

Course Title: Genes to Genomes

Course Number: BIOL 302C

Course Prerequisites: BIOL 2101, BIOL 2102, and BIOL 2103L

Course Credits: 4

Term: Spring 2025

All Sections Lecture Meeting Times: TR 12:30 PM – 1:45 PM

All Sections Lecture Location: CAST 55

Section 002 Laboratory Meeting Time: W 6:30 PM – 9:20 PM

Section 003 Laboratory Meeting Time: R 8:00 AM – 10:50 AM

Section 004 Laboratory Meeting Time: R 3:00 PM – 5:50 PM

Section 005 Laboratory Meeting Time: R 6:30 PM – 9:20 PM

Section 009 Laboratory Meeting Time: W 3:00 PM – 5:50 PM

Section 010 Laboratory Meeting Time: F 3:00 PM – 5:50 PM

All Sections Laboratory Location: CAST 41

First Half Lecture Instructor: Moses Michelsohn (he/him)

First Half Lecture Instructor Email: mmichelsohn@unm.edu

First Half Lecture Instructor Office: CAST 66

First Half Lecture Instructor Student Drop-In Hours: By appointment using link on UNM Canvas.

Second Half Lecture Instructor: Dr. Jenna Fonta (she/her/hers)

Second Half Lecture Instructor Email: jennafonta@unm.edu

Second Half Lecture Instructor Office: CAST 200

Second Half Lecture Instructor Student Drop-In Hours: By appointment using link on UNM Canvas.

First Half Laboratory Coordinator: Nicole Caimi (she/her)

First Half Laboratory Coordinator Email: ncaimi@unm.edu

First Half Laboratory Coordinator Office: CAST 39

First Half Laboratory Coordinator Student Drop-In Hours: By appointment using link on UNM Canvas.

Second Half Laboratory Coordinator: Dr. Jenna Fonta (see additional details above)

Course Description: This course will familiarize students with the core concepts of genetics and genomics, including inheritance patterns, the nature of genetic material, gene function, gene expression and regulation, genetics of model organisms, an overview of genomes, genome engineering, and personalized medicine.

Course Goals: The students will learn and develop an understanding of core concepts in genetics, genomics, and genome engineering topics which are the frontiers of modern science. The genomics section aims to develop student understanding of recombinant DNA technology, genomes, genome projects, DNA and RNA sequencing, genome engineering, and genomic medicine. There will be a strong emphasis on learning the process of science, how a testable hypothesis is formulated, tested, and data gathered and analyzed.

Student Learning Outcomes: Students who complete 302C Genes to Genomes will be able to:

1. Understand and explain the genetic and molecular basis of inheritance.
2. Explain the structure of DNA and how it is replicated.
3. Understand the structure of a gene, genetic code, and mutations.
4. Understand how prokaryotes and eukaryotes regulate gene expression.

5. Understand how genes are transcribed and how the information on messenger RNAs is translated.
6. Understand how genes influence the development and disease.
7. Explain how genetic model organisms help us understand aspects of human genetics.
8. Use methods and tools commonly used in genetics, genomics, and genome engineering.
9. Understand the use of personalized medicine, genetically modified organisms, and ethics.
10. Understand the process of science to investigate the frontiers in genetics and genomics.

Required Materials: Some course assignments in BIOL 302C will be completed on UNM Canvas. Students enrolled in BIOL 302C are required to obtain the following materials:

- Klug, W. S., Cummings, C. A., Spencer, M. A., Palladino, & D. Killian. (2019). *Essentials of Genetics* (Tenth Edition). Pearson

Course Requirements: Student performance in BIOL 302C is based on the following:

