Course Syllabus

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Last updated 28 August 2023

Course Title: Molecular Biology I Laboratory Genes and Genetics
Course Number: BI307L
Course credits: 1
Term: Fall 2023
Meeting Days: Monday
Meeting Hours: 2:30 - 5:20pm
Meeting Location: Henry Hall Lab 2

Instructor: Michael Dohm, PhD
Department: Biology, School of Natural Sciences and Mathematics, Chaminade University of Honolulu
Office: Wesselkamper Science Center (WSC) rm. 108
Phone: (808) 739 -- 8543
Office Hours: 9 - 11 am on Wednesday & Friday or by appointment
E-mail: mdohm [at] chaminade.edu (current students, please use CANVAS messaging)
Website: letgen.org (https://letgen.org)

Special Attention

Laboratory safety policies as established by the School of Natural Sciences & Mathematics (https://www.chaminade.edu/natural-sciences) and the office of Environmental Health & Safety (http://www.chaminade.edu/department-contact/environmental-safety) at Chaminade University must be obeyed at all times during lab class:

1. No food or drink
2. Students must wear closed toes shoes
3. Students must wear a lab coat when instructed to do so by Faculty or Safety Officer
4. Students are required to know location of SDS and other lab safety equipment. (http://www.letgen.org/chaminade/mod/page/view.php?id=253)

Additional rules of conduct apply in the lab, which will be provided to you on our first meeting. Failure to comply with these rules will result in loss of points or depending on the infraction, you will be asked to leave the classroom. If you do not wear proper attire on Exam days, you will not be permitted to take the exam and will receive a failing grade for that task.

Please respect the rules and do not make this an issue for us all.

Course overview

Genetics Laboratory is a one semester introduction to how geneticists study and interpret patterns of heredity, isolate and manipulate DNA elements, and conduct genetics research by utilizing public data bases and **computer** (https://www.letgen.org/chaminade/mod/glossary/showentry.php?eid=507&displayformat=dictionary) software **programs** (https://www.letgen.org/chaminade/mod/glossary/showentry.php?eid=519&displayformat=dictionary). Through hands-on exercises, discussion, and in-class projects, we will introduce genetic techniques (extraction of genetic material, electrophoresis, hybridization, amplification, data analysis) using model organisms (e.g., bacteria, Brassica, Drosophila, yeast) in order to gain practical experience with the genetic basis of simple phenotypes and an appreciation for how geneticists explore these topics and reflect upon how genetics influences the **environment** (https://www.letgen.org/chaminade/mod/glossary/showentry.php?eid=505&displayformat=dictionary) and human society. Experiments in molecular genetics typically take several hours to complete; thus, data collection and analyses usually require 2 or 3 lab periods to complete.

University Course Catalog Description

Laboratory section accompanying BI 307. Concurrent registration in BI 307 required. Prerequisites: BI 210L, BI 216 and BI 216L (Biology majors). Cross-listed with BC 307L. BI 308 Molecular Biology II Genomics and Epigenomics (3) Components and architecture of genomes. Linkage, physical mapping, and DNA sequencing. Comparing genomes of different species. Role of gene expression and gene networks in differentiation and morphogenesis. Role of DNA methylation and chromatin remodeling in regulation of genes. Role of regulatory RNAs in gene expression.

Course Prerequisites

Concurrent registration BI307

Course details

Required textbook & reading

The course lab manual is included in CANVAS, additional handouts, online sources, and articles given by instructor and made available on the Canvas course website. Your course is at **https://chaminade.instructure.com/courses/28870/**

Your lecture textbook, Concepts of Genetics, by Klug et al. will also be utilized, but it is not required.

Other required material

Students are required to obtain a laboratory coat, now available at the Division of Natural Sciences & Mathematics office (WSC, room 115), for $5. Gloves and safety goggles will be provided to you in the lab room. A personal computer or smart phone is also required material and must be brought to each lab meeting. A three-ring binder for course handouts is recommended, but not required.

