

BI 307, 3 credits

Molecular Biology I – Genes and Genetics

Section: BI307-01

Meeting days/times: Mon, Wed, Fri 1:30 – 2:20 PM

Location: Henry Room 102

Instructor: Michael Dohm, PhD

Office: Henry 6

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Office hours: (1) Tuesday & Thursday, 10AM – 12PM (2) By appointment

Course description

Genetics is a one semester introduction to the study of genes (the unit of heredity) and inheritance in biological organisms. Our focus will include patterns of inheritance (heritability, mutation), the relationship between genes, gene expression, environment, and phenotypes, molecular genetics (gene structure), biotechnology, and the genetics of cancer and regulation of the cell cycle. BI307 is intended to provide a firm foundation of genetic principles and analysis; BI308 continues your genetics education with a focus on genomics.

Interestingly, most of the technology now in use to study genes and genomes are based on just two fundamental principles of molecular biology: (1) the hydrogen bonding of complementary nucleotide sequences and (2) interactions between specific proteins with specific nucleotide sequences. Application of these two principles will appear throughout the course. Since the late 1980s, the discipline of genetics has witnessed a revolution in methods and discovery. The impact of this revolution can be seen in the food we purchase, the way our diseases are treated, and perhaps even how we view ourselves. Through lecture and discussion, we will explore these topics and reflect upon how the technology and resources of modern genetics influences the environment and human society.

Catalog description

BI 307 Molecular Biology I Genes and Genetics (3)

Life cycles and meiosis. Mendelian inheritance. Population genetics. Chromosomal and molecular basis of inheritance. Flow of genetic information. Determining structure and function of genes.

Mutation and DNA repair systems. Genetic basis of disease, DNA technology. Prerequisites: *BI 210L*, *BI 216* and *BI 216L* (*Biology majors*), *BI 216* and *BI 216L* (*Biochemistry and FS majors*).

Textbooks & resources

Required textbook. *Concepts of Genetics* 11th ed., 2014, by Klug et al., ISBN: 9780321948915. The 11th edition is available in several formats including a Kindle version. The previous edition (ISBN: 9780321732330) was used as recently as two years ago; the texts are not substantively different. However, problem sets assigned or suggested will come from the 11th edition. Access to Pearson's online web site is not required, but highly recommended as a study aid. Note: *Concepts of Genetics*, 11th ed., is also required for BI 308 Genomes & Epigenetics.

Recommended, but not required textbooks include *Essentials of Genetics*, 8th edition, by Klug et al. (ISBN: 9780321803115), *Introduction to Genetic Analysis*, 10th ed., 2010, by Griffiths et al., ISBN: 9781429276344, *Lewin's Essential Genes*, by Krebs et al., ISBN: 9781449644796.

There will be additional readings, both suggested and required, throughout the course.

Access to course website

You may access the website at <https://www.letgen.org/chaminade>. Select BI307 Genetics Lecture from the welcome screen and logon to the course. Logon and password will be provided to you by e-mail or in class during first week of the semester; at your first logon to the site you will be prompted to change your password. The letgen.org site uses latest SSL security; however, no user information (student ID, etc.) are used on the site, nor are official grades kept on the site (Dr. Dohm's grade book is maintained on a local computer).

BI307, and the accompanying lab class BI 307L, is a web-enhanced course, i.e., instruction takes place in the classroom, and technology, including the website, are used to complement and support face-to-face instruction. All lecture slides, course handouts, including the syllabus, will be made available through our web site. Quizzes typically will also be handled via the website, although other arrangements for taking quizzes may be available upon request.

The BI 307 and BI307L websites are not based on Canvas, the CMS recently adopted by Chaminade University. The BI 307/L websites are built on the Moodle CMS platform and were created and maintained by Dr Dohm at the letgen.org domain. Moodle CMS and the letgen.org site are not affiliated nor supported by Chaminade Information Technology. All questions about the site are to be directed to Dr Dohm. You are not required to use the letgen.org; it is there for your convenience and to support your learning and my teaching of the course.

