BI 420, 3 credits

Systems Biology

Section: BI420-01

Meeting days/times: Tues, Thurs 8:30 AM – 9:50 PM

Location: Wesselkamper Science Center (WSC) 120

Instructor: Michael Dohm, PhD

Office: Henry 6

Phone: 739-8543

Email: mdohm@chaminade.edu

Office hours: (1) Monday & Friday, 12:30-2:20PM; (2) By appointment

Catalog description, 2016-2017

This course will focus on the frontiers of our understanding of the multi-level networks that underlie biological systems. Lecture course reviewing the key concepts of the systems biology approach to ecological, organismal and cellular systems. Contribution of cornerstone technologies such as genomics, bioinformatics, proteomics and metabolomics will be reviewed, along with their computational foundations.

Prerequisites: *BI 308 and BI 308L*

Textbooks & resources

Required textbook. *A First Course in Systems Biology, by* Eberhard Volt. 1st Edition. ISBN: 978-081534467. Additional readings, from software manuals to current research articles, will also be required.

Required software. R statistical software (free); RStudio (free), Office suite software (presentation, spreadsheet, word processing) Microsoft or LibreOffice

Recommended software. Cytoscape, GNU Octave

Access to course website

You may access the website at https://www.letgen.org/chaminade. Select BI 420 Systems Biology 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 letgen.org site uses latest SSL security; however, no user information (student ID, etc.) are used on the site, nor are official grades kept on the site (Dr. Dohm's grade book is maintained on a local computer).

BI 420 is a web-enhanced course, i.e., instruction takes place in the classroom, and technology, including the website, are used to complement and support face-to-face instruction. All lecture slides, course handouts, including the syllabus, will be made available through our web site. Quizzes typically will also be handled via the website, although other arrangements for taking quizzes may be available upon request.

The BI 420 website is not based on Canvas, the CMS recently adopted by Chaminade University. The BI 420 websites are built on the Moodle CMS platform and were created and maintained by Dr Dohm at the letgen.org domain. Moodle CMS and the letgen.org site are not affiliated nor supported by Chaminade Information Technology. All questions about the site are to be directed to Dr Dohm. You are not required to use the letgen.org; it is there for your convenience and to support your learning and my teaching of the course.

Student learning outcomes linked to Biology Program Learning Outcomes (see University Catalog for list of Biology PLO)

At the conclusion of BI 420, students will:

1. Define the terms ‘system biology’ and explain how the era of ‘big data’ has developed form the molecular biology and computational revolution of the last decade.
2. Explain the techniques that generate “omic” data sets, specifically genomes, transciptomes, epigenomes, microbiomes, metabolomes and proteomes.
3. Manipulate (retrieve, reformat, merge) and derive insights from (interpret) data sets that exemplify these “’omes”.
4. Apply sophisticated data visualization tools to extract meaning from a massive data set.
5. Relate systems approaches to a contemporary problem in medical, or environmental biology
6. Work as part of a team to solve complex problems and to present results to

Course assessment

Your grade will be the result of points earned from group work, participation, worked problems, and exams.

Worked problems: Selected exercises from chapters 1 -- 5 and 15 will be assigned. These will not be graded but we will instead serve as the exam questions.

Exams comprise between 10 and 15 questions drawn from the textbook. The first exam (Week 6) will cover chapters 1, 2, 3, and 15' The second exam (Week 10) will cover material from chapters 4 and 5.

Group work has the following elements. Students will be randomly assigned to a team. The team will be assigned one of the topic chapters from the textbook. Each team is responsible to the class to complete all problems, present a PowerPoint slide show to summarize the chapter, and provide all programing code needed to solve the chapter problems. Each chapter has from 25 to 34 questions.

Participation in class and participation within your group are also graded elements.

The following table summarizes graded elements in the course

Item	When?	How many points?	Percent of final grade
Exam 1	Tuesday, Week 6	60	30%
Exam 2	Tuesday, Week 10	60	30%
Group work	Starts week 2, with presentations due in weeks 13 - 15	60	30%
Participation	Throughout the semester	20	10%

Final grade

Your letter grade will be based on the following point distribution out of 200 points possible.

Points earned	Percent of total	Letter grade
180 – 200	90 – 100%	A
160 – 179	80 – 89%	B
140 – 159	70 – 79%	C
120 – 139	60 – 69%	D
< 119	< 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 (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. It is your responsibility to complete the assigned problem sets. BI 420 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 letgen.org/chaminade 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 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.

BI420 Systems Biology tentative schedule, subject to change by instructor

Every attempt has been made to create an accurate pathway through the material. However, the instructor reserves the right to alter this schedule as appropriate to correct any error, or based on our progress and in the event of unforeseen events which may affect our work with the material. Readings are from A First Course in Systems Biology, ISBN: 978-081534467.

Week	***Readings***	***Assignment due***
1	Chapter 1 & 15	problems from chapter(s)
2	Chapter 2	problems from chapter(s)
3	Chapter 2	problems from chapter(s)
4	Chapter 3	problems from chapter(s)
5	Chapter 3	problems from chapter(s)
6	***Exam 1, 29 September in class***	
7	Chapter 4	problems from chapter(s)
8	Chapter 4 & 5	problems from chapter(s)
9	Chapter 5	problems from chapter(s)
10	***Exam 2, 27 September in class***	
11		
12		
13	Group presentations	
14	Group presentations	No class on Thursday, Thanksgiving
15	Group presentations	
16	Group reports, powerpoints, and programming notes must be turned in by Monday, 5 December	