

MCB 304-Molecular Genetics

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
CHEM 241A and CHEM 241B, Organic Chemistry I and II recommended
MCB301 (or alternative) recommended

Instructors:

Dr. Andrew Paek apaek@email.arizona.edu

Office hours will be delivered over zoom and in person from 8/24/21 – 10/12/21
Tues 1-3PM, LSS 331 for in person. A mask is required for in person office hours.
Zoom: <https://arizona.zoom.us/j/81332186012>

Dr. Tim Bolger tbolger@email.arizona.edu

Office hours: Thurs 1-3PM. LSS 425 for in-person (mask required).
Zoom: <https://arizona.zoom.us/j/88180734304>

Teaching Assistants:

Anastasia Amoiroglou amoirogloua@email.arizona.edu Please contact Anastasia about all non-exam attendance issues

Matt Lemke matthewlemke@email.arizona.edu

Bradford Hull hull@email.arizona.edu

Preceptor: Isis Strickland dakotai@email.arizona.edu

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.

Course meeting location and times:

This class will be taught in person: Mon: 3:00 – 3:50pm, Wed and Fri: 3:00 – 4:15pm in the Manuel Pacheco Integrated Learning Center Room 120.

The Honors section will meet Wed 9:00 – 9:50am in Life Sciences South Room 340.

Classroom attendance:

- If you feel sick or may have been in contact with someone who is infectious, stay home. Except for seeking medical care, avoid contact with others and do not travel. Classes will be recorded and uploaded onto D2L
- Notify your TA, Anastasia Amoiroglou, (amoirogloua@email.arizona.edu) if you will be missing a course meeting.
- For missing exams or assignments please contact the appropriate instructor: Dr. Andrew Paek (apaek@email.arizona.edu) or Dr. Timothy Bolger (tbolger@email.arizona.edu).
- If you must miss the equivalent of more than one week of class, you should contact the Dean of Students Office DOS-deanofstudents@email.arizona.edu to share documentation about the challenges you are facing.
- **Face coverings that cover the nose, mouth, and chin are required in our classroom:** If you forgot to bring a mask, let a TA or instructor know and one will be offered to you. Any student who violates this policy will be asked to immediately leave the learning space, and will be allowed to return only when they are wearing a face covering. Subsequent episodes of noncompliance will result in a Student Code of Conduct complaint being filed with the Dean of Students Office, which may result in sanctions being applied.
- If you forgot to bring a mask, let a TA or instructor know and one will be offered to you.
- Voluntary, free, and convenient COVID-19 testing is available for students on Main Campus.
- If you test positive for COVID-19 and you are participating in on-campus activities, you must report your results to Campus Health. To learn more about the process for reporting a positive test, visit the Case Notification Protocol.
- COVID-19 vaccine is available for all students at Campus Health.
- Visit the UArizona COVID-19 page for regular updates.
- Student absences will also be excused for Dean's excuses, sincerely-held religious observances, out-of-town interviews, and attendance at scientific conferences.
- 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.

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, Palladino and Killian 10th 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 5th, 2021. 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, this is not recommended as access to Mastering Genetics and Learning Catalytics is essential for completing Homework Quizzes and in class exercises. The deadline to opt-out is September 5th, 2021.

If you do not opt-out and choose to retain your access, the cost of \$94.99 for 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.

Equipment and software requirements:

For this class you will need access to a web-enabled device to access D2L, Learning Catalytics, Mastering Genetics and other course materials.

Grading policies:

Exams – There will be 4 exams. Exams will be taken in person. Each exam is worth 150 points (15% of your final grade). 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.

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. For late D2L assignment submissions, you must request the instructor to grant access.

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 unexcused absences from in-class work for the semester – for excused absences beyond this (see Attendance Policy) please contact your TA, Anastasia Amoiroglou amoirogloua@email.arizona.edu

| <u>Assignment</u> | <u>Value</u> |
|-----------------------|--------------|
| Exam 1 | 150 |
| Exam 2 | 150 |
| Exam 3 | 150 |
| Exam 4 | 150 |
| In-class exercises | 100 |
| Homework quizzes | 300 |
| Total Possible Points | 1000 |

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 |

Exams will be held in person, if you have a chronic condition that affects your ability to take an exam in person, please contact the Disability Resource Center. Do not show up to exams if you are feeling sick (see Attendance Policy). Please notify Dr. Paek or Dr. Bolger if you will not be able to take the exam, and we will make other arrangements.