Student learning outcomes linked to Biology Program Learning Outcomes (see University Catalog for list of Biology PLO)

This course will introduce students to the foundational concepts of Mendelian inheritance, molecular genetics, and biotechnology. Students will enhance abilities to discuss potential benefits and risks of genetic technology to the environment and or to human health and society. On completion of this course, students will be expected to:

1. Identify, describe and explain DNA, RNA, and protein structure and function; and how they relate to the "Central Dogma" of molecular biology (PLO #4, 7).
2. Use proper genetic terminology (PLO #2, 7).
3. Describe and apply concepts of transmission genetics and role of probability: Inheritance patterns and chromosomal basis of heredity (PLO #2, 4, 5, 7)
4. Identify, distinguish, and evaluate how mutations, gene flow, nonrandom mating, genetic drift, and natural selection affect the genetics structure of populations (PLO #2, 4, 5, 7).
5. Explain how chemical properties of DNA and the interactions of proteins are utilized by scientists to study and manipulate genes and phenotypes (PLO #4, 7).

Course assessment

Quizzes are multiple-choice or one word-answer format and will be taken online via the course Moodle website. Quizzes are scheduled outside of scheduled class time. Quizzes will be available for a minimum of 24-48 hours to access and complete the assignment. However, once you start, you are permitted 50 minutes to complete and submit the quiz. You have the right to take any or all quizzes by paper; you would then take the quiz as part of an arranged proctored session outside of regular class hours but before the due date for the quiz. The advantage of taking the quizzes online is that it permits rapid grading and immediate feedback – because the quizzes are predominately multiple choice, you will receive immediate feed-back once the quiz closes. The quizzes are open-book, open-notes; however, you are strongly encouraged to avoid the temptation to complete the quizzes simply by

looking through your text and notes for answers. First, you will likely run out of time. Second, the quizzes are intended to demonstrate your current understanding of the material. There are a total of ten (10) quizzes; all count to the final grade.

Worksheets: Up to four assignments. Worksheets range from solving assigned problems from your textbook to writing short essays on topics related to the course.

Exams comprise between 15 – 20 questions (approximately 25% multiple choice, 75% short answer format). Each exam will have opportunities for bonus points (10% per exam). Exams 2 – 4 will include cumulative content from previous exams.

A total of 500 points may be earned throughout the semester; each item has the following value.

Item	How many?	How often?	How many points?	Total points towards final grade
Quizzes	10	Every 1 – 2 weeks	4	40
Worksheets	4	Every 3 – 4 weeks	15	60
Exams	4	Every 3 – 4 weeks	100	400

Final grade

Points earned	Percent of total	Letter grade
450 – 500	90 – 100%	A
400 – 449	80 – 89%	B
350 – 399	70 – 79%	C
300 – 349	60 – 69%	D
< 299	< 60%	F

Course and University Policy, Reminders, and notices

1. Chaminade University abides by all aspects of the [Family Educational Rights and Privacy Act \(FERPA\)](#). Details of Chaminade's implementation of FERPA are available in your [Student Handbook \(SH\)](#).
2. You are also expected to have read and to abide by the “Student Rules of Conduct” which are available in your copy of Chaminade University’s Student Handbook (SH).
3. Success in this class is in your control. The more you do, the better the results will be for you. You are expected to attend class and to come prepared: read your text before the material is to be presented in class; preview the lecture slides available on the course web site; use the web site forum to ask questions and to discuss concepts; ask questions in class if you are unsure of material. I will suggest problems or questions from each chapter in your text or from the publisher's website for you to consider. If you have purchased access to Pearson's online content that accompanies your text book, please do take advantage of this marvelous resource. Neither the suggested problem sets nor the work on Pearson's supplemental material will be graded, nor are they required. However, the more you do, the more practice and exposure you get to the material, the better you will do on my exams. BI307 exams are based on the same concepts and problems that the text questions address.
4. Class begins and ends each time exactly on the scheduled start time. Regular attendance is expected and essential for your progress in this class. The goal of lecture and discussion will be to provide the needed context to remove barriers to your understanding of the material – going it alone is not recommended.
5. It is university policy that any student who stops attending a course without officially withdrawing may receive a failing grade (SH, p. 34). Unexcused absences equivalent to more

than a week of classes will lead to a grade reduction for the course.

