MCB 304-Molecular Genetics

Course meeting location and times:
R P Harvill Bldg, Rm 150
Mon: 3:00 – 3:50pm, Wed and Fri: 3:00 – 4:15pm
(Honors section: Life Sciences South, Rm 240; Wed: 9:00-9:50am)

Description of Course
This four unit course will cover the foundations of genetics and genomics: 1) how cells and organisms transmit information to the next generation, 2) how the phenotypes of cells and organisms are connected to the information encoded within a DNA template, and 3) how DNA sequencing and recombinant DNA technology can be used to sequence and analyze the entire set of DNA in cells. In the first half of the course, the topics will include the mechanisms of genetic transmission, basis of traits, genome replication, and gene expression. The focus of the second half of the course will be to synthesize our understanding of these fundamental processes and to explore their application to the analysis of a wide range of biological phenomena.

Course prerequisites:
MCB 181R and MCB 181L, Introductory Biology I and Laboratory
CHEM 105A and CHEM 106A or CHEM 151, General Chemistry I
CHEM 105B and CHEM 106B or CHEM 152, General Chemistry II

Recommended: CHEM 241A and CHEM 241B, Organic Chemistry I and II

Instructors:
Dr. Andrew Paek (apaek@email.arizona.edu),
Office hours: Tues 3-5, LSS 331, 8/26/19 – 10/18/19
Dr. Tim Bolger (tbolger@email.arizona.edu)
Office hours: Thurs 1-3, LSS 425, 10/21/19 – 12/11/19

Teaching Assistants:
TBD

Course Objectives
In this course students will learn how:
- An organism’s genotype leads to phenotype and the molecular mechanisms that connect them.
- Alterations in the genetic code lead to disease and are inherited.
- Recombinant DNA and other modern technologies can be used to manipulate genes.
- These concepts are applied to biological and biomedical research.

Expected Learning Outcomes
After completing this class, students will be able to:
• Use pedigrees to identify patterns of inheritance and calculate the probability of phenotypes.
• Draw the different stages of meiosis and their genetic implications.
• Perform analysis of complementation groups.
• Determine the ordering of genes on a chromosome using linkage analysis, including for chromosomal rearrangements.
• Design strategies for cloning a gene of interest.
• Recognize and manipulate DNA sequences and genomic data.
• Apply the concepts of genetics and mutation to understand the molecular pathology of diseases.
• Dissect molecular pathways and the functional relationships between gene products using genetic interactions.
• Apply modern genetic techniques to examine biological and biomedical research questions.
• Evaluate ethical dilemmas in genetic testing and treatment.

**Required text and other required materials:**
All Course materials are being delivered digitally via D2L through the Inclusive Access program. This includes: 1. a digital copy of *Essentials of Genetics* by Klug, Cummings, Spencer and Palladino, 9th edition 2. MasteringGenetics an online program used for Homework Quizzes and 3. Learning Catalytics which will be used for in class exercises.

Please access the material through D2L on the first day of class to make sure that there are no issues with delivery so any problems can be addressed quickly. You can find instructions on how to access these materials in the content section of the D2L site in the file “Accessing Course Materials”.

You automatically have access to the course materials FREE through September 8, 2019.

You must take action (even if you have not accessed the materials) to opt-out if you do not wish to pay for the materials, and choose to source the content independently. The deadline to opt-out is September 8, 2019.

If you do not opt-out and choose to retain your access, the cost of the digital course materials will appear on your September Bursars account.

Please refer to the Inclusive Access FAQs at https://shop.arizona.edu/textbooks/Inclusive.asp for additional information.

**For individuals that wish to opt out of inclusive access** you need to obtain *Essentials of Genetics* by Klug, Cummings, Spencer, and Palladino, 9th edition with MasteringGenetics (ISBN 9780134047201). This is a hard copy version of the text with MasteringGenetics. There is also a loose-leaf version with access to Mastering Genetics (ISBN 9780134319070) If you purchase one of these text
packages (using any of the aforementioned ISBNs), you will also have access to the MasteringGenetics site, to an electronic version of the textbook, and to Learning Catalytics, a classroom “clicker” app.

