







Lectures: TuTh 9:30-10:50 am CENTR113

Discussion: Friday 12:00-12:50pm HSS1330

- Podcast for lectures will be available.
- We will use Canvas for quick access to course material and other resources.
- **All announcements** and discussions will be on Piazza. (Link: https://piazza.com/ucsd/spring2024/beng182_sp24_a00/home )
- **Notes and Questions** ) https://www.dropbox.com/s/bt2t1e60q4wgkhz/CSE182_Biological_Data_Analysis.pdf?dl=0 to supplement lectures. This is updated periodically, so please visit often.
- Assignments will be handed out on Canvas and submitted using Gradescope (Entry Code:VB3WEG).
- **Integrity policy specific to CSE182** ) <https://www.dropbox.com/s/3injbbo0y0f8k7/AcademicIntegrity.pdf?dl=0>








Office Hours :

- Vineet Bafna : Monday 1-2 pm via **zoom** ) <https://ucsd.zoom.us/j/98206179891?pwd=bGxTVkhCaVlaQzFPcHlrNkRyTE1mQT09> and in FAH4303
- Vikram Siruparupu : Monday 3-4 PM in CSE basement EBUb3 B215
- Sara Javadzadeh : Tuesday 4-5 pm in CSE basement EBUb3 B240A
- Daisy Chen : Friday 3-4 pm via **zoom** ) <https://ucsd.zoom.us/j/2739757420>
 - Email: dwc001@ucsd.edu
- Xiaomeng Gao : same as Daisy's
- Cici Bu (Tutor): Tuesday 3-4pm in-person at B270A, and Friday 1-2pm on Zoom (<https://ucsd.zoom.us/j/7511846150> ) <https://ucsd.zoom.us/j/7511846150>.)

Assignments:

Assignment Submission Guide (<https://canvas.ucsd.edu/courses/54302/files/12017263?wrap=1>) 
 (https://canvas.ucsd.edu/courses/54302/files/12017263/download?download_frd=1)

Late assignment policy. 5% off for each day after the submission deadline. No submission accepted 4 days beyond due date. Regrade requests must be made on Gradescope, within 7 days after graded assignments are returned. No regrade request will be accepted subsequently.

Assignment	Due date	Data and resources
Assignment 1  (https://www.dropbox.com/scl/fi/bw5tin96v5n7prtraxro9/A1.pdf?rlkey=xa4vnqai1spfjuatpfs99b64f&dl=0)	Wednesday 4/10/2024 by 10:00 pm PT	datafile.txt  (https://www.dropbox.com/s/b255a98k8z0figg/datafile.txt?dl=0) Readme  (https://www.dropbox.com/s/p0fw10v4ver15su/readme.txt?dl=0)
Assignment 2  (https://www.dropbox.com/s/9i8cwh3z492ea0v/A2.pdf?dl=0)	Wednesday 4/24/2024 by 10:00 pm PT	Problem 1 sequences  (https://www.dropbox.com/s/lb0ry5kpaxq76vk/p1seqs.txt?dl=0) Problem 4 sequences (p4pairs.txt)  (https://www.dropbox.com/s/6kxln4zsoljsjur/p4seqs.txt?dl=0) p5pairs (Extra credit)  (https://www.dropbox.com/s/ivz2l9zphw2nn19/p5pairs.txt?dl=0)

Midterm Exam	In class 5/7/2024	Syllabus: TBD
		Readme
Assignment 3	Monday 5/13/2024, by 10:00 pm PT	Dictionary 1 Dictionary 2 DNA db
Assignment 4 (new)	Friday, 6/6/2024 by 10:00 pm PT	chrA.fasta chrA.islands SNP-Matrices (zip)
Project 2024	Sign up in teams of 4 by 5/13/2024	AA output description
	Final report due 6/6/2024	Data-sets for trial CCLE data (3Gb)

Lectures:

