

BIOL 411/511: Advanced Genetics
(3 credits)
NEW MEXICO INSTITUTE OF MINING AND TECHNOLOGY
SPRING 2020
T/Th 11:00 AM-12:15 PM

INSTRUCTOR:

Dr. Linda C. DeVeaux
Office Jones Annex 209
Office Hours: MWF 11-11:50; TTh 12:30-1:30, or by appointment
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COURSE DESCRIPTION:

A study of current topics in genetics, including the molecular basis of gene structure and action in eukaryotes and/or prokaryotes.

COURSE REQUIREMENTS:

Required textbook: Molecular Genetics of Bacteria, 4e. Snyder, et al.

Supplementary reading material will be provided online and should be considered required reading unless designated otherwise. All students should read the chapters in the textbooks prior to each class meeting. They are also required to attend the class regularly.

Students are expected to:

- attend class regularly
- read the associated chapters in the textbook prior to class
- check Canvas and NMT email for class announcements at least daily
- complete and turn in homework
- participate in class discussions and problems
- take exams at the scheduled time
- ASK QUESTIONS IN CLASS OR COME TO OFFICE HOURS

PREREQUISITES: BIOL 311 and either BIOL 333 or BIOL 341, or permission of instructor

PLACE IN CURRICULUM: This is a senior/graduate level course for majors in Biology or related graduate programs.

COURSE GOALS:

- To explore the principles and unique aspects of prokaryotic structure, diversity and DNA metabolism
- To recognize the molecular mechanisms underlying prokaryotic replication, gene expression and adaptations to changing environments
- To recognize the unique life cycles of prokaryotic viruses
- To understand the biotechnological applications of prokaryotic molecular biology

STUDENT LEARNING OUTCOMES:

- After completion of this course, students are expected to be able to
- Explain the general characteristics of prokaryotic cells

- Understand the molecular and genetic bases of cell division, genetic transfer, cell signaling, replication and gene expression
- Recognize the fundamental differences between prokaryotes and eukaryotes, and
- Interpret scientific literature

DESCRIPTION OF INSTRUCTIONAL METHODS:

The class is primarily based on lectures, delivered as PowerPoint presentations, which will be made available as .pdf files online following each lecture. Student participation in discussion and review is an essential component of the course, and will be incorporated into grading.

PROGRAM EDUCATIONAL OBJECTIVES:

Our graduates will be able to use basic principles of science to analyze, to explain, and to apply biological information and concepts. Our graduates will be able to design and implement biological research and report findings orally and in writing.

USE OF ELECTRONIC DEVICES:

Cell phones must be set to “vibrate” during lectures. No recording of lectures will be permitted, except through the ACT. No electronic devices will be allowed during exams. Calculators may be allowed at instructor discretion.

EVALUATION PROCEDURES:

There will be three take-home midterm exams, worth 100 points each, and a cumulative final exam, worth 200 points. Grades will be determined by the total number of points earned during the semester. However, instead of setting the high point total of 500 points as the standard, the high undergraduate point total earned in the class will be used and set as 100%. For example, if the high point total earned in the class is 420 points, all students with more than 378 points ($0.9 \times 420 = 378$) will earn A's, no matter what fraction of the class that is. You will be informed of the high score earned on each exam as the exams are returned. Since you will know your own score on each exam, you can keep track of your place in the grading scale at all times. Scores will be recorded on Canvas.

Exam rewrites: I will allow rewrites of written questions on the exams. These may be turned in no later than 1 week following the return of the exam. You will have the opportunity to earn up to one-half of the points you lost on each of the questions that you choose to re-address. Note that this is completely voluntary on your part; it will not be required of anyone! Any points so earned will be treated as extra credit; that is, they will not play a role in determining the high point total earned in the class. That will be determined on the basis of the grades earned directly on the exam. See “Rules for Re-evaluation of Exams” below.

Graduate student will be required to submit short reports of five journal articles relating to aspects of microbial (eukaryotic, bacterial or archaeal) genetics. The specific articles to be reviewed are not assigned, but are to be determined by each student on the basis of individual interests. The articles are to be selected from the literature published within the past three years. The reports are to be turned in no later than the dates noted on

the schedule, but may be turned in early. For more specific directions for these reports, see “Graduate Student Reports”.

All students are required to take the exams by the scheduled times.

Grading scale: 100-90, A; 89-80, B; 79-70, C; 69-60, D; <60, F.

Grades will be determined on a percentage, but the instructor reserves the option to grade on a curve, if overall scores are sufficiently low.