Technical Assistance for Canvas Users

The BI307 and BI307L websites are supported by the Canvas course management platform. CANVAS is the CMS adopted by Chaminade University. Assistance with CANVAS

- Search (Google, Bing, etc.) for help on specific topics or get tips in Canvas Students
- Live chat with Canvas Support for students
- Canvas Support Hotline for students: +1-833-209-6111
- Watch this video to get you started
- Online tutorials: click on “Students” role to access tutorials
- Contact the Chaminade IT Helpdesk for technical issues: helpdesk@chaminade.edu or call (808) 735-4855

Course Credit Hour Expectations

BI307L is a one-credit hour course and therefore requires a minimum of 45 hours of student engagement (see CUH Credit Hour Policy). One university semester credit hour typically includes one hour of contact time with the instructor plus two hours of preparation time by the

student. Thus, over the course of the semester, students enrolled in BI307L are expected to spend about 45 hours in class and an additional 20 hours on materials prior to and following lab sessions. Work includes taking quizzes, completing notebook entries, and other homework.

Course assessment

Your grade will reflect your scores on Worksheets, Exams, Notebook, Reports, and Peer evaluation. In addition to these graded assignments, worksheets and lab questions may be assigned. Each lab is accompanied by questions or a worksheet, which are intended to help you with calculations, problem solving, or troubleshooting protocols -- these are turned in as part of your **lab notebooks (http://www.letgen.org/chaminade/mod/page/view.php?id=852)** and are evaluated as part of your lab notebook record.

Notebooks: Students are expected to keep a detailed and up-to-date electronic lab notebook (Microsoft OneNote) that includes your responses to protocols, results, relevant observations plus analyses. The lab notebook will be used by you to assist you with your reports and exams. We use Microsoft OneNote to manage digital lab notebooks. The digital notebooks are shared with the instructor and may be checked at any time by the instructor during the semester. The notebook is an essential part of working in a laboratory and you will need it to be complete an accurate in order to do well on the exams. We will talk more in class about keeping a good lab notebook.

Lab reports. Each student will complete two lab reports, standard scientific format, during the course of the semester. Each student will submit an electronic document via secured web site. One revision will be permitted before a final grade is assigned for the report. Lab reports will generally follow the following format.

1. A statement of the purpose of that laboratory including a description of the importance of the experiment.
2. An outline of the materials and procedures. This includes relevant details such as dates, times, number of specimens, etc.
3. Tables or figures of results, together with a short written explanation of what is contained in them.
4. Preliminary conclusions
5. Answers to questions, written in your lab manual.

For each report graded elements are draft (30 pts), peer evaluation (10 pts), and final report (20 pts). The final report must include revisions to your manuscript which address the instructor comments. Peer evaluations are conducted on the final papers.

Peer evaluation. As part of each report grade you will evaluate two or three papers from your peers. Details will be provided along with the assignments.

Worksheets & Quizzes. Worksheets or quizzes will be offered about protocols.

Exams. Two exams, one at midterm and the second at the end of the term, will be given. Topic questions from each lab will be provided in handouts, and form the basis of quizzes and exams in the course. These topics will be discussed during lab procedures and are part of your reading assignments.

A note on **working together (http://www.letgen.org/chaminade/mod/page/view.php?id=254)**. Laboratory work is a typically to be viewed as a group homework activity, but lab reports are individual activities. In lab, we conduct experiments and record observations. We will introduce you to how to conduct the analyses required to interpret your experiments. However, you can expect to spend time outside of class completing analysis and writing up results and conclusions from the experiments. Write-ups and analyses are to be turned in by each student and the work must be the work of the student only. However, data belong to the group and so data are shared between two or sometimes the entire class of students. Periodically, we will break into groups to discuss topics or work on problems introduced in lab. The purpose of the group activity is to give you opportunities to be more active learners, but also to be responsible to each other for the material. You will be given material in advance, and you must come to class prepared to discuss the material with your classmates.

