

Course Syllabus

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Chaminade
University
OF HONOLULU

Course Number: BI-104

Course Title: Digital Biology

Department Name: Biology

College/School/Division Name: Natural Sciences and Mathematics

Term: Spring 2024

Course Credits: 1

Class Meeting Days: Section 01: Monday; Section 02: Wednesday

Class Meeting Times: Section 01: 1:30 - 2:20pm; Section 02: 11:30am - 12:20pm

Class Location:

Section 01: Monday, Room 253 C.T.C. Ching Hall

Section 02: Wednesday, Room 107 Henry Hal

Professor: Michael Dohm, PhD

Email: mdohm[[@](mailto:mdohm@chaminade.edu)]chaminade.edu

Phone: 808-739-8543

Office Location: WSC, Room 108

Office Hours: Tues 9 – 11am, 1:30 - 3pm, or by appt (please use CANVAS messaging for all correspondence with the Professor about this course)

University Course Catalog Description

Introduction to 'big data', data science, visualization and analytics in the areas of biomedicine, social sciences and the natural and built environments. Required course for Biology and Environmental majors.

Course Overview

This course is intended to be an examination on the role of technology and computational tools available to modern life scientists. Students will be exposed to a breadth of applications used in the information age to answer important biological questions across multiple disciplines. Computers enable scientists to improve data quality and laboratory efficiency more effectively than just a decade ago. Computational tools help researchers probe and model complex biological phenomena and more quickly react and adjust to changes in their fields of science. It's a quickening of discovery, which can increase breakthroughs, and health benefits from research by transdisciplinary teams. The Digital Biology course is an introduction to bioinformatics and scientific questions and how information technologies have impacted science. The expectation is that students will see the amazing scope of information directly available to researchers and the need to integrate other disciplines (e.g. computer science or information technology) into solving challenging scientific questions.

This course has been designed to:

- Prepare the students for further education in advanced biology courses, or related fields.
- Introduce the student to bioinformatics and gain confidence in use of computer technology in science.
- Provide students with hands-on experience answering questions with data.

Course Prerequisites

None

Required Learning Materials

None; instructor will provide reading materials

CANVAS: <https://chaminade.instructure.com/courses/29386>
(<https://chaminade.instructure.com/courses/29386>)

Suggested Learning Materials

Instructor provides suggested resources -- including readings, tutorials, videos -- throughout the semester to support student's project choice.

Some suggested books include:

- Digital Biology: How Nature Is Transforming Our Technology and Our Lives
- Dohm (2020) Mike's Biostatistics Book
- Data science for biology
- The Digital Cell: Cell Biology as a Data Science
- Knell (2013) Introductory R: A Beginner's Guide to Data Visualisation and Analysis Using R
- A Primer for Computational Biology

Technical Assistance for Canvas Users:

- Search for help on specific topics or get tips at [Canvas Students](https://community.canvaslms.com/groups/students/pages/home) (<https://community.canvaslms.com/groups/students/pages/home>)
- Live chat with [Canvas Support for students](https://cases.canvaslms.com/liveagentchat?chattype=student) (<https://cases.canvaslms.com/liveagentchat?chattype=student>)
- Canvas Support Hotline for students: +1-833-209-6111
- Watch this [video](https://community.canvaslms.com/docs/DOC-18585-getting-started-with-canvas-as-a-student) (<https://community.canvaslms.com/docs/DOC-18585-getting-started-with-canvas-as-a-student>) to get you started
- [Online tutorials](https://community.canvaslms.com/community/answers/guides/video-guide#jive_content_id_Students) (https://community.canvaslms.com/community/answers/guides/video-guide#jive_content_id_Students): click on “Students” role to access tutorials
- Contact the Chaminade IT Helpdesk for technical issues: helpdesk@chaminade.edu or call (808) 735-4855
- Connect to Chaminade's WI-FI: <https://metaaccess.myweblogon.com:8443> (<https://metaaccess.myweblogon.com:8443/>)

Assessment

Course grade assessed from successful completion of quizzes, worksheets, and completion of a group project. Attendance at all in-person meetings is required and your active participation is expected. A total of 300 points, weighted by category.

Category	How many/often?	Points per category	Weight
Attendance & Participation	Each week	50	17%
Project <ul style="list-style-type: none">• Proposal• Project management• Progress report• Meeting• Product• Presentation	During semester, see project timetable	100	33%
Quiz	5	50	17%
Worksheets	7	100	33%
	Total	300	100%

Quizzes and Worksheets, hereafter simply referred to as assignments, consist of testing of concepts (true false, multiple choice, short answer) and from case studies with instructions on a particular bioinformatics problem. Work may include: use of online databases and bioinformatics tools and will

be supported by in-class demonstrations and exercises. These assignments are managed by CANVAS.

