BSC4434c – Introduction to Bioinformatics

Virtual Office Hours: by appointment via Zoom (M & F)
In-person Office Hours: by appointment at MCS Room 1246 (W)
Contact: Use **Canvas** for all communication

BSC4434c is an introduction to the basic bioinformatics tools used in computational biology for life science research. The course will use web-based resources that analyze gene and protein sequences as pertinent data examples.

Student Learning Outcomes – After successful completion of this course, students will be able to:

1) Retrieve information on genes and proteins from biological and genomic databases.
2) Predict genes from DNA sequences.
3) Identify promoters and regulatory elements in DNA sequences
4) Analyze protein sequences
5) Compare protein and DNA sequences
6) Visualize and analyze protein structures
7) Construct and interpret simple phylogenies

Course Structure

Online semi-synchronous course: Each week there is a block of content available with specific due dates. Students may view and submit within the given time window; however, each module is structured to keep the group advancing together.

Recommended Textbook: "Essential bioinformatics" 2006, Authors: Jin Xiong Publisher: Cambridge University Press, ISBN -13:978-0-521-60082-8.

Evaluation of learning

Assignments

- Each lecture will have short assignments **(20%).** These are short exercises that apply the material covered in class and encourage you to read the pre-class material for the following week. Each module contains 5-15 short assignments/exercises depending on the topic and skills required for familiarity. Tutorials will be provided for each exercise.
- Group assignments and discussion (**20%).** Weekly group assignments will be given. Examples include: 1) Reading and discussing papers from the original literature on a subject related to bioinformatics or on a study that combines bioinformatics with experimental data; 2) Creating a tutorial; 3) Peer reviewing of an activity.
- Mini projects **(10%).** These are individual assignments where students apply learning points from several modules.

Quizzes and Exams

- Quizzes **(20%)**
  Multiple choices or short answer quizzes will be given at the end of each module. There are two types of assessments at the end of each module: Conceptual and Practical. The quizzes will be timed and must be completed in one session. Students are NOT allowed to leave and resume a quiz.
- Exams **(30%)**

A comprehensive exam will be given in the format of application questions that require the correct use of the various bioinformatics tools covered in class as well as an understanding of the underlying biology. A midterm exam and a multi-part final exam will be given.

Late submission policy. Late assignments will be penalized by deducting 10% of the grade for each day late. We are very strict with deadlines so please be mindful of the workload assigned for the week. Ideally, students work on the assignments in small chunks rather than in bulk on the due date. **No extra credit will be offered at the end of the semester.** Past semesters have shown that unfortunate events tend to occur on the due date such as websites/servers crashing, resources not loading properly, unresponsive computers, and many more. Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found in the online catalog at: **https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx**.

Grading: The scale, follows the policies described here
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.asp

A	100%	to 92%
A-	< 92%	to 90%
B+	< 90%	to 87%
B	< 87%	to 85%
B-	< 85%	to 80%
C+	< 80%	to 77%
C	< 77%	to 75%
C-	< 75%	to 70%
D+	< 70%	to 67%
D	< 67%	to 65%
D-	< 65%	to 61%
F	< 61%	to 0%

Course Schedule (changes can be made anytime so pay attention to announcements)

Please refer to the syllabus page on Canvas for all deadlines.

Week	Module and Lesson	Book	Topic
1	L0		Getting started
	Group activity and syllabus quiz		Read: On the lifetime of bioinformatics web services
2	**Module 1**		
	L1	EB1	Bioinformatics: Definition and overview
	L2	EB2	Biological database
	Group Activity and Module Quiz		
3	**Module 2**		
	L3	EB3	Information retrieval from databases I
	L4	EB3	Information retrieval from databases II
	Group Activity and Module Quiz		
4	**Module 3**		
	L5	EB3-4	Pairwise alignment, an overview
	L6	EB3-4	Pairwise alignment and database searching
	Group Activity and Module Quiz		
5	**Mini project 1**		
6	**Module 4**		
	L7	EB5-7	Multiple Sequence Alignment; Remote Homology Detection
	L8	EB5-7	Multiple Sequence Alignment; Remote Homology Detection
	Group Activity and Module Quiz		
7	**Midterm**		Covers modules 1-4
8	**Module 5a**		
	L9	EB8&17	Genome browsers
	L10	EB8	Predicting genes in prokaryotes
	Group Activity		
9	**Module 5b**		
	L11	EB9	Identifying plant genes
	L12	EB8-9	Promoter and Regulatory site prediction
	Group Activity and Module Quiz		
10	**Module 6**		
	L13	EB8-9	Practical DNA analysis
	L14	EB8-9	Protein analysis
	Module Quiz		
11	**Mini project 2**		
12	**Module 7**		