6. No make up quiz, exam, or presentation time will be granted for unexcused absences. For excused absences, if a student cannot attend a class in which an exam or quiz has been scheduled, the student must provide written verification of the need to miss class at least one day prior to the scheduled due date. This includes any activities sponsored by Chaminade (athletics, etc.) – it is the responsibility of the student to adhere to this policy. In the event of illness, a Doctor's note will be expected.
7. Please utilize my official office hours or make an appointment via the letgen.org/chaminade website. You are encouraged to use the Ask Dr Dohm forum – if you have a question, there is an excellent chance that others in the class have similar questions – use of Ask Dr Dohm forum counts as participation.
8. Return of graded paper material will be within ten business days after you take the graded assignment.
9. Use of music devices and cell phones is prohibited during all Natural Science and Mathematics classes at Chaminade, *unless specifically permitted by your instructor* (see item 10 and 11). Use of cellphones and music devices in laboratories is a safety issue. In addition, use of cellphones and music devices in any class is discourteous and may lead to suspicion of academic misconduct. Students who cannot comply with this rule will be asked to leave class and may be subject to laboratory safety violation fines. Please refer any questions to the Dean of Natural Sciences and Mathematics.
10. You are encouraged to bring and use your laptops or tablets to genetics lecture and workshops. However, on exam days, calculators will be provided for your use; you may not use your smartphones, tablets, or laptops during exams.
11. You may not record audio, images, or video in the classroom without expressed permission of the instructor.
12. The University provides a Chaminade email address for all students. Official Chaminade communications will be sent to the students' Chaminade email address and instructors will use only this email to communicate with students. It is the responsibility of the student to check their email frequently. Report email-related problems to the Helpdesk at 808-735-4855 or helpdesk@chaminade.edu.
13. You are encouraged to work together; however, all graded material must be your own. Cheating in the form of plagiarism (offering of work of another as one's own, SH, p. 33), collusion, and deception will not be tolerated and will negatively affect your grade. Because the university is an academic community with high professional standards, its teaching function is seriously disrupted and subverted by academic dishonesty. Such dishonesty includes, but is not limited to, cheating, which includes giving/receiving unauthorized assistance during an examination; obtaining information about an examination before it is given, using inappropriate/prohibited sources of information during an examination; altering answers after an examination has been submitted; and altering the records on any grade. (Refer to the CUH catalog for further information).
14. Title IX Declaration: Chaminade University of Honolulu recognizes the inherent dignity of all individuals and promotes respect for all people. Sexual misconduct, physical and/or psychological abuse will NOT be tolerated at CUH. If you have been the victim of sexual misconduct, physical and/or psychological abuse, we encourage you to report this matter promptly. As a faculty member, I am interested in promoting a safe and healthy environment, and should I learn of any sexual misconduct, physical and/or psychological abuse, I must report the matter to the Title IX Coordinator. Should you want to speak to a confidential source you may contact the following:
 - ♦ Chaminade Counseling Center| 808 735-4845.
 - ♦ Any priest serving as a sacramental confessor or any ordained religious leader serving in the sacred confidence role.

15. Pursuant to several federal and state laws, including the Americans with Disabilities Act of 1990, as amended by the ADA Amendments Act of 2008, and Section 504 of the Rehabilitation Act of 1973, all qualified students with disabilities are protected from discrimination on basis of disability and are eligible for reasonable accommodations or modifications in the academic environment to enable them to enjoy equal access to academic programs, services, or activities. If a student would like to determine if they meet the criteria for accommodations, they should contact the Counseling Center at 808-735-4845 for further information. Students with special needs who meet criteria for the Americans with Disabilities Act (ADA) provisions must provide written documentation of the need for accommodations from CUH Counseling Center (Dr. June Yasuhara, 735-4845) by the end of the third week of classes. Failure to provide written documentation will prevent your instructor from making necessary accommodations.

