

# MCDB 187AL, Bioinformatics Lab Syllabus

## “Research Immersion Laboratory in Genomic Biology”

### Summer Session A 2024

#### Course Director/Lecturer:

**Lukasz Salwinski, PhD**

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The best way to contact me is by e-mail to set up a time to talk. Please, include 'MCDB187AL' in the email subject to make your email stand out.

#### TAs:

Lab 1A: Priyanka Sagar

**E-mail:** [priyasagar95@g.ucla.edu](mailto:priyasagar95@g.ucla.edu)

Lab 1B: Jiachen Ai

**E-mail:** [jiachenai@g.ucla.edu](mailto:jiachenai@g.ucla.edu)

*The course MCDB 187AL Summer Session C [June 24 – August 2 2024] will be taught on-line through Zoom (both lectures & lab sessions).*

*Zoom link for **on-line LECTURES (not LAB sessions!)**:*

#### Zoom link:

URL: <https://ucla.zoom.us/j/92090922386?pwd=VhiORcse8Lb3cW6CLRmraw3Qka2oFR.1>

Meeting ID: 920 9092 2386

Passcode: 440969

NOTE: Separate zoom links for **on-line lab sessions** will be provided by TAs

## Duration of the course:

- 6 weeks [June 24 – August 2 2024]

**NOTE: No lectures and lab sessions on July 5th, 2024 (day after Independence Day)**

## Course Materials

Slides/supplementary materials/lecture recordings will be posted on google drive:

<https://drive.google.com/drive/folders/17FTYc4qdWfscybALoi85EP3VocD3qiV6?usp=sharing>

## Course Description

The goal of this course is learning the use of informatics tools for the annotation of genomes. Students will be provided fragments of a genome from a relatively poorly studied organism that we have sequenced at UCLA. Each student will learn how to identify protein coding genes within the fragments. Gene models are first identified using gene prediction tools, and then compared to existing proteins of related organisms using multiple sequence alignments, and errors in the gene models are corrected. Once a final high-quality gene model is determined, the student will use a suite of tools to functionally, and structurally characterize the protein. These include tools for the prediction of cellular localization, secondary structure, and function. Finally, the student will attempt to generate three dimensional models of the protein. Typically, students are able to characterize a couple of genes during the course of the quarter (for the summer session: 1-2 genes). While the course has no exams, the students are expected to present the results of their research two times throughout the quarter (week 3 & week 6) and write a paper/final report, following the structure of typical standard scientific publications.

## Course structure:

- **LECTURE sessions** – Mondays/Wednesdays/Fridays at 8am-9:30am  
Lecturer/Instructor: **Lukasz Salwinski, PhD**
- **COMPUTER LAB sessions** – Mondays/Wednesdays/Fridays
  - Section **1A** at 10:30am-1:30pm  
TA/Instructor: **Priyanka Sigar**
  - Section **1B** at 2pm-5pm  
TA/Instructor: **Jiachen Ai**

## Learning Outcomes for this Course:

- **Foundational Knowledge:** How are genes identified and characterized from a DNA sequence?
- **Application Goals:** To use current informatics tools for the prediction of genes, sequence alignment, functional characterization and 3D structural modeling
- **Integration Goals:** How do we interpret data that is generated by informatics tool to arrive at an understanding of the function and evolution of genes?
- **Human Dimensions Goals:** Am I able to carry out research and present the results before my class and write a standard scientific paper?
- **Caring Goals:** Can I interact with my classmates and TA(s) in order to solve problems that arise while conducting research?
- **"Learning-How-to-Learn" Goals:** Can I learn to carry out independent research, while at the same time reaching out for help when problems occur?

## How to Succeed in this Course (Expectations for Students)

The students are expected to learn to use the informatics tools in the lab portion of the course. While they will have support from TAs and classmates, this work is largely conducted independently. Moreover, they will have to present their results in front of the class and write a paper following standard scientific criteria.