Grading

A total of 400 points may be earned throughout the semester; each item has the following value.

Item	How often?	Points per assignment	Weight
Quizzes or Worksheets	10	5	12.5%
Reports	2	60	30%
Draft		30	

Final		20	
Peer evaluation		10	
Lab notebook	Collected twice	80	20%
Midterm		10	
End term		70	
Exams	2	75	37.5%
Course total		400	100%

Final grade: Your grade will be based on the following.

	Letter grade
90 - 100%	A
80 - 89%	B
70 - 79%	C
60 - 69%	D
< 60%	F

Official grade records

Canvas provides a way for you to monitor your graded assignments. This is convenient, but students should be aware that the final word about grades depends on the Official Grade Book for the course. Thus, although the Canvas record will show your points for an assignment, be advised that your assigned grade is finalized by the official grade book, which is maintained by Dr Dohm. You may always inquire about your current standing in the course by sending a **message** to Dr Dohm from within Canvas.

Lab schedule

Click **here to view the schedule of labs and assignment due dates**.

Student (Course) Learning Outcomes

1. Describe and apply the Scientific Method to observable phenomenon including being able to recognize and synthesize proper scientific questions and hypotheses; as well as being able to understand the relationship between the structure and function of genes and proteins.
2. Graph, analyze and interpret scientific data appropriately and correctly.
3. Perform & understand experimental methodology in regards to DNA extraction, PCR, sequencing, bioinformatic computer modeling and mendelian inheritance.
4. Write scientific paper(s) and/or lab report(s).

Alignment of Course Learning Outcomes (CLO) to Biology Program Outcomes (PLO)

CLO	PLO
1	1, 2, 3
2	2, 3
3	1, 2, 3
4	1, 2, 3, 4

Biology Program Learning Outcomes

Upon completion of the B.S. degree program in Biology the student will demonstrate:

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 entry requirements, career pathways and progression for the major post-graduate fields of research, education and the health professions.

University outcomes

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 (‘Ōlelo 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 (‘Ōlelo 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 (‘Ōlelo 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 (‘Ōlelo 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 (‘Ōlelo No‘eau 203) All knowledge is not taught in the same school

Alignment of Natural Sciences 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 the 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.

Chaminade University catalog: Academic honesty is an essential aspect of all learning, scholarship, and research. It is one of the values regarded most highly by academic communities throughout the world. Violations of the principle of academic honesty are extremely serious and will not be tolerated. Students are responsible for promoting academic honesty at Chaminade by not participating in any act of dishonesty and by reporting any incidence of academic dishonesty to an instructor or to a University official. Academic dishonesty may include theft of records or examinations, alteration of grades, and plagiarism, in addition to more obvious dishonesty. Questions of academic dishonesty in a particular class are first reviewed by the instructor, who must make a report with recommendations to the Dean of the Academic Division. Punishment for academic dishonesty will be determined by the instructor and the Dean of Academic Division and may include an "F" grade for the work in question, an "F" grade for the course, suspension, or dismissal from the University.

Additional information on student conduct can be found in the student handbook.

Tutoring and Writing Services

Chaminade 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.

Online Tutoring through Smarthinking

All CUH students are eligible to use Smarthinking, an online tutoring system. Students can access Smarthinking via their Canvas account. Through Smarthinking, students can connect in real-time with an expert educator in a variety of subjects using a virtual whiteboard technology. Students also have an option to schedule a 30-minute appointment with a tutor of their choice. The Online Writing Lab provides students with the ability to receive a detailed, personalized critique of any written assignment through a formal critique process. All sessions are archived and available for students to review at any time for studying or test preparation.