Lecture and Exam Schedule, subject to change by Instructor

<i>Date</i>	<i>Text readings</i>	<i>Topics</i>	<i>Assignments</i>
Mon, Aug 20	Ch01	Introduction	
Wed, Aug 22	CH02	Mitosis & Meiosis	
Fri, Aug 24	CH02	Mitosis & Meiosis	
Mon, Aug 27	CH03	Mendelian genetics	
Wed, Aug 29	CH03/CH04	Mendelian genetics	
Fri, Aug 31	CH04	Mendelian genetics	
Mon, Sep 3		Labor day	
Wed, Sep 5	CH05	Mapping (selected reading)	
Fri, Sep 7	CH25	Population genetics	
Mon, Sep 10	CH25	Population genetics	
Wed, Sep 12	CH25	Population genetics	
Fri, Sep 14			Exam01
Mon, Sep 17	CH07	Sex determination, dosage compensation	
Wed, Sep 19	CH07	Sex determination, dosage compensation	
Fri, Sep 21	CH07	Sex determination, dosage compensation	
Mon, Sep 24	CH09	Extranuclear inheritance	
Wed, Sep 26	CH09	Extranuclear inheritance	
Fri, Sep 28	CH10/CH11	DNA structure, replication	
Mon, Oct 1	CH10/CH11	DNA structure, replication	
Wed, Oct 3	CH10/CH11	DNA structure, replication	
Fri, Oct 5	CH12	DNA organization	
Mon, Oct 8		Discover Day	
Wed, Oct 10			Exam02
Fri, Oct 12	CH13	RNA & Transcription	
Mon, Oct 15	CH13	RNA & Transcription	
Wed, Oct 17	CH13	RNA & Transcription	
Fri, Oct 19	CH13	Protein & Translation	
Mon, Oct 22	CH14	Protein & Translation	
Wed, Oct 24	CH14	Genetics Prokaryotes	
Fri, Oct 26	CH14	Genetics Prokaryotes	
Mon, Oct 29	CH16	Regulation gene expression Prokaryotes	
Wed, Oct 31	CH16	Regulation gene expression Prokaryotes	
Fri, Nov 2			Exam03
Mon, Nov 5	CH08	Chromosome mutations	
Wed, Nov 7	CH15	Mutation & DNA repair	
Fri, Nov 9	CH15	Mutation & DNA repair	
Mon, Nov 12		Veterans Day	
Wed, Nov 14	CH15	Mutation & DNA repair	
Fri, Nov 16	CH15	Mutation & DNA repair	

Mon, Nov 19	CH19	Genetics of cancer	
Wed, Nov 21	CH19	Genetics of cancer	
Fri, Nov 23		Thanksgiving	
Mon, Nov 26	CH19	Genetics of cancer	
Wed, Nov 28	CH22	Ethics DNA technology	
Fri, Nov 30	CH22	Ethics DNA technology	
Mon, Dec 3			
Tue, Dec 4			
Wed, Dec 5			
Thu, Dec 6			Exam 4

BI307 Genetics Lecture tentative schedule, subject to change by instructor

Every attempt has been made to create an accurate pathway through the material. However, the instructor reserves the right to alter this schedule as appropriate to correct any error, or based on our progress and in the event of unforeseen events which may affect our work with the material. Readings are from 11th edition of Concepts of Genetics, ISBN: 978-0321948915.

Week	Day	Readings	Graded Item	Theme
1	8/22, 8/24, 8/26		Pretest	Introduction
		Chapter02	Quiz00	Mitosis & Meiosis
		Chapter03		Mendelian genetics
2	8/29, 8/31, 9/2	Chapter03	Quiz01	
		Chapter04		Mendelian genetics
		Chapter05	Quiz02	Linkage & Chromosome mapping
3	9/7, 9/9	Chapter23	Worksheet01	Quantitative genetics
		<i>Holiday, 5 September, no class</i>		
4	9/12, 9/14, 9/16	Chapter23	Quiz03	
		Exam 1, Friday, 16 September		
5	9/19, 9/21, 9/23	Chapter25		Population & Evolutionary genetics
			Quiz04	
6	9/26, 9/28, 9/30	Chapter09		Extranuclear inheritance
		Chapter10 & 12	Quiz05	DNA structure & organization
			Worksheet02	
7	10/3, 10/5, 10/7	Chapter10 & 12		
		Chapter11	Quiz06	DNA replication & recombination
8	10/12, 10/14	Chapter11		
		<i>Holiday, 10 October, no class</i>		
		Exam 2, Wednesday, 12 October		
9	10/17, 10/19, 10/21	Chapter20	Quiz07	Recombinant DNA technology
10	10/24, 10/26, 10/28	Chapter13	Quiz08	RNA & transcription
			Worksheet03	
			Quiz09	
11	10/31, 11/2, 11/4	Chapter14		RNA processing & editing
		Exam 3, Friday, 4 November		
12	11/7, 11/9	Chapter08		Chromosome mutations
		<i>Holiday, 11 November, no class</i>		
13	11/14, 11/16, 11/18	Chapter15	Quiz10	Mutations & DNA repair
			Worksheet04	
14	11/21, 11/23	Chapter18	Quiz11	Developmental genetics
		<i>Holiday, 24 & 25 November, no class</i>		
15	11/28, 11/30, 12/2	Chapter19	Quiz12	Cancer genetics
16	12/08/16	Exam 4, 8:30 - 10:30 AM		