- **Homework (HW):** Students are required to complete a Homework assignment each week in lecture, except during examination weeks. Homework assignments reinforce material presented in lecture and in the assigned readings. Homework assignments are posted on UNM Canvas.
- **Examinations (EX):** Students are required to complete three in-class examinations during the semester. Examinations will include questions about all course materials (lectures, videos, discussion readings, background readings, etc.) covered in the previous quarter of the course (*i.e.* examinations are not cumulative, although knowledge is cumulative so some questions may depend on understanding of topics presented in other units).
- **Cumulative Final Examination (FE):** There is a Cumulative Final Examination in BIOL 302C during Week 17 scheduled following the UNM Exam Schedule. Approximately half the material included on this examination will be material covered in the final 4 weeks of lecture, while the other half will include material from throughout the lecture portion of the course.
- **Laboratory Participation (LP):** Students are required to attend each laboratory session and engage with the presented material and laboratory group work. Students must arrive on-time and remain in laboratory sessions until dismissed by their Graduate Teaching Assistant at the end of the scheduled session to receive credit for participation. The lowest two scores (of thirteen total) will be dropped automatically for each student.
- **Laboratory Pre-Lab Assignments (PL):** Students are required to complete a Laboratory Pre-Lab Assignment prior to most weeks in the laboratory. These brief quizzes are completed on UNM Canvas and ask students to review the posted materials for the upcoming laboratory session. Laboratory Pre-Lab Assignments are at 11:59 PM on the Sunday before a week of laboratory.
- **Laboratory Worksheets (LW):** Students are required to complete a Laboratory Worksheet for many activities conducted in the laboratory. These assignments should be completed in their associated laboratory session and submitted on UNM Canvas. Many laboratory activities involve group work, but each student is responsible for submitting a copy of their Laboratory Worksheet to UNM Canvas.
- **Laboratory EASE and Welcome Assignment (WA):** Students are required to complete these two assignments in the first few weeks of the course. These assignments introduce students to the structure of the course and skills necessary to complete coursework.

- **Laboratory Poster Project (PP):** Students are required to complete a group Laboratory Poster Project. Students will be assigned to a poster group during the first few weeks of the course. Poster groups will work together in the laboratory to choose a topic, conduct a literature review, create a research question, and present their proposal as a printed poster. Poster groups will be evaluated throughout the semester as they complete parts of this project. Individual participation in group activities and peer review will be included as a significant part of the grade for the Laboratory Poster Project. Poster groups will present their posters in a laboratory session near the end of the semester.
- **Laboratory Reports (LR):** Students will work throughout the semester to write and revise a Laboratory Report based on data collected in the laboratory. Individual Laboratory Report assignments will be submitted throughout the semester to allow Graduate Teaching Assistant feedback on student writing. A final Laboratory Report will be submitted near the end of the semester incorporating many of the components composed and revised by students throughout the semester.

Student Time Management: Students are expected to spend approximately six hours working on course materials outside of their scheduled course times each week. The course instruction team for this and all biology courses are dedicated to helping our students achieve success in their courses and eventual careers. Students that feel their efforts in this course are not reflected by their assignment grades are encouraged to reach out to their course instruction team to help develop strategies to improve their performance. Students are encouraged to review the schedule of Student Assistance Drop-In Hours (available on UNM Canvas) while planning when to work on their assignments.

Attendance and Late Work: Students are expected to attend all lectures each semester to maximize their success in this course. Students are required to arrive on-time to their lecture section every time and are expected to remain in class for the duration of their scheduled section. Participation in lecture sessions will not be recorded, but participation is one of the best ways to engage with the presented material.

Students that miss an Examination must contact their Lecture Instructor in a timely fashion to arrange an alternative.

Students are expected to attend all laboratory sessions each semester. Students are required to arrive on-time to their registered laboratory section every week and are expected to remain in class for the duration of their scheduled section. Students that arrive late will not be allowed into their scheduled laboratory session once it has begun. Students that choose to leave before they are dismissed by their Graduate Teaching Assistant will receive a zero for the Laboratory Participation grade associated with that laboratory session.

The lowest two scores on Laboratory Participation and on Laboratory Worksheets are dropped automatically for all students in BIOL 302C. This grading scheme gives students two chances to miss a laboratory session during the semester without serious implications for their course grade (zeros on Laboratory Participation dropped as lowest grades). Students who miss lab without excuse do not need to contact their Graduate Teaching Assistant or the Lab Coordinator following a missed laboratory.

Students who miss a laboratory for a potentially excused reason (Medical, Bereavement, Armed Services, UNM Athletics, Traditional Obligation, etc.) must submit an absence report to the Lab Coordinator using the link on UNM Canvas in a timely fashion to arrange for an alternative assignment.

Course Grades: Students are responsible for actively tracking their grades online through UNM Canvas. Students with grade concerns should address them with their course instruction team as soon as possible upon receiving graded work. All grades are considered permanent two weeks after the grade is assigned. Students are responsible for adhering to all UNM grade policies. This course is not offered for Credit/No Credit.