If you purchase a used copy of the textbook, purchase only the textbook from another vendor, or use a copy purchased by a friend, etc., you must purchase access to MasteringGenetics, which can be accomplished at www.masteringgenetics.com. Information about how to log in, how to set up your MasteringGenetics account, how to connect to the MCB 304 course, and how to gain access to Learning Catalytics, is found on the course D2L site.

**Grading policies:**
University policy regarding grades and grading systems is available at: http://catalog.arizona.edu/policy/grades-and-grading-system

Requests for incompletes (I) and withdrawal (W) must be made in accordance with university policies, which are available at: http://catalog.arizona.edu/policy/grades-and-grading-system#incomplete and http://catalog.arizona.edu/policy/grades-and-grading-system#Withdrawal, respectively.

Grade evaluations will be determined by the following criteria:

- **4 exams** – Each exam is worth 15% of your final grade (150 points). The scores for each exam will be adjusted so that the average of the top 5% of raw scores equals 150 points. For example, if the average of the top 5% of raw scores is 139, then your adjusted score will be your raw exam score plus 11. The 4th exam will be scheduled for the final exam period but will not be cumulative.

- **In-class work** – 10% of your final grade is determined by participation in problem-solving via Learning Catalytics and worksheets during class. Students will be allowed up to 3 absences from in-class work for the semester – absences beyond this will generally not be credited (see attendance policy). Attempts to feign class attendance (e.g. by logging into Learning Catalytics and answering in-class questions from a remote location) will be treated as violations of academic integrity.

- **Homework quizzes** – Homework quizzes will be online on Mastering Genetics or D2L and generally will be available one week prior to their due date. The average score of all quizzes is worth 30% of your final grade. You will be allowed two attempts, with your best score being recorded. Late work will be accepted up to one week after the due date, with a deduction of 15% for each day late. Please note that Mastering Genetics grades on a question-by-question basis, so all questions answered correctly before the due date will receive full credit. Questions answered after the due date will receive a 15% reduction for each day late. For D2L quizzes, the quiz must be submitted by the due date to receive full credit.
credit. For late D2L assignment submissions, you must request the instructor to grant access.

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<tr>
<th>Assignment</th>
<th>Value</th>
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<tbody>
<tr>
<td>Exam 1</td>
<td>150</td>
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<td>Exam 2</td>
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<td>Exam 3</td>
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<td>Exam 4</td>
<td>150</td>
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<tr>
<td>In-class exercises</td>
<td>100</td>
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<tr>
<td>Homework quizzes</td>
<td>300</td>
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<tr>
<td>Total Possible Points</td>
<td>1000</td>
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For students in the Honors section, up to 100 additional points will be awarded based on your work in the Honors section. Thus, for Honors students, 1100 total possible points are available.

Final letter grades are based on the following scale:
- 90-100%  A
- 80-90%    B
- 70-80%    C
- 60-70%    D
- Below 60%  E

Students not appearing for exams without an official excuse will receive a 0 for the exam. Generally, there will be no makeup exams. If there is an official excuse, your other exams will be averaged to assign a grade for the missed exam. In the rare case that two or more exams are missed with an official excuse, the situation will be dealt with on an ad-hoc basis.

Requests for re-grades must be submitted to the instructor within two weeks from the date of receiving the exam. Requests must be sent electronically with a coherent justification for why more points should be given. Exception: students may come by Dr. Bolger’s office to view and discuss the 4th exam once the exam grades are posted at the end of the semester.

**Honors credit:**
Students taking this course for Honors credit should be enrolled in Section 002 of MCB 304, and must participate in the additional Honors discussion section led by Dr. Bolger held on Wednesdays @ 9AM in Life Sciences South Room 240. Additional information will be provided at the first Honors section meeting on August 28th.

