BI 104-02, Digital Biology

Location: Clarence T. C. Ching Hall (CTCC) rm 250

Meeting times: TH, 9:00 – 9:50

Instructor: Mark Speck, PhD

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Required Textbook: No required textbook; readings provided by instructor or via Internet URLs.

Course description: 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. Although the Digital Biology course is a survey of the current state of digital science and how information technologies have impacted biology it is now considered an emerging discipline. In general, digital biology can be grouped into three areas as recently defined at the symposium, *Digital Biology: the Emerging Paradigm,* held at the National Institutes of Health in Bethesda Maryland, "1) scientific data integration, 2) multi-scale biological monitoring and 3) the networking of 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 biological questions.

Course learning outcomes: At the conclusion of BI 104,students will:

1. Describe how vast amounts of data are being generated and integrated into science.
2. Describe or conceptualize how data is used to model scientific information from the cellular to the global scale.
3. Describe how various scientific disciplines are now integrated to solve biological questions.

Course requirements: Grading will be based on student points earned from attendance, assigned homework, and two group projects. Homework will be discussed in class with assignments selected randomly from students at the beginning of class. Projects will focus on material and sources discussed in classed and using a team approach to problem solving. Groups will be expected to present their work in class and lead any subsequent discussions.

Grading summary

What	When	Value
Attendance	Each week; 4 pts off for each unexcused absence after the second absence	20 pts

Homework	Every week, five assignments randomly selected from the class. 2-4 assignments from each student.	80 pts
Group projects	Two group projects will be assigned during the semester worth 50 pts each	100 pts
	Total points	200 pts

Final Grade: Your letter grade will be based on the following point distribution.

Points earned	Percentage 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

Friendly reminders and notices:

1. Since this class meets once per week attendance is essential for you to progress through the course. There is no textbook; rather, publicly available resources and class discussions will carry us through the semester.
2. Class begins at 8:30 AM and ends at 9:20 AM; there is no accepted variation to this schedule.
3. Please eat before or after class out of respect to your peers and instructor.
4. There are no make up exams, as the major grading will come from group projects. There are no extra points; the work expected from you in this course should be sufficient to obtain your desired grade.
5. Participation is the key to success here; there are no stupid questions.
6. You are encouraged to work together, science is highly collaborative, and however we may switch groups for each project. This is to encourage teamwork with different people.
7. *Policy on Cell Phones and Music Devices.* The use of music devices and cell phones is prohibited during all Natural Science and Mathematics classes at Chaminade, unless specifically permitted by your instructor. The use of cell phones and music devices in any class is discourteous and may lead to suspicion of academic misconduct. Students who connot comply with this rule will be asked to leave class. Please refer any questions to the Dean of Natural Sciences and Mathematics.
8. Although the following might not apply for this class I'm adding it anyway. *ADAAA Accommodations.* Regarding accommodations for extra time or other requests about how quizzes or exams are administered; please be aware that I can only accommodate your requests if you have a documented ADAAA agreement with Chaminade University on file at the Counseling Center. If you need to seek such accommodations, please contact Dr. June Yasuhara at 725-4845 or by e-mail at jyasuhara@chaminade.edu as soon as possible.

Course content with tentative schedule

Week	Dates	Lecture Topic
1	15 Jan	Digital age of biology
2	22 Jan	Digital age of biology, continued
3	29 Jan	DNA sequencing and the power of genomics
4	5 Feb	DNA sequencing and the power of genomics, continued
5	12 Feb	Protein databases; how sequence and domains help predict function
6	19 Feb	Protein databases; how sequence and domains help predict function, continued
7	26 Feb	Group projects
8	5 Mar	Computational chemistry
9	12 Mar	Computational chemistry, continued
10	19 Mar	Microscopy and imaging
11	26 Mar	Spring Recesss
12	2 Apr	Microscopy and imaging, continued
13	9 Apr	Medical imaging and image handling, continued
14	16 Apr	Biodiversity and systems biology
15	23 Apr	Biodiversity and systems biology, continued
16	30 Apr	Group projects
17	7 May	Group projects, continued if needed