Beginning by the third week of the semester, students will form groups and conduct a project-based activity in bioinformatics. Additional details will be provided as needed during the semester. Graded activities include a written proposal, project management plan, weekly progress report, one or more meetings with Dr Dohm, and product (e.g., a database, a website, a program), and a short presentation.

Course Credit Hour Expectations

BI-104 is a one-credit hour seminar course and therefore requires a minimum of 45 hours of student engagement (see CUH Credit Hour Policy). One university semester credit hour typically includes one hour of in-class contact time with the professor plus two hours of preparation time outside of classroom by the student. Thus, over the course of the semester, students enrolled in BI-104 are expected to spend about 15 hours in class, 10 hours on quizzes and worksheets, and 20 hours on group and independent project work. These times are approximate -- individual needs may vary. Time spent outside of class by students may be better expressed by tasks to do. For example, students can re-write and update lecture notes, perform focused reading from the textbook and other resources, coding and problem solving, developing concept maps, and creating and taking practice exams.

Grading Scale

Letter grades are given in all courses except those conducted on a credit/no credit basis. They are interpreted as follows:

Letter grade	Percentage range	Criteria *
A	90 -- 100%	Outstanding scholarship and an unusual degree of intellectual initiative
B	80 -- 89%	Superior work done in a consistent and intellectual manner
C	70 -- 79%	Average grade indicating a competent grasp of subject matter
D	60 -- 69%	Inferior work of the lowest passing grade, not satisfactory for fulfillment of prerequisite course work
F	< 60%	Failed to grasp the minimum subject matter; no credit given

* From [University Course Catalog](https://catalog.chaminade.edu/generalinformation/academicaffairs/undergraduate/academicinformation/)

(<https://catalog.chaminade.edu/generalinformation/academicaffairs/undergraduate/academicinformation/>)

Official grade records

Canvas provides a way for you to monitor your graded assignments. This is convenient, but students should be aware that the final word about grades depends on the Official Grade Book for the course. Thus, although the Canvas record will show your points for an assignment, be advised that your assigned grade is finalized by the official grade book, which is maintained by Dr Dohm. You may always inquire about your current standing in the course by sending a message to Dr Dohm, within Canvas.

Tutoring and Writing Services

Chaminade is proud to offer free, one-on-one tutoring and writing assistance to all students. Tutoring and writing help is available on campus at Kōkua 'Ike: Center for Student Learning in a variety of subjects (including, but are not limited to biology, chemistry, math, nursing, English, etc.) from trained Peer and Professional Tutors. Please check Kōkua 'Ike's website (<https://chaminade.edu/advising/kokua-ike> (<https://chaminade.edu/advising/kokua-ike/>)) for the latest times, list of drop-in hours, and information on scheduling an appointment. Free online tutoring is also available via Smarthinking. Smarthinking can be accessed 24/7 from your Canvas account. Simply click Account – Notifications – Smarthinking. For more information, please contact Kōkua 'Ike at tutoring@chaminade.edu or 808-739-8305.

Schedule of lectures, assignments, and exams

Click here to view [BI-104 schedule \(https://chaminade.instructure.com/courses/29386/pages/bi104-schedule\)](https://chaminade.instructure.com/courses/29386/pages/bi104-schedule)

Program Learning Outcomes

Upon completion the program in Biology, a graduating student will demonstrate the following competencies:

1. Apply the scientific method in the design and testing of hypotheses
2. Transform and display, statistically evaluate, validate, and interpret scientific data and communicate the results of such analyses effectively both orally and in writing
3. Acquire, summarize, and synthesize information from published scientific literature, databases and bioinformatics software to extract and interpret biological data
4. Recognize the chemical and physical principles that underlie all life forms, and the biological organization at the molecular, cellular, tissue, organ, organism, and system levels that emerge from these principles
5. 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. Evaluate the etiology of major human disease burden in terms of, pathophysiological mechanisms, epidemiology within populations and possible therapeutic approaches

- 7. Integrate an awareness of bioethical issues to positively influence the application of science to service, justice and peace in the solution of societal problems

Course Learning Outcomes and Linkage to Program Learning Outcomes

Students who successfully complete this course will be able to:

Course Learning Outcomes	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7
Describe how vast amounts of data are being generated and integrated into science				X			
Describe or conceptualize how data is used to model scientific information from the cellular to the global scale				X			
Describe how various scientific disciplines are now integrated to solve biological questions.				X			
Describe the six different levels of scientific questions.				X	X		

Alignment of Natural Sciences Courses with Marianist and Hawaiian values of the University.

The Natural Sciences Division provides an integral, quality education: sophisticated integrative course content taught by experienced, dedicated, and well-educated instructors.