Course Grading Scheme

Assignment Category	Iterations	Drops	Grade Portion
Homework	12	One lowest score	25%
Examinations	3	One lowest score	35%
Cumulative Final Examination	1	None	15%
Laboratory Participation	14	Two lowest scores	7.5%
Laboratory Pre-Lab Assignments	14	None	0.75%
Laboratory Worksheets	13	Two lowest scores	5%
Laboratory EASE and Welcome Assignment	2	None	0.5%
Laboratory Poster Project	8	None	6.25%
Laboratory Reports	4	None	5%

Semester Grading Scheme

Grade Range	0 - 59.49	59.5 - 69.49	69.5 - 75.49	75.5 - 79.49	81.5 - 84.49	84.5 - 89.49	91.5 - 94.49	94.5+
Letter Grade	F	D	C	C+	B	B+	A	A+

UNM Accommodations Statement: UNM is committed to providing equitable access to learning opportunities for students with documented disabilities. As your instructor, it is my objective to facilitate an inclusive classroom setting, in which students have full access and opportunity to participate. To engage in a confidential conversation about the process for requesting reasonable accommodations for this class and/or program, please contact Accessibility Resource Center (<https://arc.unm.edu/>) at arcsrvs@unm.edu or by phone at 505-277-3506

UNM Citizenship and/or Immigration Status Statement: All students are welcome in this class regardless of citizenship, residency, or immigration status. Your professor will respect your privacy if you choose to disclose your status. UNM as an institution has made a core commitment to the success of all our students, including members of our undocumented community. The Administration's welcome is found on our website: <http://undocumented.unm.edu/>.

UNM Connecting to Campus and Finding Support Statement: UNM has many resources and centers to help you thrive, including opportunities to get involved in campus life, research experiences, mental health resources, academic support such as tutoring, resource centers for people like you, free food at Lobo Food Pantry, jobs on campus and financial capability support. Your advisor, staff at the resource centers and Dean of Students, and I can help you find the right opportunities for you.

UNM Credit-hour Statement: This is a four credit-hour course. Class meets for two 75-minute sessions and one 170-minute laboratory session of direct instruction for fifteen weeks during

the Spring 2025 semester. Please plan for a minimum of six hours of out-of-class work (or homework, study, assignment completion, and class preparation) each week.

UNM Land Acknowledgement: Founded in 1889, the University of New Mexico sits on the traditional homelands of the Pueblo of Sandia. The original peoples of New Mexico Pueblo, Navajo, and Apache since time immemorial, have deep connections to the land and have made significant contributions to the broader community statewide. We honor the land itself and those who remain stewards of this land throughout the generations and also acknowledge our committed relationship to Indigenous peoples. We gratefully recognize our history.

UNM Respectful Conduct Expectations Statement: I am committed to building with you a positive classroom environment in which everyone can learn. I reserve the right to intervene and enforce standards of respectful behavior when classroom conduct is inconsistent with University expectations and/or classroom community agreements. Interventions and enforcement may include but are not limited to required meetings to discuss classroom expectations, written notification of expectations, and/or removal from a class meeting. Removal from a class meeting will result in an unexcused absence. The University of New Mexico ensures freedom of academic inquiry, free expression and open debate, and a respectful campus through adherence to the following policies: D75: Classroom Conduct, Student Code of Conduct, University Policy 2240 – Respectful Campus, University Policy 2210 – Campus Violence.

UNM Responsible Learning and Academic Honesty Statement: Cheating and plagiarism (academic dishonesty) are often driven by lack of time, desperation, or lack of knowledge about how to identify a source. Communicate with me and ask for help, even at the last minute, rather than risking your academic career by committing academic dishonesty. Academic dishonesty involves claiming that work created by another source is your own original work. It is a Student Code of Conduct violation that can lead to a disciplinary procedure. When you use a resource in work submitted for this class, document how you used it and distinguish clearly between your original work and the material taken from the resource.

UNM UAP 2720 and 2740 Statement: Our classroom and university should always be spaces of mutual respect, kindness, and support, without fear of discrimination, harassment, or violence. If you ever need assistance or have concerns about incidents that violate this principle, please access campus support resources. These include confidential services at LoboRESPECT Advocacy Center, the Women's Resource Center, and the LGBTQ Resource Center. The University of New Mexico prohibits discrimination on the basis of sex (including gender, sex stereotyping, gender expression, and gender identity). UNM faculty and graduate teaching assistants are considered "responsible employees." "Responsible employees" must communicate reports of sexual harassment, sexual misconduct and sexual violence to Compliance, Ethics and Equal Opportunity. For more information on the campus policy regarding sexual misconduct, reporting, and reporting for "responsible employees," please see UAP 2720 and UAP 2740.