## Helping You Succeed & Creating an Inclusive Classroom

### Community (Instructor, TA, and Community Expectations)

UCLA's Office for Equity, Diversity, and Inclusion provides resources, events, and information about current initiatives at UCLA to support equality for all members of the UCLA community. I hope that you will communicate with me or your TA if you experience anything in this course that does not support an inclusive environment, and you can also report any incidents you may witness or experience on campus to the Office of Equity, Diversity, and Inclusion on their website.

## How Your Learning Will Be Assessed (Grading Policy)

The in class final presentation, the final report/paper, and lab/lecture attendance [A, B, C..... etc.]

**Why I do not grade on a curve:** In recent years, research into higher education assessment practices have shown that grading on a curve can create unnecessarily competitive environments for students and result in outcomes that disadvantage some groups of students over others. This is true in data collected and analyzed for our students at UCLA as well. For this reason, I do not grade on a curve. Your grade is therefore not based on how you did in comparison to your peers, but instead how successful you are at evidencing that you have mastered the intended learning goals for that specific assessment. However, if I do find that particular assessment questions I gave an assignment were unreasonably challenging, unclear, or unfair for any reason I will provide additional credit as appropriate. If you ever feel that an assignment or specific question is unfair or confusing please come and speak with me or your TA (ideally before it is due or during the assessment, but afterwards is okay also) so that we can address this concern as soon as possible. I am committed to making sure the assessment of your learning is comprehensive, fair, and incorporates best practices from education research on assessment design and inclusive practices.

### Grading Scale:

- **Letter Grade:**

A+	A	A-
99-100%	93-98.9%	90-92.9%
B+	B	B-
87-89.9%	83-86.9%	80-82.9%
C+	C	C-
77-79.9%	73-76.9%	70-72.9%
D	F	
60-69.9%	0-59%	

### Grade components:

- Lecture & Lab Attendance (15%)
- Two presentations (30%)
- Final report (55%)

## Course Schedule (tentative)

- **Week 1** - Overview, The species on interest, Genome sequencing
- **Week 2** (Independence day)- Genome assembly and annotation, BLAST, pairwise sequence alignment
- **Week 3** - Pairwise sequence alignment, protein sequence annotation: domains, membrane proteins, cellular localization; Student presentations (1<sup>st</sup> presentation)
- **Week 4** - Multiple sequence alignment, phylogenetic trees, co-evolution/STRING
- **Week 5** Gene Ontology , protein structure/structure viewer
- **Week 6** - Protein structure prediction, sequencing 'beyond genome', final presentations (2<sup>nd</sup> presentations)

### Assignments for the “paper/final report” (submitted through Bruin Learn):

**Week 2** - Introduction and background

**Week 4** - Materials & methods

**Week 5** - Results & discussion (including figures)

**Week 6** - Abstract & final conclusions

**This is a tentative schedule and subject to change, with schedule adjustments posted on Bruin Learn (Canvas) announcements or through e-mail notifications.**

### **IMPORTANT:**

- **Assignments will be due always by Friday midnight PT (for example.: assignment for week 2 “Introduction & background” has to be uploaded till Friday midnight PT of week 2)**
- **The final report/paper will be due at the end of Tuesday following the final week [till August 6, 2024, midnight].**

## Computer labs

- Students will use Apollo to process sequence data
- Additional tools will be presented and used as needed

## Student Resources for Support and Learning

**Providing feedback to me and to your TAs:** I encourage your feedback at any time throughout the quarter about things that are helping you learn, or things that aren't helping. Please try to communicate with me or with your TA if there are ways that we can improve the course to better support student learning.

**Personal Problems:** I understand that sometimes life makes it difficult to focus on schoolwork. If you are having a personal problem that affects your participation in this course, please talk to me to create a plan. Please do not wait until the end of the quarter to share any challenges that have negatively impacted your engagement and academic performance. The sooner we meet, the more options we will have available to us to support your overall academic success. If you are not comfortable speaking with me directly, please utilize the other student resources provided below in order to understand how to best approach success in this course given your personal needs as soon as possible.

