72.5	C
≥ 70.0	C-
≥ 67.5	D+
≥ 62.5	D
≥ 59.5	D-
< 59.5	F

Standard rounding practices will be used. Grades with a tenth decimal place equal to or above 5 will be rounded to the next whole number. There is NO CURVE at any time in this course, and no grades will be dropped.

Extra credit assignments may be available. Extra credit points will be added to the quizzes category.

Attendance policy

Attendance is mandatory. Because lab courses are participatory, your physical presence is required during every class. You will be allowed one unexcused absence without adversely affecting your grade. Each additional unexcused absence will result in a 10-point deduction from the final lab participation grade. An unexcused absence is defined as failure to notify the course instructor prior to the start of the class from which you will be absent. Notification must also be provided for scheduled exams in other courses that conflict with the meeting time of your section. Notification can be in the form of personal communication, email, or contact by cell phone (text or voicemail). If you miss two or more consecutive classes due to illness, a doctor's note will be required. If you miss a class, it is your responsibility to keep experiments on schedule by attending one or more Friday open lab sessions.

Late Assignments

Late assignments will be accepted, however, 25% will be deducted from the earned score within 2 days of the due date. Work submitted later than 2 days after the due date will receive a 0. It is always beneficial to submit a late assignment. A zero on an assignment can significantly decrease the final grade. As with any assignment, always be sure to receive and save confirmation of submission from Canvas in case there are problems.

Laboratory Safety

While working with bacteria, students are required to adhere to University of Colorado Boulder Environmental Health & Safety (EH&S) requirements and procedures. Briefly, students will use personal protective equipment including aprons, goggles, and gloves. Additionally, closed-toe shoes must be worn. No food or drink will be allowed in the lab once work with *Salmonella* begins. Completion of the EH&S Basic Biosafety course and evaluation is also required before work with bacteria begins.

Laboratory Conduct

Both students and faculty each have responsibility for maintaining an appropriate learning environment. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, color, culture, religion, creed, politics, veteran's status, sexual orientation, gender, gender identity and gender expression, age, disability, and nationalities. Class rosters are provided to the instructor with the student's legal name. The instructors will gladly honor your request to address you by an alternate name or

gender pronoun. Please advise the instructors of this preference early in the semester so that we may make appropriate changes to the records. See policies at http://www.colorado.edu/policies/classbehavior.html and at

Plagiarism and Academic Dishonesty

As commonly defined, plagiarism consists of claiming the ideas, words, or writings that belong to another as your own. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you have the permission of that person. In this course, placing quotes around a statement or statements is unacceptable, even when the source is cited. Plagiarism is one of the most serious forms of academic misconduct. A student accused of academic dishonesty will either accept the accusation made by a faculty member or request a hearing before a student panel, who will make a decision on the accusation of academic dishonesty. In addition to academic sanctions imposed by the faculty, students found guilty of academic dishonesty also face consequences from the honor code council ranging from attending a mandatory class in ethics to expulsion from the campus. More information about CU-Boulder's Honor Code may be found at www.colorado.edu/honorcode/.

All lectures, handouts and other materials used in this course (including those provided in Canvas) are copyrighted. Because these materials are copyrighted, you do not have the right to reproduce, transmit, provide or receive these materials without explicit permission of the instructor/authors. Any other use of these materials is considered "unauthorized" and is therefore a form of academic dishonesty.

Students with Disabilities

If you qualify for accommodations because of a disability, please submit a letter from Disability Services in a timely manner so that your needs may be addressed. Disability Services determines accommodations based on documented disabilities. Contact: 303-492-8671, Willard 322, and http://www.Colorado.edu/disabilityservices.

Religious Observances

Campus policy regarding religious observances requires that faculty make every effort to reasonably and fairly deal with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. Students must inform instructors at least two weeks prior to absence due to a religious obligation. See full details at: http://www.colorado.edu/policies/fac_relig.html

Discrimination and Harassment

The University of Colorado does not discriminate on the basis of race, color, national origin, sex, age, disability, creed, religion, sexual orientation, or veteran status in admission and access to, and treatment and employment in, its educational programs and activities. (Regent Law, Article 10, amended 11/8/2001). CU Boulder will not tolerate acts of discrimination or harassment based upon Protected Classes or related retaliation against or by any employee or student. For purposes of this CU Boulder policy, "Protected Classes" refers to race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, or veteran status.

The Discovery Lab is considered a Safe Zone and aims to create an inclusive and supportive environment for everyone.

We encourage students to address issues with individuals in the presence of the instructor. Private meetings will be arranged if requested. If a student feels uncomfortable addressing a problem with an individual directly, contact the

appropriate faculty. For issues related to peers or TAs, contact Pamela Harvey. For issues related to the instructor, contact the chair of MCDB.