



Chaminade
University
OF HONOLULU

Course Syllabus

[Chaminade University Honolulu](http://www.chaminade.edu)

3140 Waiialae Avenue - Honolulu, HI 96816

www.chaminade.edu

Course Number: BI 307

Course Title: Molecular Biology I Genes and Genetics

Department Name: Biology

College/School/Division Name: Naturals Sciences & Mathematics

Term: Fall 2019

Course Credits: 3

Class Meeting Days: Mon, Wed, Fri

Class Meeting Hours: 1:30 – 2:20 PM

Class Location: Henry Hall, 102

Instructor Name: Michael Dohm, PhD

Email: mdohm (at) chaminade.edu *

Phone: 808.739.43

Office Location: WSC 108

Office Hours: Tue & Thu, 10 AM - 12 PM or by appointment

Instructor Website: letgen.org

**please use the messaging system within your course management system*

University Course Catalog Description

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, typing and population genetics. Introduction to genomics and epigenetics.

Course Overview

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.

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 media, course handouts, including the syllabus, will be made available through our web site.

I am committed to creating a course that is inclusive in its design. If you encounter barriers, please let me know immediately so we can determine if there is a design adjustment that can be made. I am happy to consider creative solutions as long as they do not compromise the intent of the assessment or learning activity. For additional information about accommodations please see item 12.6 in this syllabus.

Marianist Values

This class represents one component of your education at Chaminade University of Honolulu. An education in the Marianist Tradition is marked by five principles and you should take every opportunity possible to reflect upon the role of these characteristics in your education and development:

1. Education for formation in faith
2. Provide an integral, quality education
3. Educate in family spirit
4. Educate for service, justice and peace
5. Educate for adaptation and change

Native Hawaiian Values

Education is an integral value in both Marianist and Native Hawaiian culture. Both recognize the transformative effect of a well-rounded, value-centered education on society, particularly in seeking justice for the marginalized, the forgotten, and the oppressed, always with an eye toward God (Ke Akua). This is reflected in the 'Olelo No'eau (Hawaiian proverbs) and Marianist core beliefs:

1. Educate for Formation in Faith (Mana) E ola au i ke akua ('Olelo No'eau 364) May I live by God
2. Provide an Integral, Quality Education (Na'auao) Lawe i ka ma'alea a kū'ono'ono ('Olelo No'eau 1957) Acquire skill and make it deep
3. Educate in Family Spirit ('Ohana) 'Ike aku, 'ike mai, kōkua aku kōkua mai; pela iho la ka nohana 'ohana ('Olelo No'eau 1200) Recognize others, be recognized, help others, be helped; such is a family relationship
4. Educate for Service, Justice and Peace (Aloha) Ka lama kū o ka no'eau ('Olelo No'eau 1430) Education is the standing torch of wisdom
5. Educate for Adaptation and Change (Aina) 'A'ohe pau ka 'ike i ka hālau ho'okahi ('Olelo No'eau 203) All knowledge is not taught in the same school

Biology Program Learning Outcomes

Upon completion of the B.S. degree program in Biology the student will demonstrate the following Program Learning Outcomes (PLO):

1. An understanding of the scientific method and the ability to design and test a hypothesis
2. The ability to visualize, statistically evaluate, validate and interpret scientific data, and to communicate science effectively both orally and in writing
3. The ability to acquire and comprehend information from published scientific literature and to employ computational resources in the resolution of biological problems
4. An understanding of the chemical and physical principles that unite all life forms, and of biological organization at the molecular, cellular, tissue, organ, organism and system levels
5. The ability to define the components and processes of genetic and epigenetic information transmission, and their determinant effects on the adaptive and evolutionary processes that they drive

6. An understanding of the etiology of major human disease burdens in terms of pathophysiological mechanisms, epidemiology within populations and possible therapeutic approaches
7. An understanding of the entry requirements, career pathways and progression for the major post-graduate fields of research, education and the health professions

Alignment of Natural Science & Mathematics Courses with Marianist and Hawaiian values of the University

The Natural Sciences Division provides an *integral, quality education*: sophisticated integrative course content taught by experienced, dedicated, and well-educated instructors.