/MD

Course Summary:

BI307L schedule

Schedule tentative subject to change by instructor

Draft, last updated 28 August 2023

Click here for **BI307L Syllabus** (https://chaminade.instructure.com/courses/28870/assignments/syllabus)

Week	Date	Notes	Lab
1	21-Aug	Submit notebook url Lab safety quiz Quiz-Introduction	**Week 1:** (https://chaminade.instructure.com/courses/28870/modules/110705) Introduction Lab safety Digital lab notebook
2	28-Aug		**Week 2** (https://chaminade.instructure.com/courses/28870/modules/110706) Mendel genetics Inheritance: Background One gene, two alleles Statistics & Expected values Human population genetics
3	4-Sep	No class	**Holiday – No Lab**
4	11-Sep		**Week 4** (https://chaminade.instructure.com/courses/28870/modules/110708) Digital lab notebook Yeast & YPD media Mendel and Pedigree problems Human population genetics Pipetter calibration Hydroponics Tomato
5	18-Sep		**Week 5** (https://chaminade.instructure.com/courses/28870/modules/110709) DNA extraction Bioinformatics I Yeast growth analysis Disk assay Genotoxicity & Mutagenisis PCR: HRM & Sequencing Tomato: Check growth

Week	Date	Notes	Lab
6	25-Sep	Lab notebook due Lab exam 1	**Week 6** **(https://chaminade.instructure.com/courses/28870/modules/110710)** Yeast – mutagenesis PCR – gels Genes pClone: Exploring promoters Tomato: Check growth
7	2-Oct	Report 1 draft due	**Week 7** **(https://chaminade.instructure.com/courses/28870/modules/110711)** Yeast – mutagenesis Genes pClone: Exploring promoters
8	9-Oct	No class	
9	16-Oct	Report 1 final due	Week 9 Bioinformatics II pClone: Exploring promoters DNA extraction
10	23-Oct		Week 10 Analysis day Bioinformatics III Yeast – RNA extraction
11	30-Oct		Week 11 Analysis day Yeast – qPCR DNA extraction
12	6-Nov		Week 12 Analysis day QPCR Yeast DNA extraction
13	13-Nov	Report 2 draft due	Week 13 Analysis day Yeast

Week	Date	Notes	Lab
14	20-Nov	Lab exam 2	
15	27-Nov	Report 2 final due Lab notebook due	Clean up
16	8-Dec	Last day of semester	

* Every attempt has been made to create a timely and accurate pathway through the material. However, the instructor reserves the right to alter this schedule as appropriate to correct any error, or to accommodate our progress and mastery of the material, or in the event of unforeseen events which may affect our work with the material. If changes to exam dates are needed, reasonable accommodations will be offered to any student who are affected by a change to the exam schedule.

Click here for **BI307L Syllabus (https://chaminade.instructure.com/courses/28870/assignments/syllabus)**

Date	Details	Due
Fri Aug 26, 2022	First Assignment (https://chaminade.instructure.com/courses/28870/assignments/295929)	due by 11:59pm
	Lab safety contract form (https://chaminade.instructure.com/courses/28870/assignments/295934)	due by 11:59pm
Mon Aug 21, 2023	Submit your digital notebook's URL (https://chaminade.instructure.com/courses/28870/assignments/295945)	due by 5:30pm
Sun Aug 27, 2023	Quiz Lab Safety (https://chaminade.instructure.com/courses/28870/assignments/295916)	due by 11:59pm
	Quiz: Introduction (https://chaminade.instructure.com/courses/28870/assignments/295914)	due by 11:59pm
Mon Aug 28, 2023	Quiz - Mendel (https://chaminade.instructure.com/courses/28870/assignments/295919)	due by 11:59pm
Mon Sep 4, 2023	Bioinformatics I (https://chaminade.instructure.com/courses/28870/assignments/295921)	due by 11:59pm
	Submit leaf counts (https://chaminade.instructure.com/courses/28870/assignments/295942)	due by 11:59pm
	Submit tomato quantitative measures (https://chaminade.instructure.com/courses/28870/assignments/295944)	due by 11:59pm
Sun Sep 10, 2023	Linkage problems (https://chaminade.instructure.com/courses/28870/assignments/295918)	due by 11:59pm
	Mendel - Pedigree (https://chaminade.instructure.com/courses/28870/assignments/295915)	due by 11:59pm
	More Mendel (https://chaminade.instructure.com/courses/28870/assignments/295913)	due by 11:59pm
Fri Sep 29, 2023	Grade01 Notebook (https://chaminade.instructure.com/courses/28870/assignments/295930)	due by 11:59pm
	LabExam01 (https://chaminade.instructure.com/courses/28870/assignments/295935)	due by 11:59pm
Wed Oct 4, 2023	Submit Report01 Draft here (https://chaminade.instructure.com/courses/28870/assignments/295940)	due by 12:30pm
Wed Oct 11, 2023	Interpretating plates (https://chaminade.instructure.com/courses/28870/assignments/295932)	due by 11:59pm