Date	Topic	Slides	Optional reading
4/2/2024	Course outline	L1 slides ↗(https://www.dropbox.com/s/bso0exchmuirvef/L1.pptx?dl=0)	Bioinformatics Algori
			Chap 3 has a brief intro Python guide ↗(http://www.python.org) Perl ↗(http://www.perl.org)
Week 1,2			
4/4	Sequence Alignment	Alignments (PPT) ↗(https://www.dropbox.com/s/cl/fi/nyuqahelzo8z21ny4a7ia/L2_alignment.pptx?rlkey=isw3ke7urzslifbvlwga4wapl&dl=0)	Historical (fun) notes or (Chap. 4) ↗(https://www.nature.com/)
4/9	Local alignment	pdf of slides ↗(https://www.dropbox.com/s/xfptksob6c5l4dj/L2_alignment.pdf?dl=0)	
4/11			
<i>Discussion</i>			
1	Python intro	Disc 1 slides	
4/5		Recording in Media Gallery	
Week 2			
4/13	Scoring matrices	Scoring matrices ↗(https://www.dropbox.com/s/4rqvr86pa1115al/Scoringmatrices.pptx?dl=0) Scoring matrices (pdf of slides) ↗(https://www.dropbox.com/s/iyqwgjlpdp0g6qtx/Scoringmatrices.pdf?dl=0)	Scoring matrices ↗(http://www.nature.com/) Wiki:Dayhoff ↗(http://www.nature.com/) Note on Blosum Matri (http://www.nature.com/)

Preview ↓

Discussion

2 Alignment review
4/12 [Disc 2 slides](https://docs.google.com/presentation/d/1q8R57oEyHCoaDa86pLEsKgpz-yhzbITuS-X_v3H_13g/edit?usp=sharing) (https://docs.google.com/presentation/d/1q8R57oEyHCoaDa86pLEsKgpz-yhzbITuS-X_v3H_13g/edit?usp=sharing)

Week 3 Distributions Blast statistics
4/16 [E-values, P-values](https://www.dropbox.com/s/ez4l4mmwd4iulx1/L5_E-values_P-values.pptx?dl=0) (https://www.dropbox.com/s/ez4l4mmwd4iulx1/L5_E-values_P-values.pptx?dl=0) [Notes on Blast Statist](#)
4/18 [pdf of slides](https://www.dropbox.com/s/xp4wewj2ry84byl/L5_E-values_P-values.pdf?dl=0) (https://www.dropbox.com/s/xp4wewj2ry84byl/L5_E-values_P-values.pdf?dl=0) [1.html](#))
P-values

Discussion 3 E-values, P-values
4/19 [Disc 3 slides](https://docs.google.com/presentation/d/1xhUdxBUz3zhgTyyx_WyYFvgR2VWrlqA7Gnqtdm8eBr4/edit?usp=sharing) (https://docs.google.com/presentation/d/1xhUdxBUz3zhgTyyx_WyYFvgR2VWrlqA7Gnqtdm8eBr4/edit?usp=sharing)
Recording in Media Gallery

Week 4 Keyword matching The Pigeonhole principle
4/23 [Dictionary matching](https://www.dropbox.com/s/ki1t46rtw1rcjg/keywordfiltering.pptx?dl=0) (https://www.dropbox.com/s/ki1t46rtw1rcjg/keywordfiltering.pptx?dl=0) [Wiki: aho-corasick](#)
4/25 [pdf of slides](https://www.dropbox.com/s/sctaobrudn2gbup/keywordfiltering.pdf?dl=0) (https://www.dropbox.com/s/sctaobrudn2gbup/keywordfiltering.pdf?dl=0)
keyword matching
Speeding up Blast

Discussion 4 Pigeonhole principle, pattern matching, tries, Aho-Corasick
5/1 [Disc 4 slides](https://docs.google.com/presentation/d/1VyxL5w2EkP9dGQFIS5mLZhK0i9zlZdeTUV8EuCTxsRo/edit?usp=sharing) (https://docs.google.com/presentation/d/1VyxL5w2EkP9dGQFIS5mLZhK0i9zlZdeTUV8EuCTxsRo/edit?usp=sharing) [Old slides](https://docs.google.com/presentation/d/1VyxL5w2EkP9dGQFIS5mLZhK0i9zlZdeTUV8EuCTxsRo/edit?usp=sharing) (https://docs.google.com/presentation/d/1VyxL5w2EkP9dGQFIS5mLZhK0i9zlZdeTUV8EuCTxsRo/edit?usp=sharing)
Recording in Media Gallery

4/25 Regular expression matching Profiles [Regular Expression Matching](https://www.dropbox.com/s/kgurubesy5c5iiq/L7.regular_expression_search.pptx?dl=0) (https://www.dropbox.com/s/kgurubesy5c5iiq/L7.regular_expression_search.pptx?dl=0) [Wiki: Amos Bairoch](http://en.wikipedia.org/wiki/Amos_Bairoch) [ExpASy tools](http://www.expasy.org/) (http://www.expasy.org/) [PROSITE](http://us.sciencelab.com/prosite/) (http://us.sciencelab.com/prosite/)
[pdf of slides](https://www.dropbox.com/s/ry7gqzbm2blbj2j/L7.regular_expression_search.pdf?dl=0) (https://www.dropbox.com/s/ry7gqzbm2blbj2j/L7.regular_expression_search.pdf?dl=0)