- *We educate in family spirit* – every classroom is an *Ohana* and you can expect to be respected yet challenged in an environment that is supportive, inclusively by instructors who take the time to personally get to know and care for you.
- *We educate for service, justice and peace*, since many of the most pressing global issues (climate change, health inequity, poverty, justice) are those which science and technology investigate, establish ethical parameters for, and offer solutions to.
- *We educate for adaptation and change*. In science and technology, the only constant is change. Data, techniques, technologies, questions, interpretations and ethical landscapes are constantly evolving, and we teach students to thrive on this dynamic uncertainty.

The study of science and technology can be formative, exploring human creativity and potential in the development of technologies and scientific solutions, the opportunity to engage in the stewardship of the natural world, and the opportunity to promote social justice. We provide opportunities to engage with the problems that face Hawai'i and the Pacific region through the Natural Sciences curriculum, in particular, those centered around severe challenges in health, poverty, environmental resilience, and erosion of traditional culture. The Marianist Educational Values relate to Native Hawaiian ideas of *mana*, *na'auao*, *ohana*, *aloha* and *aina*. We intend for our Natural Sciences programs to be culturally-sustaining, rooted in our Hawaiian place, and centered on core values of *Maiau*, be neat, prepared, careful in all we do; *Makawalu*, demonstrate foresight and planning; *`Ai*, sustain mind and body; *Pa`a Na`au*, learn deeply.

Course (Student) Learning Outcomes (CLO)

By the end of our course, students will be able to:

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

Alignment of Learning and Program Outcomes

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. The table lists BI307 course (student) learning outcomes mapped to one or more PLO.

Students will be expected to:

Course Learning Outcomes	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
Identify, describe and explain DNA, RNA, and protein structure and function; and how they relate to the “Central Dogma” of molecular biology			X	X	X	X	
Use proper genetic terminology in exam and other writing assignments		X	X	X	X		
Describe and apply concepts of transmission genetics and role of probability: Inheritance patterns and chromosomal basis of heredity	X	X		X	X		
Identify, distinguish, and evaluate how mutations, gene flow, nonrandom mating, genetic drift, and natural selection affect the genetics structure of populations	X	X		X	X		
Explain how chemical properties of DNA and the interactions of proteins are utilized by scientists to study and manipulate genes and phenotypes	X			X	X	X	

Course Prerequisites

BI 210L, BI 216 and BI 216L (Biology majors). Cross-listed with BC 307.

Required Learning Materials

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.

There will be additional readings provided to the student throughout the course. These additional readings may be recommended or required.

Note: *Concepts of Genetics*, 11th ed., is also suggested 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.

Access to Pearson's online web site is not required, but highly recommended as a study aid.

Course Website and Access Information

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).

Technical Assistance for Course Website Users

The BI307 and BI307L websites are not based on Canvas, the CMS 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 letgen.org/chaminade; it is there for your convenience and to support my teaching of the course.

While course materials for BI307 and BI307L are not available with Canvas, course evaluation for BI 307 is administered by Chaminade University through Canvas. Assistance with CANVAS. Search for help on specific topics at help.instructure.com. [Chat live with Canvas Support 24/7/365](#). Watch this [video to get you started](#) with online guides and tutorials. Contact the Chaminade IT Helpdesk for technical issues: helpdesk@chaminade.edu, or call (808) 735-4855.

Tutoring and Writing Services

Biology students are encouraged to ask for help first with their biology instructors. Attend office hours or make an appointment to meet with your instructor; ask questions via online forums and during class time. In addition, Chaminade University is proud to offer free, one-on-one tutoring and writing assistance to all students. Tutoring and writing help is available on campus at Kōkua `Ike: Center for Student Learning in a variety of subjects (including, but are not limited to: biology, chemistry, math, nursing, English, etc.) from trained Peer and Professional Tutors. Please check Kōkua `Ike's website (<https://chaminade.edu/advising/kokua-ike/>) for the latest times, list of drop-in hours, and information on scheduling an appointment. Free online tutoring is also available via Smarthinking. Smarthinking can be accessed 24/7 from your Canvas account. Simply click Account – Notifications – Smarthinking. For more information, please contact Kōkua `Ike at tutoring@chaminade.edu or 808-739-8305.