- We educate in family spirit – every classroom is an Ohana and you can expect to be respected yet challenged in an environment that is supportive, inclusively by instructors who take the time to personally get to know and care for you.
- We educate for service, justice and peace, since many of the most pressing global issues (climate change, health inequity, poverty, justice) are those which science and technology investigate, establish ethical parameters for, and offer solutions to.
- We educate for adaptation and change. In science and technology, the only constant is change. Data, techniques, technologies, questions, interpretations, and ethical landscapes are constantly evolving, and we teach students to thrive on this dynamic uncertainty.

The study of science and technology can be formative, exploring human creativity and potential in the development of technologies and scientific solutions, the opportunity to engage in the stewardship of

the natural world, and the opportunity to promote social justice. We provide opportunities to engage with the problems that face Hawai'i and the Pacific region through the Natural Sciences curriculum, in particular, those centered around severe challenges in health, poverty, environmental resilience, and erosion of traditional culture. The Marianist Educational Values relate to Native Hawaiian ideas of mana, na'auao, ohana, aloha and aina. We intend for our Natural Sciences programs to be culturally-sustaining, rooted in our Hawaiian place, and centered on core values of Maiau, be neat, prepared, careful in all we do; Makawalu, demonstrate foresight and planning; `Ai, sustain mind and body; Pa`a Na`au, learn deeply.

Alignment of BI104 with Marianist and Hawaiian values of the University

BI-104 Cellular and Organismal Biology II lecture and lab provides an integral quality education as it is an introductory science course which provides students a foundation that will be necessary to be successful in several upper division science courses, including but not limited to BI308/L, BI311, BI420, BI471/L, and BI495. As each new topic is introduced throughout the semester, a point is made to link the current subject matter with those future biology courses. Additionally, it is highlighted how the subject matter may be integrated with other sciences like chemistry and physics so that students understand that this BI104 course, as well as biology in general, is not a standalone course. To be successful and utterly understand biology one needs to understand how it relates to the bigger scientific community.

This course also focuses on educating in the family spirit. This is done by emphasizing that science is not done in a vacuum. Throughout the semester there are several small group projects/presentations both within the lecture and the lab. These are designed to not only assist student in learning the subject matter but to encourage them to build relationships within the peer groups. In order to foster collaborative learning homework assignments are given such that students are instructed to answer in their own words; however students are strongly encouraged to work with their peers to find and discuss the answers to these questions.

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. Please attend the section of BI104 for which you were registered. There are two sections of BI104; Although we cover the same topics, you are responsible for the material presented in the section in which you were registered.

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. BI104 assignments 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.
6. 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.
7. 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 may not 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.
8. Return of graded material will generally be within 5-7 class days after you take the graded assignment.
9. Dr Dohm does not use CANVAS to produce your grade -- assignment scores are reported in CANVAS for your convenience, but the official course grade book is located on Dr Dohm's grading database. Therefore, totaling function is blocked in CANVAS. Students are expected to keep track of their graded material.
10. 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 below, policy item 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.
11. You may not record by camera or video or audio recording device any lecture or other class activity without prior permission from the instructor.
12. Dr Dohm encourages students to bring and use laptops (macOS or Windows PCs best) or 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.

13. 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 (phone 808-735-4845).
 - Any priest serving as a sacramental confessor or any ordained religious leader serving in the sacred confidence role (Bro. Edward Brink, Rector; phone 808-735-4835 or Campus Ministry; 808-735-4774).
14. Chaminade University abides by all aspects of the Family Educational Rights and Privacy Act Links to an external site.(FERPA). FERPA is a Federal law that protects the privacy of student education records. Details of Chaminade's implementation of FERPA are provided in your [Chaminade University Student Handbook and Academic Planner](https://assets.chaminade.edu/wp-content/uploads/2022/07/29101951/22-23-Student-Hanbook-Working-Revisions.pdf) (<https://assets.chaminade.edu/wp-content/uploads/2022/07/29101951/22-23-Student-Hanbook-Working-Revisions.pdf>).
15. Chaminade University is committed to making reasonable accommodations to assist individuals with disabilities in reaching their academic potential (Americans with Disabilities Act Links to an external site.). If you have a disability which may impact your performance, attendance, or grades in this course and require accommodations, you must first must obtain written documentation of the need for accommodations from the Chaminade University Counseling Center (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 <https://chaminade.edu/student-life/counseling-services> (<https://chaminade.edu/student-life/counseling-services/>).
16. You are also expected to have read and to abide by the "Student Rules of Conduct" (p. 25 - 29) Chaminade University's Student Handbook and Academic Planner Links to an external site.. 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)
17. 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

Course Summary: