

## Syllabus

### BI 308 Molecular Biology II Genomics and Epigenetics

#### Spring 2020 meeting days/times:

MWF 11:30 – 12:20 AM, Hale Hoaloha 101

**Instructor:** Dr Mike Dohm, **Office:** Wesselkamper Science Center; **Phone:** 808-739-8543

**Office hours:** Use [Ask Dr Dohm](#) forum; in person on Monday & Wednesday 9 – 11 AM; By appointment (use Messages at course website)

#### 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 CANVAS course website. Quizzes typically will also be handled via the CANVAS website although other arrangements for taking quizzes are available to the student upon request.

You may access the CANVAS site directly at <https://chaminade.instructure.com>. Select BI308 Genomics & Epigenetics Lecture from the welcome screen and logon to the course. Use your CUH ID and password. Access to CANVAS is maintained by the IT department -- send access questions to [helpdesk@chaminade.edu](mailto:helpdesk@chaminade.edu). All course content and assignments are 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.

#### 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 non-Mendelian 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 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).

#### Biology Program Learning Outcomes (PLO)

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

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 profession.

\* See Chaminade University Undergraduate Catalog

## Marianist Educational Values

1. Educate for Formation in Faith
2. Provide an Excellent Education
3. Educate in Family Spirit
4. Educate for Service, Justice, and Peace
5. Educate for Adaptation and Change

## Course assessment:

Your grade will be the result of points earned from 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. Student's will not be graded on these exercises; instead, reflection and peer evaluation will be used to assess learning.

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.

## Final grade:

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

<i>Item</i>	<i>How many?</i>	<i>How often?</i>	<i>How many points?</i>	<i>Total points towards final grade</i>
Quizzes	8	every 1-2 weeks		0
Exams	4	every 4 weeks	100	400

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

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

## Course and University Policy, Reminders, and Notices:

1. **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; I cannot re-teach the class -- it is your responsibility to obtain missed lecture topics from your classmates who were in attendance.

2. 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.

3. **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: I highly recommend that you ask in class or via the course forum.

4. **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. I do not post answers to these suggested problems; however, I encourage you to discuss them with me in class or via the course forum.

5. **If a student cannot attend a class in which an exam has been scheduled, the student must notify the instructor in person no later than the class prior to the scheduled exam.** Notification does not include phone calls or by email. 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% one day late: maximum points possible 85% two to three days late: maximum points possible 70% More than three days, you will not be permitted to take the exam and a score of "0" will be assigned.

**6. Return of graded material will generally be within 5-7 class days after you take the graded assignment.**

**7. 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.

**8. You may not record by camera or video or audio recording device any lecture or other class activity without prior permission from the instructor.**

**9. I encourage you to bring and use your laptops and tablets in class.** However, use of these devices is conditional -- nonacademic activity during class hours is disruptive to the class and everyone around. Mute the sound and avoid "low-battery" emergencies -- electrical outlets are generally not available for student use during class hours.

10. Chaminade University recognizes the inherent dignity of all individuals and promotes respect for all people. Sexual misconduct will NOT be tolerated at Chaminade. If you have been the victim of sexual misconduct, 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, I must report the matter to the Title IX Coordinator. **Should you want to report to a confidential source you may contact the following:**

- Counseling Center (Dr. June Yasuhara; phone 808-735-4845).
- Any priest serving as a sacramental confessor or any ordained religious leader serving in the sacred confidence role (Fr. George Cerniglia, Rector; phone 808-739-8399 or Campus Ministry; 808-735-4774).

**11. Chaminade University abides by all aspects of the Family Educational Rights and Privacy Act (FERPA).** FERPA is a Federal law that protects the privacy of student education records. Details of Chaminade's implementation of FERPA are available beginning on page 12 in your 2014 - 2015 [Chaminade University Student Handbook and Academic Planner](#).

12. Chaminade University is committed to making reasonable accommodations to assist individuals with disabilities in reaching their academic potential ([Americans with Disabilities Act](#)). **If you have a disability which may impact your performance, attendance, or grades in this course and require accommodations, you must first obtain written documentation of the need for accommodations from the Chaminade University Counseling Center** (Dr. June Yasuhara; phone 808-735-4845) as soon as possible 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](http://www.chaminade.edu/student_life/sss/counseling_services.php).

**13. You are also expected to have read and to abide by the "Student Rules of Conduct" Chaminade University's Student Handbook and Academic Planner.** The handbook is available from the Bookstore or online at [http://www.chaminade.edu/student\\_life/handbook.php](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 or get you contact information if I cannot help.

## Exam Schedule

Exam	Date
1	Monday, 10 February
2	Monday, 9 March
3	Friday, 10 April
4	6 May, 11AM - 1PM

## Quiz schedule

Quiz	Quiz opens on or about	Quiz supports Exam
1	1/27	1
2	2/3	
3	2/19	2
4	2/26	
5	3/16	3
6	4/1	
7	4/15	4
8	4/24	

## Lecture schedule\*

Week	Date	Day	Lecture	Topic	Brown04
1	01-13	Monday	0	Pretest, schedule	Introduction
	01-15	Wednesday	1	Genetics Review & Introduction	Ch01
	01-17	Friday	2		Ch01
2	01-20	Monday		<b>ML King Holiday, no class</b>	
	01-22	Wednesday	3	<b>Marianist Founders' Day Mass, no class</b>	
	01-24	Friday	4	Eukaryote Nuclear Genomes	Ch07
3	01-27	Monday	5	<b>Quiz 1</b>	Ch07
	01-29	Wednesday	6		Ch07
	01-31	Friday	7	Genomes of Organelles & Prokaryotes	Ch08
4	02-03	Monday	8	<b>Quiz 2</b>	Ch08
	02-05	Wednesday	9		Ch08
	02-07	Friday	10		Ch08
5	02-10	Monday		<b>Exam01</b>	CH1,7,8
	02-12	Wednesday	1	Viral genomes	Ch09.1
	02-14	Friday	2	Transposons	Ch09.2
6	02-17	Monday		<b>President's Day, no class</b>	
	02-19	Wednesday	3	Transposons; <b>Quiz 3</b>	Ch09.2
	02-21	Friday	4	"Accessing" the genome	Ch10
7	02-24	Monday	5		Ch10
	02-26	Wednesday	6	DNA-binding proteins; <b>Quiz 4</b>	Ch11
	02-28	Friday	7		Ch11
8	03-02	Monday	8	Transcriptome	Ch12
	03-04	Wednesday	9		Ch12
	03-06	Friday	10		Ch12
9	03-09	Monday		<b>Exam02</b>	CH9,10,11,12
	03-11	Wednesday	1	Proteome	Ch13
	03-13	Friday	2		Ch13
10	03-16	Monday	3	Genome expression; <b>Quiz 5</b>	Ch14
	03-18	Wednesday	4		Ch14
	03-20	Friday	5		Ch14
11	03-23	Monday		<b>Spring Break</b>	
	03-25	Wednesday		<b>Spring Break</b>	
	03-27	Friday		<b>Spring Break</b>	
12	03-30	Monday	6	Mutations & DNA repair	Ch16
	04-01	Wednesday	7	<b>Quiz 6</b>	Ch16
	04-03	Friday	8	Recombination & transposition	Ch17
13	04-06	Monday	9		Ch17
	04-08	Wednesday		<b>Exam03</b>	CH13,14,16,17
	04-10	Friday		<b>Good Friday, no classes</b>	
14	04-13	Monday	1	instructor provided reading	Evolution
	04-15	Wednesday	2	<b>Quiz 7</b>	Evolution
	04-17	Friday		Na Liko Na`auau, no class	
15	04-20	Monday	3		Evolution
	04-22	Wednesday	4		Ch18
	04-24	Friday	5	<b>Quiz 8</b>	Ch18
16	04-27	Monday	6		Ch18
	04-29	Wednesday	7		Ch18
	05-01	Friday	8	<b>Last Day</b>	
17					
	05-06	Wednesday		<b>Finals – Exam04: 11AM -- 1PM</b>	Ch18, Evolution

\* subject to change by instructor