Independent Study BI308L Syllabus

Molecular Biology II Genomics and Epigenomics Lab

Fall 2017 meeting days/times: 2:30PM, either Monday or Tuesday depending on student's schedule, see attached schedule for example
Instructor: Dr Mike Dohm, **Office**: Henry Hall, room 6; **Phone**: 808-739-8543
Email: mdohm@chaminade.edu → Students: please use website Messaging system
Office hours: Mon & Fri 11:30 AM – 1PM; Other times may be possible, but by appointment only.

Special Attention:

Henry L3 Safety and Proper Attire: We are obliged to follow applicable safety policies as established by the Environmental Safety Office: (1) No food or drink; (2) You must wear closed toes shoes; and (3) A lab coat and other appropriate PPE must be worn when directed by the instructor. Failure to comply with these rules will result in loss of points and you will be asked to leave the classroom until you are able to comply. *Please make note*: If you do not wear proper attire on Exam days, you will be asked to leave the class room until such time as you are able to comply with the lab safety rules; you will not be allowed to make up the exam and you will therefore receive a "0" for that exam. Please respect the rules and our obligation to provide a safe working environment for all of us. Do not make this an issue for us all.

Required textbook(s):

Lab manual (online and printed), additional handouts, online sources, and articles given by instructor. A Canvas website will be available for your use during the semester: https://chaminade.instructure.com/ – login details will be provided.

Recommended textbook(s):

It is highly recommended you have a copy of a good genetics textbook to refer to. *Concepts of Genetics*, 11th edition, by Klug et al. (ISBN: 978-032194891); and *Introduction to Genomics*, 2nd ed., 2012, by Arthur Lesk (ISBN: 978-0199564354). There will be additional recommended and required readings provided by the instructor throughout the course.

Access to course website:

BI308Lis a web-enhanced course, i.e., instruction takes place in the classroom, and technology, including the website, is used to complement and support face-to-face instruction. All lecture slides, course handouts, including this syllabus, will be made available to you at our web site. Quizzes typically will also be handled via the website, although other arrangements for taking quizzes may be available upon request. You may access the website via letgen.org/chaminade. Select BI-308L -01-1. You should already be enrolled: username is initial firstname plus lastname all lowercase. Upon first logon, a password change request will greet you. Follow the instructions. The web site uses latest SSL security; your information is safe provided you use a decent password. Although the course management software provides a Grading feature, this feature is only for information purposes and for you to monitor your progress only; your official grades for the course are maintained by Dr Dohm in his grade book in his office.

Use of the online material for BI308L is part of your participation in the course. For a satisfactory score on this element, you are expected to spend about an active hour each week on the site.

Course description:

Genomics & Epigenetics is a one semester introduction to the study of genomes (the entirety of an

organism's heredity information) and epigenetics, the heritable changes in gene expression as a result of changes other than DNA sequence alterations in biological organisms. Since the late 1990s, the discipline of genomics 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 diagnosed, and perhaps even how we view ourselves. Through lecture and discussion, we will explore these topics and reflect upon how the technology and discovery in genomics impacts the environment and human society. We will discuss genome structure and how to locate elements like a specific gene to a particular region of the genome, incorporating use of new technologies like genome wide mutant screens and RNA interference, and nonMendelian inheritance as a result of epigenetic changes to DNA. Students will be introduced and gain experience with software tools to interrogate genomic data.

Course catalog description:

BI 308L Molecular Biology II Laboratory Genomics and Epigenetics (1)Laboratory section accompanying BI 308. Concurrent registration in BI 308 required. Prerequisites: BI 307L. Materials intensive fee applies.

Student learning outcomes linked to Program Learning Outcomes:

Biology Program Learning Outcomes (PLO) are provided in the 2017-2018 University Catalog, p. 86. Students will be expected to demonstrate an understanding of

1. Use of bioinformatics software for genome assembly and annotation (PLO #2, 3, 7)
2. Using databases to develop and test hypotheses of genome structure (PLO #1, 2, 3, 7)
3. How to recognize mutants (mutant screening) and changes in methylation patterns (CpG islands) (PLO # 1 - 5)
4. Distinction between microarray and qPCR sources of error PLO # 1 - 5)
5. Use of modern instrumentation to complement molecular genetic hypotheses about genome structure and patterns of inheritance (PLO #1, 2, 4, 5, 6)

Course assessment:

Your grade will reflect your work on two (2) lab reports (each worth and 30 points) and six (6) worksheets (each worth 10 points). You are expected to keep a digital laboratory notebook (OneNote, you will receive training) of your work and this will be inspected twice and *at random times through the course* for a maximum of 30 points.