TENTATIVE COURSE SCHEDULE:

Date	Chapter	Topic
January 14-February 6 (8 lectures) February 13	Introduction, 1,2,3	Genotype to Phenotype Exam 1 due
February 11-March 3 (7 lectures) March 10	4, 5, 6, 7, 8	Plasmids/phage Exam 2 due
March 5-April 14 (10 lectures) April 21	9, 10, 11, 12,	Transposons/Repair/Regulation Exam 3 due
April 16-April 28 (4 lectures)	13, 14	Bacterial Cell biology/sporulation Catch-up/review
April 30-May 5		Final Exam

Graduate student reports are due on the following dates:

February 4
February 25
March 24
April 9
April 28

Counseling and Disability Services:

Reasonable Accommodations

New Mexico Tech is committed to protecting the rights of individuals with disabilities. Qualified individuals who require reasonable accommodations are invited to make their needs known to the Office of Counseling and Disability Services (OCDS) as soon as possible. To schedule an appointment, please call 835-6619.

Counseling Services

New Mexico Tech offers mental health and substance abuse counseling through the Office of Counseling and Disability Services. The confidential services are provided free of charge by licensed professionals. To schedule an appointment, please call 835-6619.

ACADEMIC MISCONDUCT:

Academic Honesty:

New Mexico Tech's Academic Honesty Policy for undergraduate students is found in the student handbook:

http://www.nmt.edu/images/stories/student_univ_relations/NMT%20Student%20Handbook%202016-17.pdf

You are responsible for knowing, understanding, and following this policy. Acts of dishonesty in class activities include cheating on exams and quizzes, and copying text from ANY source, including the internet, and passing it off as your own work. Copying of homework answers from the internet, for example, is considered cheating (and plagiarism). Instructors are obligated to report dishonesty, and I will follow University policy. Violators will be given an appropriate penalty, such as reduction of grade or expulsion from the class.

Respect Statement:

New Mexico Tech supports freedom of expression within the parameters of a respectful learning environment. As stated in the New Mexico Tech Guide to Conduct and Citizenship: "New Mexico Tech's primary purpose is education, which includes teaching, research, discussion, learning, and service. An atmosphere of free and open inquiry is essential to the pursuit of education. Tech seeks to protect academic freedom and build on individual responsibility to create and maintain an academic atmosphere that is a purposeful, just, open, disciplined, and caring community."

RULES FOR RE-EVALUATION OF EXAMS

1. Re-evaluation will **not** be applied to definitions.
2. Re-write points will **not** be allowed for identification of the correct answer on qualified multiple choice questions, since that answer will have been identified on the exam
3. For consideration, you must turn in both your exam and your re-written answers; **do not** change the answers on the exam.
4. Your re-written answers **must** stand alone. The new answer must address the exam question completely, just as if that were the first time you had attempted to answer that question. I will look at your original answers only to determine how many, if any, additional credit points are to be given for the new answer.
5. To facilitate re-evaluation, put your re-written answers on fresh paper (**do not** try to write them on your exam paper) and clearly indicate which questions you are addressing.
6. You **do not** have to submit new answers for every question on the exam; you can address only those questions you choose.
7. **BE SURE** to put your name on both you exam and your fresh sheets; I do not retain the exam sign-out sheets so it will not be possible for me to determine who should get the credit based on exam numbers.
8. It will make things much easier for me if your new answers are typed and printed out, and not hand-written, but that is not required. At the very least, make an effort to write as legibly as possible. If I can't read it, I can't grade it.
9. To be on the safe side, it would be a good idea to staple all fresh sheets to your exam (and I don't carry a stapler with me!). Doing so will minimize the possibility that I will lose some or all of them.
10. **Just like the exams, the re-writes are to be your own work! You can use your text and/or notes but do not work with anyone else in developing your new answers. As it would on exams, working with someone else will be considered cheating, and I will deal with it accordingly. Also, please see the handout on Plagiarism at the Idaho State University Student Success Center website:**

<http://www.isu.edu/success/writing/handouts/plagiarism.pdf>

Graduate student reports

In addition to the exams, graduate students will be required to submit short reports of five journal articles relating to aspects of microbial genetics. The specific articles to be reviewed are not assigned, but are to be determined by each student on the basis of individual interests. The articles are to be selected from the literature published within the past three years. The reports are to be turned in no later than the dates noted on the schedule, but may be turned in early if the student wishes. Individual reports are not to exceed two pages in length and are to include the title of the article, authors' names, the journal citation, a brief discussion of the background for the research done (Why was it done?), a brief discussion of the techniques used (How was it done?) and the results obtained (What did they find?), and a discussion of the conclusions reached by the authors (What did they conclude and why?). In addition, where appropriate, you should provide your personal evaluation of the work done and the analyses applied (Did the authors use the best techniques? Did they reach reasonable conclusions based on the data reported? Were there any noticeable omissions in the manuscript?). These reports will be graded on a 1-10 point scale, primarily being evaluated on the clarity of the presentation and the relation of the work to some specific principle of microbial genetics. A rubric will be provided. Because of the higher possible point total, graduate students will be graded separately from undergraduates, using the same general grading method described above, but with a point total of 550.

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