Date	Details	Due
	Interpretating plates Copy (https://chaminade.instructure.com/courses/28870/assignments/295933)	due by 11:59pm
Fri Oct 20, 2023	Use of ORF Finder: Practice and Worked example (https://chaminade.instructure.com/courses/28870/assignments/295946)	due by 2pm
	Bioinformatics II: Student Executive Summary (https://chaminade.instructure.com/courses/28870/assignments/295923)	due by 11:59pm
	Bioinformatics II: Student protocol (https://chaminade.instructure.com/courses/28870/assignments/295924)	due by 11:59pm
	Use of Virtual Ribosome: Practice and worked example (https://chaminade.instructure.com/courses/28870/assignments/295947)	due by 11:59pm
Sun Oct 22, 2023	Nucleic Acid quality and quantity (https://chaminade.instructure.com/courses/28870/assignments/295938)	due by 11:59pm
Sun Nov 5, 2023	Quiz - PCR (https://chaminade.instructure.com/courses/28870/assignments/295920)	due by 11:59pm
Mon Nov 6, 2023	M&M mass and counts (https://chaminade.instructure.com/courses/28870/assignments/295937)	due by 5pm
	Bioinformatics II - 2 November (https://chaminade.instructure.com/courses/28870/assignments/295922)	due by 11:59pm
Tue Nov 14, 2023	Confirm receipt Report 1 draft comments (https://chaminade.instructure.com/courses/28870/assignments/295925)	due by 11:59pm
Fri Nov 24, 2023	LabExam02 (https://chaminade.instructure.com/courses/28870/assignments/295936)	due by 11:59pm
	Submit new draft Report 1 (https://chaminade.instructure.com/courses/28870/assignments/295943)	due by 11:59pm
Tue Nov 28, 2023	Evolution of lactate intolerance (https://chaminade.instructure.com/courses/28870/assignments/295926)	due by 11:59pm
	Evolutionary genetics simulation (https://chaminade.instructure.com/courses/28870/assignments/295927)	due by 11:59pm
	Quiz - Evolutionary and Population genetics (https://chaminade.instructure.com/courses/28870/assignments/295917)	due by 11:59pm

Date	Details	Due
Wed Nov 29, 2023	**Project Peer evaluation** (https://chaminade.instructure.com/courses/28870/assignments/295939)	due by 8:59am
Sun Dec 10, 2023	**Experiment Yeast Results** (https://chaminade.instructure.com/courses/28870/assignments/295928)	due by 11:59pm
Mon Dec 11, 2023	**Student Course Evaluation** (https://chaminade.instructure.com/calendar?event_id=32277&include_contexts=course_28870)	12am
Fri Dec 15, 2023	**Grade02 Notebook** (https://chaminade.instructure.com/courses/28870/assignments/295931)	due by 11:59pm
	Submit Report01 final (https://chaminade.instructure.com/courses/28870/assignments/295941)	due by 11:59pm