# **BI308 Syllabus**

# **Molecular Biology II Genomics and Epigenomics**

### Spring 2018 meeting days/times:

.....Section 1: MWF 10:30 – 11:20 AM, Henry Hall, room 109.....

### Instructor: Dr Mike Dohm, Office: Henry Hall, room 6; Phone: 808-739-8543

**Office hours**: Use Ask Dr Dohm forum; in person on Tuesday & Thursday 9 AM – 1 PM; By appointment

### **Required textbook:**

Genomes 4, 2017, by T. A. Brown (ISBN: 978-0815345084); There will be additional readings provided by the instructor throughout the course.

### **Recommended textbooks:**

Introduction to Genomics, 2nd ed., 2012, by Arthur Lesk (ISBN: 978-0199564354); Concepts of Genetics, 11th edition, by Klug et al. (ISBN: 978-0-321-94891-5); Genome: The autobiography of a species in 23 chapters, by Matt Ridley (ISBN: 978-0060894085).

### Access to course website

BI308 Genetics & Epigenetics is a web-enhanced course. All lecture slides, course handouts, including the syllabus, will be made available through our Moodle site. Quizzes typically will also be handled via the Moodle site although other arrangements for taking quizzes are available to the student upon request.

I don't use Canvas to support this course.

You may access the Moodle site directly at https://www.letgen.org/chaminade. Select BI308 Genomics & Epigenetics 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 website is maintained by Dr Dohm is not affiliated nor supported by Chaminade Information technology. You are not required to use the site; it is there for your convenience and to support your learning and my teaching of the course. All questions about the site are to be directed to Dr Dohm.

# **Course description:**

Molecular Biology II: 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.

The course is necessarily cumulative – you can expect topics covered build on concepts from the first semester; you can also expect that each exam includes material from previous weeks.

### **Catalog description:**

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. *Prerequisites: BI 307* 

### **Course learning outcomes:**

This course will introduce students to the foundational concepts of molecular genetics, genomics, and bioinformatics. Students will enhance abilities to discuss potential benefits and risks of genetic technology to the environment and or to human health and society.

# Student learning outcomes and linkages to Program Learning Outcomes (PLO)\*:

Students will be expected to demonstrate an understanding of

- 1. Organization of genomes (PLO: #1, #2. #3, #4, #5, #6, #7).
- 2. How sequencing technologies, software, and prior knowledge is incorporated into a genome assembly (PLO: #1, #2. #3, #4)
- 3. How to locate a gene (or other element) by molecular genetic and bioinformatic approaches (PLO: #1, #2. #3, #4).
- 4. Local and genomic control of gene expression (PLO: #2. #3, #4, #5, #6).
- 5. The role of sequence and imprinting on allele-specific patterns of inheritance (PLO: #1, #2. #3, #4, #5, #6).

\* See Chaminade University 2016-2017 Undergraduate Catalog

### **Course assessment:**

Your grade will be the result of points earned from quizzes, worksheets, and exams.

Quizzes and Worksheets, hereafter simply referred to as Quizzes, consist of testing of concepts (multiple choice) and from case studies with instructions on a particular genomics or bioinformatics problem. Work will include: use of online databases and bioinformatics tools and will be supported by work in laboratory exercises. Quizzes will be administered in class.

Four exams, each based on 8-9 lectures from up to five chapters from the lectures, quizzes, worksheets and required textbook. Exams will include about 20 questions (approximately 70% multiple choice, 20% short answer format; 10% "essay"). Each exam is cumulative – that is, Exam 2 will include concepts and terms discussed prior to Exam 1, and so forth, leading up the fourth exam, which is cumulative over the entire semester. All exams are given equal weight.

Each exam will include opportunities for bonus points (10% per exam). Bonus is earned for correctly defining terms selected by the instructor. Additional bonus points may be earned from answering

questions I post on the Ask Dr Dohm Forum.

#### Service Learning:

Students will be required to provide 10 hours during the semester for an organization or in an activity that is related to human genetics. More information on the opportunities will be provided in the first few weeks of class. A 2-3 page reflection paper will be due during Week 14 on the activities. If you complete the service earlier in the semester, you are encouraged to submit the paper earlier in the semester, as in within two weeks of completing the service.

#### Final grade:

A total of 400 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	5	every 1-2 weeks	5	20
Service Learning			20	20
Exams	4	every 3-4 weeks	90	360

Your letter grade will be based on the following point distribution out of 400 points possible.

Points earned	Percent of total	Letter grade
360-400	90-100%	A
320-359	80-89%	В
280-319	70-79%	С
240-279	60-69%	D
239 or fewer	< 60%	F

Course and University Policy, Reminders, and Notices:

- 1. Chaminade University abides by all aspects of the <u>Family Educational Rights and Privacy Act (FERPA</u>). Details of Chaminade's implementation of FERPA are available in your <u>Student Handbook (SH</u>).
- 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.

BI308 Lecture and Exam schedule (tentative, subject to change by instructor)

# Weeks 1 – 4

Genomes, Transcriptomes, and Proteomes (Brown Ch01) Eukaryotic Nuclear Genomes (Brown Ch07) Genomes of Prokaryotes and Eukaryotic Organelles (Brown Ch08) Genomes of Bacteriophages and Eukaryotic Viruses (Brown Ch09.1) Exam01 Monday, 12 February (in class)

# Weeks 5 – 8

Mobile genetic elements (Brown Ch09.2) Accessing the genome (Brown Ch10) The role of DNA-Binding proteins in genome expression (Brown Ch11) Transcriptomes (Brown Ch12) Exam02 Monday, 12 March (in class)

# Weeks 9 - 11

Proteomes (Brown Ch13) Genome expression in the context of cell and organism (Brown Ch14) Spring Break 26 March - 30 March Exam03 Takehome, due Monday 9 April

# Weeks 12 – 15

Evolution (Dohm's notes) How genomes evolve (Brown Ch18)

# **Finals Week**

Exam04 BI308-01 - Thursday, 10 May 11:00AM - 1:00PM