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.

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.

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. You will be required to complete homework quizzes and reading assignments on your own time.

Academic advising:

If you have questions about your academic progress this semester, please reach out to your academic advisor (<https://advising.arizona.edu/advisors/major>). Contact the Advising Resource Center (<https://advising.arizona.edu/>) for all general advising questions and referral assistance. Call 520-626-8667 or email to advising@arizona.edu

Class Recordings:

Classes will be recorded and accessible through D2L. Students may not modify content or re-use content for any purpose other than personal educational reasons. All recordings are subject to government and university regulations. Therefore, students accessing unauthorized recordings or using them in a manner inconsistent with UArizona values and educational policies are subject to suspension or civil action.

Accessibility and accommodations:

Our goal in MCB304 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.

Life challenges:

If you are experiencing unexpected barriers to your success in your courses, please note the Dean of Students Office is a central support resource for all students and may be helpful. The [Dean of Students Office](#) can be reached at 520-621-2057 or DOS-deanofstudents@email.arizona.edu.

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 examinations. They will also be asked to affirm their compliance to rules about accessing notes/textbooks/etc. for the exams.

Statement on compliance with COVID-19 mitigation guidelines:

As we enter the Fall semester, your and my health and safety remain the university's highest priority. To protect the health of everyone in this class, students are required to follow the university guidelines on COVID-19 mitigation. Please visit www.covid19.arizona.edu.

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 other educational setting such as Zoom. This type of behavior includes use of cell phones, refusing to collaborate, interrupting class activities, etc. Also included is the distractive use of laptops, tablets, and other technology in in-person classes. 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 the online class 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>.

UA non-discrimination and anti-harassment policy:

The University is committed to creating and maintaining an environment free of discrimination; see: <http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy>.

Our class 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: <http://www.registrar.arizona.edu/personal-information/family-educational-rights-and-privacy-act-1974-ferpa?topic=ferpa>.

Academic advising:

If you have questions about your academic progress this semester, or your chosen degree program, please note that advisors at the [Advising Resource Center](#) can guide you toward university resources to help you succeed.

Physical and mental-health challenges:

If you are facing physical or mental health challenges this semester, please note that Campus Health provides quality medical and mental health care. For medical appointments, call 520-621-9202. For After Hours care, call 520-570-7898. For the Counseling & Psych Services (CAPS) 24/7 hotline, call 520-621-3334.

Where to go, who to call if you're in crisis:

Located in Tucson? Call the [Community-Wide Crisis Line](#) 24 hours a day, 7 days a week at 520-622-6000.

Are you a concerned friend? Concerned friends can find out more about helping a friend who might be experiencing problems through our [Friend 2 Friend](#) website.

[Resources for sexual assault, relationship violence, and stalking.](#)

24-Hour Hotlines:

[The National Suicide Prevention Lifeline](#) is a 24-hour, toll-free, confidential suicide prevention hotline available to anyone in suicidal crisis or emotional distress. By dialing [1-800-273-TALK](#) (8255), the call is routed to the nearest crisis center in a national network of more than 150 centers providing counseling and mental health referrals.

[Crisis Text Line](#): Text HOME to 741741 from anywhere in the United States, anytime, about any type of crisis. A live, trained Crisis Counselor receives the text and responds.

[Suicide Prevention for LGBTQ Youth through the Trevor Project](#): 866-4-U-TREVOR (1-866-488-7386). Online instant messaging available 7 days a week, 3 pm - 10 pm ET (12 pm -- 7 pm PT) or text TREVOR to 1-202-304-1200.

[Veterans' Suicide Prevention Lifeline](#): 1-800-273-TALK (1-800-273-8255)

[SAMHSA Treatment Referral Hotline](#) (Substance Abuse): 1-800-662-HELP (1-800-662-4357)

[National Sexual Assault Hotline](#): 1-800-656-HOPE (1-800-656-4673)

[Loveisrespect \(National Dating Abuse Helpline\)](#): Call 1-866-331-9474 (TTY: 1-866-331-8453). Text LOVEIS to 22522 - you'll receive a response from a peer advocate prompting you for your question.

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.