**Attendance policy:**
Participating in the course and attending lectures and other course events are vital to the learning process. As such, attendance is required at all lectures and class meetings. Student absences will be excused for Dean’s excuses, sincerely-
held religious observances, out-of-town interviews, and attendance at scientific conferences. Other absences will be dealt with on a case-by-case basis. **For attendance issues, please email the designated TA.** Do not email your instructor unless you are unable to make it to an exam. Per recent changes to University policy, please do not send documentation of illness to the instructors as this could incur a privacy violation. If you have a chronic condition that affects your ability to attend class or complete class requirements, please contact the Disability Resource Center, and the DRC will work with you and the instructors to find a reasonable accommodation (see Accessibility and Accommodations section). Please note that the DRC and the instructors cannot make accommodations when they are not aware of potential issues.

UA policies concerning class attendance and absences can be found at: [http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop](http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop).
[http://policy.arizona.edu/human-resources/religious-accommodation-policy](http://policy.arizona.edu/human-resources/religious-accommodation-policy).
[http://deanofstudents.arizona.edu/absences](http://deanofstudents.arizona.edu/absences).

**Assignment due dates and test schedule:**
A detailed course schedule, including due dates for assignments and dates of exams, is found on our course D2L site.

**Classroom behavior and creating a supportive classroom environment:**
We strive to create a classroom environment that is professional and conducive to learning for all students. Please help us to do this by regulating your own behavior so that it supports the learning of those around you. To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities (e.g., texting, chatting, reading a newspaper, making phone calls, web surfing, etc.).

Disruptive behavior is prohibited. Disruptive behavior means conduct that materially and substantially interferes with or obstructs the teaching or learning process in the context of a classroom or educational setting. This type of behavior includes use of cell phones, refusing to collaborate, interrupting class activities, sleeping, newspaper reading, etc. Also included is the distractive use of laptops, tablets, and other technology. Students observed engaging in disruptive activity will be asked to cease this behavior. Those who continue to disrupt the class will be asked to leave lecture or discussion and may be reported to the Dean of Students.

Threatening behavior is prohibited. Threatening behavior means any statement, communication, conduct or gesture, including those in written form, directed toward any member of the University community that causes a reasonable
apprehension of physical harm to a person or property. The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See: http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students.

Accessibility and accommodations:
Our goal in this classroom is that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, please let us know so that we can discuss options. Note that all official requests for accommodations must be made via the Disability Resource Center (520-621-3268). The need for specialized services must be documented and presented to the Disability Resource Center at least 1 week prior to the due date of the first exam. For additional information on the Disability Resource Center and reasonable accommodations, please visit http://drc.arizona.edu/.

Please be aware that the accessible seating in this room should remain available for students who find that standard classroom seating is not usable.

Academic integrity:
Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity.

Any form of cheating or plagiarism may result in a failing grade for the course, and in other appropriate disciplinary actions, as described at Dean of Students website mentioned above.

Selling class notes and/or other course materials to other students or to a third party for resale is not permitted. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA email to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student email addresses. This conduct may also constitute copyright infringement.

Expectations specific to MCB 304:
1. Students may work together in discussion and consultation on homework assignments and in-class activities unless specifically instructed otherwise.
2. Students may not collaborate or consult with other students in the completion or submission of the written examinations.
UA non-discrimination and anti-harassment policy:
The University is committed to creating and maintaining an environment free of discrimination; see:

Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

Additional resources:
UA academic policies and procedures are available at:
http://catalog.arizona.edu/policies.

Student assistance and advocacy information is available at:
http://deanofstudents.arizona.edu/student-assistance/students/student-assistance.

Confidentiality:
Information regarding the rights of students and institutional responsibilities with respect to student records is available at:

*The information in this course syllabus, other than the grade and absence policies, may be subject to change with advance notice, as deemed appropriate by the instructors.*