**Academic Accommodations Based on a Disability:** Students with disabilities requiring academic accommodations should submit their request for accommodations as soon as possible, as it may take up to two weeks to review the request. For more information, please visit the CAE website ([www.cae.ucla.edu](http://www.cae.ucla.edu)), visit the CAE at A255 Murphy Hall, or contact us by phone at (310) 8251501..

If you are already registered with the Center for Accessible Education (CAE), please request your Letter of Accommodation on the Student Portal. If you are seeking registration with the CAE, please submit your request for accommodations via the CAE website. Please note that the CAE does not send accommodations letters to instructors - you must request that I view the letter in the online Faculty Portal. **Once you have requested your accommodations via the Student Portal, please notify me immediately so I can view your letter.**

**Campus Resources and Support Services around UCLA Available to Students:** Students in Crisis: From the Office of the Dean of Students: Faculty and Staff 911 Guide for Students, commonly known as the “Red Folder.” This tool is intended to provide you with quick access to important resources for assisting students in need.

**Bruin Resource Center:** Includes services for transfer students, undocumented students, veterans, and students with dependents. <http://www.brc.ucla.edu/>

**Counseling and Psychological Services Wooden Center West:** (310) 825-0768  
[www.caps.ucla.edu](http://www.caps.ucla.edu)

**Letters & Science Counseling Service:** A316 Murphy Hall: (310) 825-1965 [www.college.ucla.edu](http://www.college.ucla.edu)

**Academics in the Commons at Covell Commons:** (310) 825-9315 free workshops on a wide variety of issues relating to academic & personal success [www.orl.ucla.edu](http://www.orl.ucla.edu) (click on “academics”)

**College Tutorials at Covell Commons:** (310) 825-9315 free tutoring for ESL/math & science/composition/and more! [www.college.ucla.edu/up/ct/](http://www.college.ucla.edu/up/ct/)

**Lesbian, Gay, Bisexual and Transgender Resource Center Student Activities Center, B36:** (310) 206-3628 [www.lgbt.ucla.edu](http://www.lgbt.ucla.edu)

**Dashew Center for International Students and Scholars 106 Bradley Hall: (310) 825-1681**

[www.internationalcenter.ucla.edu](http://www.internationalcenter.ucla.edu)

**Student Legal Services; A239 Murphy Hall: (310) 825-9894; [www.studentlegal.ucla.edu](http://www.studentlegal.ucla.edu)**

**Dean of Students Office; 1206 Murphy Hall: (310) 825-3871; [www.deanofstudents.ucla.edu](http://www.deanofstudents.ucla.edu)**

## **Additional Course Policies and UCLA Policies**

Use this section to clearly communicate to students about such policies as the use of laptops/phones, tardiness, expectations related to group work, communication policies, missing class, safety requirements, or other course-specific policies.

**Use of Laptops, Tablets or Phones in Class:** You can decide if you want to use your laptop, tablet or phone in class. Research finds that laptop multitasking is likely to hinder not only your own learning, but also the learning of anyone who can see your laptop. For the sake of your peers' learning, I therefore ask that if you use an electronic device during class, either only have lecture notes showing or sit in the back row.

**Message about Academic Integrity to all UCLA Students from UCLA Dean of Students:** UCLA is a community of scholars. In this community, all members including faculty, staff and students alike are responsible for maintaining standards of academic honesty. As a student and member of the University community, you are here to get an education and are, therefore, expected to demonstrate integrity in your academic endeavors. You are evaluated on your own merits. Cheating, plagiarism, collaborative work, multiple submissions without the permission of the professor, or other kinds of academic dishonesty are considered unacceptable behavior and will result in formal disciplinary proceedings usually resulting in **suspension** or **dismissal**.

