# Course Syllabus

**Course Title**:
Molecular Biology I Genes and Genetics Lab

**Course Number-section**:
BI 307L-02

**Course Credits**: 1

**Department**: Biology

**Term**: Fall 2019

**Class Meeting Days**:
Mon

**Class Meeting Hours**:
2:30 PM – 5:20 PM

**Class Location**: Henry Hall, Lab 3

**Instructor**: Michael Dohm, PhD

**Email**: mdohm (at) chaminade.edu*

**Phone**: 739-8543

**Office Location**: WSC 108

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

**Website**: https://letgen.org/chaminade

*please use the messaging system within your course management system

## Special Attention

Laboratory safety policies as established by the Division of Natural Sciences & Mathematics and Environmental Health & Safety Office at Chaminade University must be obeyed at all times during lab class:

1. No food or drink
2. You must wear closed toes shoes
3. You must wear a lab coat
4. Students are required to know location of SDS and other lab safety equipment.

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 description

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 software programs. 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, *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 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.

## Course details

**Required textbook & reading**: Lab manual (online), additional handouts, online sources, and articles given by instructor and made available on the course website. 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 for $5. Gloves and safety goggles will be provided. A notebook (cloth bound) and pen are also required materials students must bring to each lab meeting. A three-ring binder for course handouts is recommended, but not required.

**Access to course website:** The instructor maintains a web site to help manage the course. This website belongs to the instructor and the site is run on a Moodle CMS platform. All course handouts, including the syllabus, will be made available through our Moodle site, but can be obtained by other means upon request. Quizzes will also be handled via Moodle. You may access the web site directly at https://www.letgen.org/chaminade.

- Select BI307L Dr Dohm's Genetics Lab from the welcome screen and logon to the course.
- Your logon will be the first initial from your first name and your last name (e.g., Joe Key logon would be jkey).
- An initial password will be provided to you by email or in class; you will be prompted to change the password on your first logon to the site.
- If you are currently enrolled in Dr Dohm's lecture section of genetics, then you already have your username – they are the same for BI307 and BI307L.

## 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 and are evaluated as part of your lab notebook record.

**Notebooks**: Students are expected to keep a detailed and up-to-date notebook that includes your responses to protocols, results, relevant observations plus analyses. The notebook will be used by you to assist you with your reports and exams; the notebook itself will be evaluated twice 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 (40 pts), peer evaluation (20 pts), and final report (20 pts). The final report must include revisions to your manuscript which address the peer evaluations and instructor comments accompanied by a cover letter addressing each point raised in review.

**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**. 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. Many of these questions will be used as the basis for quizzes.

**A note on working together**. 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.

| Assignment | Points | Dates |
|---|---|---|
| Worksheets or quizzes (5) | 60 pts, 12 pts each | 1 - 2 per month |
| Reports (2)<br>includes draft, final version, and peer evaluations | 180 pts, 90 pts each | mid and end of semester |
| Notebook | 40 pts | Mid and end of semester |
| Exams (2) | 120 pts, 60 pts each | Mid and end of semester |
| **Total** | **400 pts** | |

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

| Points earned | Percent of total | Letter grade |
|---|---|---|
| 360 – 400 | 90 – 100% | A |
| 320 – 359 | 80 – 89% | B |
| 280 – 319 | 70 – 79% | C |
| 240 – 279 | 60 – 69% | D |
| 239 | < 60% | F |

## Catalog Description

BI 307L Molecular Biology I Laboratory – Genes and Genetics (1) Laboratory section accompanying BI 307. Concurrent registration in BI 307 required. Materials intensive fee applies. Prerequisites: BI 210L, BI 216 and BI 216L.

## 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

## Course Learning Outcomes and Linkage to Program Learning 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 BI307L course (student) learning outcomes mapped to one or more PLO (1 - 7).

Students will be expected to:

| Course Learning Outcomes | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| 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 | |

## 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 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 and University Policy

### 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.

## Course schedule

Tentative* BI307L Lab Schedule for Dr Dohm's sections, Fall 2019

| Week | | Lab | Graded items |
|---|---|---|---|
| 1 | Aug 26 | Introduction<br>Lab safety | |
| 2 | Sep 02 | **Holiday – No Lab** | |
| 3 | Sep 09 | Digital lab notebook<br>Mendel genetics<br>Inheritance: Background<br>One gene, two alleles<br>Expected values<br>Arabidopsis: Check growth | |
| 4 | Sep 16 | Digitial lab notebook<br>Yeast<br>DNA extraction (plant, human, yeast)<br>PCR & primer design (Bioinformatics I)<br>Arabidopsis: Check growth | |
| 5 | Sep 23 | Yeast growth analysis<br>Pedigree problems<br>Disk assay; Genotoxicity & Mutagenisis<br>PCR: HRM & Sequencing<br>Arabidopsis: Check growth | |
| 6 | Sep 30 | Yeast – mutagenesis<br>PCR – gels<br>Genes<br>pClone: Exploring promoters<br>Arabidopsis: Check growth | Lab notebook check<br>Exam01 |
| 7 | Oct 07 | Yeast – mutagenesis<br>Genes<br>pClone: Exploring promoters<br>Arabidopsis: Check growth | Report 1 due |
| 8 | Oct 14 | **Holiday – No Lab** | |

| Week | | Lab | Graded items |
|---|---|---|---|
| 9 | Oct 21 | Bioinformatics II<br>pClone: Exploring promoters<br>Arabidopsis: Check growth | |
| 10 | Oct 28 | Analysis day<br>Bioinformatics III<br>Yeast – RNA extraction | |
| 11 | Nov 04 | Analysis day<br>Yeast – qPCR | |
| 12 | Nov 11 | **Holiday – No Lab** | |
| 13 | Nov 18 | Analysis day<br>qPCR analysis<br>Arabidopsis: Check growth | |
| 14 | Nov 25 | Human population genetics | Lab notebook due<br>Exam02 |
| 15 | Dec 02 | Human population genetics | Report 2 due |

* 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.