	L15	EB10-11	Phylogeny Basics
	L16	EB10-11	Phylogeny Basics
	Module Quiz		
13	**Module 8**		
	L17	EB12-13	Visualizing and comparing Protein structures
	L18	EB12-14	Visualizing and comparing Protein structures
	Group Activity and Module Quiz		
14	**Mini project 3**		
15-16	**Final Exam**		Covers all materials presented in class

EB= Essential Bioinformatics Textbook

Teaching Team:

Instructor: Dr. Jo Marie Bacusmo (jmbacusmo@ufl.edu)

Teaching assistants:
Manoj Kambara (manoj.kambara@ufl.edu)
Meagan Michalik (meagan.michalik@ufl.edu)
Nicolas Ruiz (ruiz.nicolas@ufl.edu)
Sarah Lorduy (sarahlorduy@ufl.edu)
Jason Liang (jason.liang@ufl.edu)
Ishae Isriguha (isriguha@ufl.edu)
Athitheya Gobinatham (agobinathan@phhp.ufl.edu)
Merrick Graham (m.graham@ufl.edu)
Devshree Patel (dpatel5@ufl.edu)

Academic Honesty: UF students are bound by the Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obliged to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor of TAs in this class. It is assumed all work will be completed independently unless the assignment is defined as a group project, in writing by the instructor. This policy will be vigorously upheld at all times in this course.

Exam Proctoring: Academic integrity is maintained through the Honorlock Test Management System. Students must abide by the Honorlock proctoring rules and regulations. Cameras must be turned ON and the student's face must be visible throughout the entire duration of the exam. The students are expected to provide their own computer/laptop and secure a testing location that meets the Honorlock standards.

Unforseen Life Events: For ALL matters that require special consideration, please contact UMatter, We Care in the Office of the Dean of Students. They will verify your case and contact me with advice on how to deal with your specific situation. I would like to note that a letter or e-mail from them does not guarantee special consideration and deadline extension, it is merely a suggestion on how best to deal with your case. I will make the final decision based on their recommendation after reviewing your case.

Software Use: All faculty, staff and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate.

How To Succeed in This Class:

DO THE WORK AND SUBMIT ON TIME.

Do NOT wait for the last hour/minute to complete assignments and quizzes. The weekly tasks are designed to be completed progressively over a week instead of doing it all in one day. Be aware that this is an online course and successful submissions also depend on internet stability and performance of the required websites. Technical difficulties, server overload, and connection issues often occur when assignments and quizzes are left at the last minute. Therefore, I suggest you start and submit your work early to give yourself time to deal with any unforeseen technical difficulties.

Develop a regular study habit. We cover a lot of material in this class and cramming is not the best way to go. Do note that the final exam is cumulative. This means you need to retain information and skills you have learned throughout the course to sufficiently prepare for exams. Cramming and retention rarely go together.

Online Course evaluations: Students are expected to provide feedback on the quality of instruction in this course based on 10 criteria. These evaluations are conducted online at https://evaluations.ufl.edu. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu

Campus Helping Resources: Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

• *University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575,* www.counseling.ufl.edu/cwc/

• *Career Resource Center,* First Floor JWRU, 392-1601, www.crc.ufl.edu/ www.crc.ufl.edu/

• *Emergencies*, University Police Department: 392-1111 or 9-1-1

Students with Disabilities: Students requesting classroom accommodation must first register with the Dean of Student Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. Send all letters to jmbacusmo@ufl.edu. The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. 0001 Reid Hall, 352-392-8565, www.dso.ufl.edu/drc/