**Forms of Academic Dishonesty:** As specified in the UCLA Student Conduct Code, violations or attempted violations of academic dishonesty, include, but are not limited to, cheating, fabrication, plagiarism, multiple submissions or facilitating academic dishonesty:

**Cheating:** Unauthorized acquiring of knowledge of an examination or part of an examination

- Allowing another person to take a quiz, exam, or similar evaluation for you
- Using unauthorized material, information, or study aids in any academic exercise or examination – textbook, notes, formula list, calculator, etc.
- Unauthorized collaboration in providing or requesting assistance, such as sharing information
- Unauthorized use of someone else's data in completing a computer exercise
- Altering a graded exam or assignment and requesting that it be regraded

**Plagiarism:** Presenting another's words or ideas as if they were one's own

- Submitting as your own through purchase or otherwise, part of or an entire work produced verbatim by someone else
- Paraphrasing ideas, data or writing without properly acknowledging the source
- Unauthorized transfer and use of someone else's computer file as your own
- Unauthorized use of someone else's data in completing a computer exercise

**Multiple Submissions:** Submitting the same work (with exact or similar content) in more than one class without permission from the instructor to do so. This includes courses you are currently taking, as well as courses you might take in another quarter.

**Facilitating Academic Dishonesty:** Participating in any action that compromises the integrity of the academic standards of the University; assisting another to commit an act of academic dishonesty.

- Taking a quiz, exam, or similar evaluation in place of another person
- Allowing another student to copy from you
- Providing material or other information to another student with knowledge that such assistance could be used in any of the violations stated above (e.g., giving test information to students in other discussion sections of the same course)

**Fabrication:** Falsification or invention of any information in an academic exercise

- Altering data to support research
- Presenting results from research that was not performed
- Crediting source material that was not used for research

Sample language on cheating:

While you are here at UCLA, you may find yourself in a situation where cheating seems like a viable choice.

You may rationalize to yourself that "Everyone else does it"...Well, they don't. And will that matter when YOU get caught? NO! If you are unsure whether what you are considering doing is cheating, just ask yourself ...how would you feel if your actions were public, for anyone to see? Would you feel embarrassed or ashamed? If the answer is yes, that's a good indicator that you are taking a risk and rationalizing it to yourself.

If after reviewing the information above, you are still unclear about any of the items – **don't take chances**, don't just take your well-intentioned friend's advice – ASK your TA or your Professor. Know the rules - Ignorance is NO defense. In addition, avoid placing yourself in situations which



might lead your TA or Professor to **suspect you of cheating**. For example, during an exam don't sit next to someone with whom you studied in case your answers end up looking "too similar."

### **Alternatives to Academic Dishonesty**

- **Seek out help** – meet with your TA or Professor, ask if there is special tutoring available.
- **Drop the course** – can you take it next quarter when you might feel more prepared and less pressured?
- **Ask for an extension** – if you explain your situation to your TA or Professor, they might grant you an extended deadline.
- **See a counselor** at Student Psychological Services, and/or your school, college or department – UCLA has many resources for students who are feeling the stresses of academic and personal pressures.

Remember, **getting caught cheating affects more than just your GPA**. How will you explain to your parents, family and friends that you have been suspended or dismissed? How will it affect your financial aid award and/or scholarship money? Will you be required to, and be able to pay back that money if you are no longer a student? If you live in the residence halls, where will you go if you are told you can no longer live there?

You have worked very hard to get here, so don't cheat! If you would like more information, please come see us at the Dean of Students' Office in 1206 Murphy Hall, call us at (310) 825-3871 or visit their website at

[www.deanofstudents.ucla.edu](http://www.deanofstudents.ucla.edu).

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**Please keep this syllabus easily accessible so that you can refer to it throughout the quarter. Contact me or your TA with any clarifying questions. I look forward to getting to know you and supporting your learning in this course.**