Course Assessment

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	3	30
Worksheets	4	Every 3 – 4 weeks	10	40
Exams	4	Every 3 – 4 weeks	100	400
Participation	Many opportunities	Throughout the semester	Attendance: 20% Facilitator: 50% Responder: 30%	30

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 twelve (12) quizzes; all count to the final grade.

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

Participation: A total of 30 points are possible for participation and regular attendance. Students with regular attendance, defined as no more than four, nonconsecutive, unexcused absences during the semester, will be awarded 6 points – all others will receive zero points. Attendance is important, but your active, meaningful participation during class will also be evaluated. You will be expected to facilitate classroom and forum exam discussions by asking questions (facilitator: up to 15 points possible); you are also expected to respond to forum postings and contribute to classroom discussions (responder: up to 9 points).

Exams comprise between 10 and 15 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.

Homework? 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.

While I am happy to answer questions about homework, please do not ask FIRST for the answers; I expect you to have tried them on your own (work in groups!!) before seeking answers.

Grading Scale

Letter Grade	Percent of total	Points earned	Catalog description
A	90 – 100	450 – 500	Outstanding scholarship and an unusual degree of intellectual initiative
B	80 – 89	400 – 449	Superior work done in a consistent and intellectual manner
C	70 – 79	350 – 399	Average grade indicating a competent grasp of subject matter
D	60 – 69	300 – 349	Inferior work of the lowest passing grade, not satisfactory for fulfillment of prerequisite course work.
F	< 60	< 299	Failed to grasp the minimum subject matter; no credit given

Course Policies

Instructor and Student Communication

Please utilize Dr Dohm's scheduled office hours or make an appointment via the letgen.org/chaminade website. You are encouraged to use the online [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. Return of graded paper material will be within ten business days after you take the graded assignment.

Attendance Policy

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.

The following attendance policy is from the 2018-2019 Academic Catalog (p. 57-58): Students are expected to attend regularly all courses for which they are registered. Student should notify their instructors when illness or other extenuating circumstances prevents them from attending class and make arrangements to complete missed assignments. Notification may be done by emailing the instructor's Chaminade email address, calling the instructor's campus extension, or by leaving a message with the instructor's division office. It is the instructor's prerogative to modify deadlines of course requirements accordingly. Any student who stops attending a course without officially withdrawing may receive a failing grade. Unexcused absences equivalent to more than a week of classes may lead to a grade reduction for the course. Any unexcused absence of two consecutive weeks or more may result in being withdrawn from the course by the instructor, although the instructor is not required to withdraw students in that scenario. Repeated absences put students at risk of failing grades. Students with disabilities who have obtained accommodations from the Chaminade University of Honolulu ADA Coordinator may be considered for an exception when the accommodation does not materially alter the attainment of the learning outcomes. Federal regulations require continued attendance for continuing payment of financial aid. When illness or personal reasons necessitate continued absence, the student should communicate first with the instructor to review the options. Anyone who stops attending a course without official withdrawal may receive a failing grade or be withdrawn by the instructor at the instructor's discretion.

Late Work Policy

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.

Grades of "Incomplete"

Students and instructors may negotiate an incomplete grade when there are specific justifying circumstances. An Incomplete Contract (available form the Divisional Secretary and the Portal) must be completed. When submitting a grade the "I" will be accompanied by the alternative grade that will automatically be assigned after 90 days. These include IB, IC, ID, and IF. If only an "I" is submitted the default grade is F. The completion of the work, evaluation, and reporting of the final grade is due within 90 days after the end of the semester or term. This limit may not be extended.

Writing Policy

Instructions and expectations for written materials to be submitted by students will be provided as needed during the semester.

