Biology 308 (3 credits)

Molecular Biology II – Genomics and Epigenetics

Instructor: Dr Mike Dohm
Office: Henry 6
Office Hours: Tuesday 8:30 – 10AM; By appointment

Course logistics:

Section	Days	Time	Location
1	MWF	10:30-11:20 AM	CTCC 253
2	MWF	1:30-2:20 PM	CTCC 250

Required textbook: *Genomes 3*, by T. A. Brown (ISBN: 9780815341383)

Recommended textbook: *Essentials of Genetics*, 7th ed., 2010, by Klug et al. (ISBN: 9780321618696)

There will be additional readings provided by the instructor throughout the course.

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 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: After taking this course, students will be expected to demonstrate an understanding of

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

Course prerequisites: Required courses: BI207/307.

Course assessment: Your grade will be the result of points earned from worksheets and exams.

> Worksheets consist of testing of concepts and case studies with instructions on a particular genomics or bioinformatics problem. Work will include: use of online databases and bioinformatics tools; The objective of the worksheets is to provide hands-on activities to support lecture and textbook readings.
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> Four exams, each based on 8-9 lectures from up to five chapters from the required textbook. Exams will include between 15 and 20 questions (approximately 30% multiple choice, 50% short answer format; 20% "essay").
>
> Each exam will include opportunities for bonus points (10% per exam)

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 & Worksheets	8	Every 2 weeks	10	80
Exams	4	Every 6-7 weeks	80	320

Final grade: 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%	B
280 – 319	70 – 79%	C
240 – 279	60 – 69%	D
< 239	< 60%	F

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.
2. 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 CUH Counseling Center (Dr. June Yasuhara; phone 735-4845) by the end of week three of the class, in order for the instructor to plan accordingly. Failure to provide written documentation will prevent your instructor from making the necessary accommodations. Please refer any questions to the Dean of Students and review the procedures at http://www.chaminade.edu/student_life/sss/counseling_services.php.
3. 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 available from the Bookstore and online at http://www.chaminade.edu/student_life/handbook.php Please note standards of academic honesty expected of you. If you are unsure what

your responsibilities are, please ask and I will be happy to help you.

4. Class begins each time exactly at the time scheduled (check your section number) – please be on time. Chronic tardiness will be viewed as absence from class. If you miss or are tardy for class, please note that we will proceed without you and you will miss material; it is your responsibility to obtain missed lecture topics from your classmates who were in attendance.
5. There are two sections of BI308; On Exam days, please attend the section you registered for. However, if space is available, you may, with permission from the instructor, attend a different section to make up any missed lecture.
6. You are expected to attend class and to come prepared:
   ► Read assigned and suggested readings before the material is to be presented in class;
   ► Do ask questions if you are unsure of material:
      In class
      Via the course forum.
      My office!
   ► Do more than the minimum required!

   I will suggest problems or questions from each chapter in your text or from the publisher's website for you to consider; these will not 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. BI308 exams are based on the same concepts and problems that the text questions address.
7. If a student cannot attend a class in which an exam has been scheduled, the student must notify the instructor no later than the class prior to the scheduled exam. Student athletes need to provide the instructor with a schedule of all travel during the semester, in addition to providing a letter from the Athletics Department prior to travel. In the event of an emergency or an illness, a Doctor's note will be expected and accommodations will be made on a case-by-case basis. Lacking an authorized excuse, you may still be allowed to take the exam at a later time, but you will not be able to earn full credit for the assignment, in fairness to those students who took the exam on time.
   ► Same day, but at later time: maximum points possible 95%
   ► 1 day late: maximum points possible 85%
   ► 2 - 3 days late: maximum points possible 70%
   ► More than 3 days, you will not be permitted to take the exam and a score of "0" will be assigned.
8. Return of graded material will generally be within two weeks 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. 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.

Exam dates and tentative lecture schedule

Check with instructor for updated schedule.

Exam 1: Studying Genomes		
Genomes, Transcriptomes and Proteomes	Ch1	Week 1
Studying DNA	Ch2	Week 1
Mapping Genomes	Ch3	Week 2
Sequencing Genomes	Ch4	Week 2
Understanding a Genome Sequence	Ch5	Week 3
Understanding How a Genome Functions	Ch6	Week 3
Review in class		3 February
Exam 1		5 February

Exam 2: Genome Anatomies		
Eukaryotic Nuclear Genomes	Ch7	Week 4
Genomes of Prokaryotes and Eukaryotic Organelles	Ch8	Week 4 - 6
Virus Genomes and Mobile Genetic Elements	Ch9	Week 6 & 7
Review in class		3 March
Exam 2		5 March

Exam 3: How Genomes Function		
Accessing the Genome	Ch10	Week 8
Assembly of the Transcription Initiation Complex	Ch11	Week 8 & 9
Synthesis and Processing of RNA	Ch12	Week 10 & 12
Regulation of Genome Activity	Ch14	Week 10 & 12
Review in class		4 April
Exam 3		7 April

Exam 4: How Genomes Evolve		
Mutations and DNA Repair	Ch15	Week 13 & 14
Recombination	Ch16	Week 13 & 14
How genomes evolve	Ch18	Week 15 & 16
Review in class		2 May
Exam 4	Section 2 Section 1	6 May, 11am - 1pm 8 May, 11am - 1pm