UNM Wellness Statement: If you do need to stay home due to illness or are experiencing a wellness challenge, please take advantage of the resources below. You can communicate with me by scheduling an appointment (link on UNM Canvas) and I can work with you to provide alternatives for course participation and completion. Let me, an advisor, or another UNM staff member know that you need support so that we can connect you to the right resources. UNM is a mask friendly, but not a mask required, community. If you are experiencing COVID-19 symptoms, please do not come to class.

Lecture Schedule: Spring 2025

Week	Date	Lecture Topic and Assigned Readings
01	Jan 21	Lecture Topic: Introduction to Genetics Readings: Klug <i>et al.</i> Ch. 1
	Jan 23	Lecture Topic: Mitosis and Meiosis Readings: Klug <i>et al.</i> Ch. 2 Due by 11:59 PM on Jan 24: HW-01
02	Jan 28	Lecture Topic: Mendelian Genetics I Readings: Klug <i>et al.</i> Ch. 3
	Jan 30	Lecture Topic: Mendelian Genetics II Readings: Klug <i>et al.</i> Ch. 3 Due by 11:59 PM on Jan 31: HW-02
03	Feb 04	Lecture Topic: Modified Mendelian Ratios I Readings: Klug <i>et al.</i> Ch. 4
	Feb 06	Lecture Topic: Modified Mendelian Ratios II Readings: Klug <i>et al.</i> Ch. 4 Due by 11:59 PM on Feb 07: HW-03
04	Feb 11	Lecture Topic: Sex Determination and Sex Chromosomes, Chromosome Mutations Readings: Klug <i>et al.</i> Ch. 5, 6
	Feb 13	Examination 1 (EX-01)
05	Feb 18	Lecture Topic: Linkage and Chromosome Mapping in Eukaryotes Readings: Klug <i>et al.</i> Ch. 7
	Feb 20	Lecture Topic: Genetic Analysis and Mapping in Bacteria and Bacteriophages Readings: Klug <i>et al.</i> Ch. 8 Due by 11:59 PM on Feb 21: HW-04
06	Feb 25	Lecture Topic: DNA Structure and Analysis Readings: Klug <i>et al.</i> Ch. 9
	Feb 27	Lecture Topic: DNA Replication Readings: Klug <i>et al.</i> Ch. 10 Due by 11:59 PM on Feb 28: HW-05
07	Mar 04	Lecture Topic: The Genetic Code and Transcription Readings: Klug <i>et al.</i> Ch. 12
	Mar 06	Lecture Topic: Translation and Proteins Readings: Klug <i>et al.</i> Ch. 13 Due by 11:59 PM on Mar 07: HW-06
08	Mar 11	Lecture Topic: Chromosome Structure Readings: Klug <i>et al.</i> Ch. 11
	Mar 14	Examination 2 (EX-02)