Cell phones, Smart Phones and Watches, Tablets, Laptops Music Devices and Cellular Phones

Students are encouraged to bring laptops or tablets to class to facilitate note-taking; the instructor may assign online activities and readings that may require the use of a laptop or tablet. However, laptops and tablets should not be misused, such as checking distracting websites. Use your best judgment and respect your classmates and instructor. Unless specifically permitted by your instructor, use of music devices, cell phones, and other personal technology is prohibited during all Natural Science and

Mathematics classes, as it is discourteous and may lead to suspicion of academic misconduct. Students unable to comply will be asked to leave class. If use of such technology is permitted by the instructor, out of consideration for your classmates, please set your music devices or cell phone to silent mode during class. For in-class exams you will be asked to place all laptops, tablets, or other devices into your bag and or placed on the floor.

Accommodations

If you need individual accommodations to meet course outcomes because of a documented disability, please speak with me to discuss your needs as soon as possible so that we can ensure your full participation in class and fair assessment of your work. 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 the Counseling Center by the end of week three of the class, in order for instructors to plan accordingly. 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 (counselingcenter@chaminade.edu).

Title IX Compliance

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. If you or someone you know has been harassed or assaulted, you can find the appropriate resources by visiting Campus Ministry, the Dean of Students Office, the Counseling Center, or the Office for Compliance and Personnel Services.

Academic Conduct Policy

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. See the current Undergraduate Academic Catalog and the Student Handbook available from Student Affairs.

Schedule

Readings are from 11th edition of Concepts of Genetics, ISBN: 978-0321948915

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.

Week	Date	Day	Chapter	Topics, coverage
1	Aug 26	Mon		Introduction
	Aug 28	Wed	1	Introduction

Week	Date	Day	Chapter	Topics, coverage
	Aug 30	Fri	2	Mitosis & Meiosis
2	Sep 02	Mon		Holiday
	Sep 04	Wed	2	Mitosis & Meiosis
	Sep 06	Fri	2	Mitosis & Meiosis
3	Sep 09	Mon	3	Mendelian
	Sep 11	Wed	3	Mendelian
	Sep 13	Fri	4	Mendelian
4	Sep 16	Mon	7	Sex chromosomes
	Sep 18	Wed	7	Sex chromosomes
	Sep 20	Fri	5	Linkage
5	Sep 23	Mon	5	Linkage
	Sep 25	Wed	Ch1 – 5, 7	Review01
	Sep 27	Fri		Exam01
6	Sep 30	Mon	10	DNA structure
	Oct 02	Wed	10	DNA structure
	Oct 04	Fri	11	Replication & recombination
7	Oct 07	Mon	11	Replication & recombination
	Oct 09	Wed	11	Replication & recombination
	Oct 11	Fri	12	Chromosomes
8	Oct 14	Mon		Holiday
	Oct 16	Wed	8	Chromosome mutations
	Oct 18	Fri	15	Mutation, DNA repair
9	Oct 21	Mon	15	Mutation, DNA repair
	Oct 23	Wed	Ch10 – 12, 15,	Review02
	Oct 25	Fri	Exam01	Exam02
10	Oct 28	Mon	Ch13	RNA & transcription
	Oct 30	Wed	Ch13	RNA & transcription
	Nov 01	Fri	Ch14	Proteins & translation
11	Nov 04	Mon	Ch14	Proteins & translation
	Nov 06	Wed	Ch16	Gene expression, Prokaryotes
	Nov 08	Fri	Ch17	Gene expression, Eukaryotes
12	Nov 11	Mon		Holiday
	Nov 13	Wed	Ch17	Gene expression, Eukaryotes
	Nov 15	Fri	Ch13,14,16,17,	Review03
13	Nov 18	Mon	Exam01 & 02	Exam03
	Nov 20	Wed	Ch23	Quantitative genetics
	Nov 22	Fri	Ch25	Evolutionary genetics
14	Nov 25	Mon	Ch25	Evolutionary genetics

Week	Date	Day	Chapter	Topics, coverage
	Nov 27	Wed	Ch25	Evolutionary genetics
	Nov 29	Fri		Holiday
15	Dec 02	Mon	Ch20, 22	DNA technology, bioethics
	Dec 04	Wed	Ch20, 22	DNA technology, bioethics
	Dec 06	Fri	Ch20, 22, 23, 25, &	Review04
16	Dec 09	Mon	cumulative	
	Dec 10	Tue		
	Dec 11	Wed		Exam04