Lab reports and Worksheets. Lab reports or Worksheets will be completed by each student. The reports and worksheets are centered on one major element of the course. Reports are to be written in scientific format according to APA style and submitted via the website site for the course. Worksheets may be completed in class. Make copies of your Reports and Worksheets – these are to be included in your lab notebook. Expectations and formats for Reports and Worksheets will be provided by the instructor.

Laboratory work is a typically to be viewed as a group homework activity, but lab reports are individual activities.

A note on expectations:

Most of genomics research involves work with large sets of data. We will not generate this data; instead, we will download data from various databases to conduct *in silico* experiments. *In silico* roughly means we do experiments with the computer. 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.

Topic questions from each lab will be provided in handouts, and form the basis of exam questions 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 your reports.

Individual meetings with instructor**:** To better help you with some of the analytical work required in this course the instructor will require you to meet with him twice during the semester; more on this requirement will be discussed at the appropriate time.

Assignment	Points	Dates due
Reports (2) & Worksheets (6)	120 pts,	Every 2-3 weeks; see schedule for dates
Lab notebook	30 pts	6th week(5 pts) + 16th week (20 pts)
Total	150 pts	

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

Percent of total	Letter grade	*Interpretation (page 42, CUH 2016-17 catalog)*
90 – 100%	A	Outstanding scholarship and an unusual degree of intellectual initiative
80 – 89%	B	Superior work done in a consistent and intellectual manner
70 – 79%	C	Average grade indicating a competent grasp of subject matter
60 – 69%	D	Inferior work of the lowest passing grade, not satisfactory for fulfillment of prerequisite coursework.
< 60%	F	Failed to grasp the minimum subject matter; no credit given

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. 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 course 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 2016-17 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.

Tentative list and dates of Labs with due dates for lab reports
All meeting days start at 2:30PM, subject to change by instructor and consultation with student

Laboratory	**Topics**
Week 1 Monday 8/28	Introduction to the course; Setup with OneNote Digital Lab Notebooks
Week 2 Monday 9/4	No Lab, Labor Day holiday
Week 3 Monday 9/11	Digital lab notebooks Introduction, MacBooks, PheGenI, dbSNP, Online databases and "Methods" ***Worksheet 1: Databases (due week 4)*** ***Worksheet 2: GWAS (due week 5)***
Week 4 Monday 9/18	Acquiring sequences, BLAST search Bioinformatics: (UGENE, : BOWTIE & BLAST) 1. Sequence assembly with a reference 2. De novo sequence Karyotypes: Polytene chromosomes 1. C-bands & G-bands ***2.*** Imaging ***Worksheet 3: Sequencing (due week 7)***
Week 5 Monday 9/27	Bioinformatics: More UGENE work Evolutionary Genomics **Worksheet 4: Sequence alignment (due week 8)**
Week 6 Monday 10/4	President's Day, no labs this week ***Individual meetings with Instructor this week*** **Notebooks due**
Week 7 Monday 10/9	No Lab
Week 8 Monday 10/16	Methylation & Epigenetics ***Report 1: Epigenetics (due week 10)***
Week 9 Monday 10/23	Molecular clock ***Worksheet 5: Molecular Clock Due week 10***
Week 10 Monday 10/30	***Worksheet 6: Phylogenomics (due week 12)*** ***Report 2: Evolutionary genomics analysis of candidate gene for human disorder (due week 15)***
Week 11 Monday 11/8	Phylogenomics, continued
Week 12	***Individual meetings with Instructor***
Week 13	***Individual meetings with Instructor***
Week 14	***Individual meetings with Instructor***
Week 15	***Individual meetings with Instructor***
Week 16 Monday 11/27	Report 5 due **Notebooks due**