Week	Date	Lecture Topic and Assigned Readings
09	Mar 17 – Mar 21	Spring Break – No Lecture
10	Mar 25	Lecture Topic: Gene Mutation, DNA Repair, and Transposition Readings: Klug <i>et al.</i> Ch. 14
	Mar 27	Lecture Topic: Regulation of Gene Expression in Bacteria Readings: Klug <i>et al.</i> Ch. 15 Due by 11:59 PM on Mar 28: HW-07
11	Apr 01	Lecture Topic: Regulation of Gene Expression in Eukaryotes I Readings: Klug <i>et al.</i> Ch. 16
	Apr 03	Lecture Topic: Regulation of Gene Expression in Eukaryotes II Readings: Klug <i>et al.</i> Ch. 16 Due by 11:59 PM on Apr 04: HW-08
12	Apr 08	Lecture Topic: Recombinant DNA Technology I Readings: Klug <i>et al.</i> Ch. 17
	Apr 10	Lecture Topic: Recombinant DNA Technology II Readings: Klug <i>et al.</i> Ch. 17 Due by 11:59 PM on Apr 11: HW-09
13	Apr 15	Lecture Topic: Genomics, Bioinformatics, and Proteomics I Readings: Klug <i>et al.</i> Ch. 18
	Apr 17	Examination 3 (EX-03)
14	Apr 22	Lecture Topic: Genomics, Bioinformatics, and Proteomics II Readings: Klug <i>et al.</i> Ch. 18
	Apr 24	Lecture Topic: Epigenetics Readings: Klug <i>et al.</i> Special Topics 1 (End of Book) Due by 11:59 PM on Apr 25: HW-10
15	Apr 29	Lecture Topic: The Genetics of Cancer Readings: Klug <i>et al.</i> Ch. 19
	May 01	Lecture Topic: Quantitative Genetics and Multifactorial Traits Readings: Klug <i>et al.</i> Ch. 20 Due by 11:59 PM on May 02: HW-11
16	May 06	Lecture Topic: Population and Evolutionary Genetics Readings: Klug <i>et al.</i> Ch. 21
	May 08	Lecture Topic: Special Topic (Student/Instructor Choice) Due by 11:59 PM on May 09: HW-12
17	May 15	Cumulative Final Examination (FE-01) 10:00 AM – 12:00 PM in CAST 55

Laboratory Schedule: Spring 2025

Week	Date	Lecture Topic and Assigned Readings
01	Jan 20 - Jan 24	Martin Luther King Jr. Day - No Laboratory
02	Jan 27 - Jan 31	Laboratory Topic: Mitosis and Meiosis Due by 11:59 PM on Jan 31: LW-01 Due by 11:59 PM on Feb 02: WA-01, PL-01
03	Feb 03 - Feb 07	Laboratory Topic: Meiosis and Primary Literature Due by 11:59 PM on Feb 07: LW-02 Due by 11:59 PM on Feb 09: WA-02, PL-02
04	Feb 10 - Feb 14	Laboratory Topic: Corn Inheritance & Pedigrees Due by 11:59 PM on Feb 14: LW-03 Due by 11:59 PM on Feb 16: PL-03
05	Feb 17 - Feb 21	Laboratory Topic: Pipette Techniques and <i>Arabidopsis</i> Due by 11:59 PM on Feb 21: LW-04 Due by 11:59 PM on Feb 23: PL-04
06	Feb 24 - Feb 28	Laboratory Topic: DNA Structure Due by 11:59 PM on Mar 02: PL-05
07	Mar 03 - Mar 07	Laboratory Topic: Phenotyping and DNA Extraction Due by 11:59 PM on Mar 07: LW-05, LR-01 Due by 11:59 PM on Mar 09: PL-06
08	Mar 10 - Mar 14	Laboratory Topic: DNA Structure and Replication Due by 11:59 PM on Mar 14: LW-06, PP-01
09	Mar 17 - Mar 21	Spring Break - No Laboratory Due by 11:59 PM on Mar 23: PL-07, PL-08
10	Mar 24 - Mar 28	Laboratory Topic: PCR DNA Replication Due by 11:59 PM on Mar 28: LW-07, PP-02 Due by 11:59 PM on Mar 30: PL-09
11	Mar 31 - Apr 04	Laboratory Topic: The <i>lac</i> Operon Due by 11:59 PM on Apr 04: LW-08, PP-03, LR-02 Due by 11:59 PM on Apr 06: PL-10, PL-11
12	Apr 07 - Apr 11	Laboratory Topic: Gel Electrophoresis Due by 11:59 PM on Apr 11: LW-09, PP-04 Due by 11:59 PM on Apr 13: PL-12
13	Apr 14 - Apr 18	Laboratory Topic: Sequencing Analysis Due by 11:59 PM on Apr 18: LW-10 Due by 11:59 PM on Apr 20: PL-13
14	Apr 21 - Apr 25	Laboratory Topic: Case Study #1 Due by 11:59 PM on Apr 25: LW-11, PP-05, LR-03
15	Apr 28 - May 02	Laboratory Topic: Poster Presentation Due by 11:59 PM on May 02: PP-06, PP-07 Due by 11:59 PM on May 04: PL-14
16	May 05 - May 09	Laboratory Topic: Case Study #2, SNPs & Human Disease Due by 11:59 PM on May 09: LW-13, LW-14, PP-08, LR-04
17	May 12 - May 16	Final Examinations Week - No Laboratory