Week 5 Profiles Profiles and HMMS
4/30 [Profiles and HMMS](https://www.dropbox.com/s/tn00t5cy3ot52rh/L8-Profiles_and_HMMS.pptx?dl=0) (https://www.dropbox.com/s/tn00t5cy3ot52rh/L8-Profiles_and_HMMS.pptx?dl=0) [psi-blast \(optional re](http://www.ncbi.nlm.nih.gov/blast/blast.cgi)
5/2 [pdf of slides](https://www.dropbox.com/s/0zvw6t9phr5ri0r/L8-Profiles_and_HMMS.pdf?dl=0) (https://www.dropbox.com/s/0zvw6t9phr5ri0r/L8-Profiles_and_HMMS.pdf?dl=0) [http://www.ncbi.nlm.nih.gov/blast/blast.cgi?tool=pubmed&pubmedr](http://www.ncbi.nlm.nih.gov/blast/blast.cgi)

Discussion 5 Regular expressions, go over practice midterm
Recording in Media Gallery

5/7 Midterm Exam in class [Syllabus](#)

Discussion 6 Hidden Markov Models and Viterbi Algorithm
[Slides](https://docs.google.com/presentation/d/1ewQ6qMb5SvGvCgVDKku8NM9T38LCVKGDy1fyNDsBqxE/edit?usp=sharing) (https://docs.google.com/presentation/d/1ewQ6qMb5SvGvCgVDKku8NM9T38LCVKGDy1fyNDsBqxE/edit?usp=sharing)
Recording in Media Gallery

Week 6,7 Transcription and Translation

5/9 Gene Finding [Gene Finding basics](https://www.dropbox.com/s/bx2n22cclyrv6xe/genefinding_part_1.pptx?dl=0) [↗](https://www.dropbox.com/s/bx2n22cclyrv6xe/genefinding_part_1.pptx?dl=0) [GENSCAN](http://genescan.org) [↗](http://genescan.org) [Beginner's guide to g](http://genescan.org)

5/13 Project discussion [Gene Finding](https://www.dropbox.com/s/j87bfv5gi0wf8kh/genefinding.pptx?dl=0) [↗](https://www.dropbox.com/s/j87bfv5gi0wf8kh/genefinding.pptx?dl=0) [\(http://www.nature.com/](http://www.nature.com/)

Discussion 7 Gene finding biology background

[Slides](https://docs.google.com/presentation/d/1j2Hj9nVdHK2PwKywUXfTyq6elqnK5GBE_7ozINp_k/edit?usp=share_link) [↗](https://docs.google.com/presentation/d/1j2Hj9nVdHK2PwKywUXfTyq6elqnK5GBE_7ozINp_k/edit?usp=share_link) [Recording in Media Gallery](https://docs.google.com/presentation/d/1j2Hj9nVdHK2PwKywUXfTyq6elqnK5GBE_7ozINp_k/edit?usp=share_link)

Week 7,8 Peptide mass spectrometry

5/16 [MS introduction and isotopic profiles](https://www.dropbox.com/s/i9f3opkusq2gg5f/MassSpecIntroduction.pptx?dl=0) [↗](https://www.dropbox.com/s/i9f3opkusq2gg5f/MassSpecIntroduction.pptx?dl=0)

5/21 [Tandem MS](https://www.dropbox.com/s/125ysnvtxbh14yf/ms.pptx?dl=0) [↗](https://www.dropbox.com/s/125ysnvtxbh14yf/ms.pptx?dl=0)

Discussion 8 Isotope profile, tandem MS for peptide identification review

[Slides](https://docs.google.com/presentation/d/1DqyKKzK7aPPLhGpnaatM3foxRK-vEAhphVgaA9QSuUw/edit?usp=sharing) [↗](https://docs.google.com/presentation/d/1DqyKKzK7aPPLhGpnaatM3foxRK-vEAhphVgaA9QSuUw/edit?usp=sharing) [Recording in Media Gallery](https://docs.google.com/presentation/d/1DqyKKzK7aPPLhGpnaatM3foxRK-vEAhphVgaA9QSuUw/edit?usp=sharing)

Week 8,9 Phylogeography

5/23 [Intro to Population Genetics](https://www.dropbox.com/s/i0i9340oahgriku/PopGen_phylogeny.pptx?dl=0) [↗](https://www.dropbox.com/s/i0i9340oahgriku/PopGen_phylogeny.pptx?dl=0)

5/28 Association mapping [Phylogeography slides](https://www.dropbox.com/s/8tg9bkguhphvpi9/Phylogeography.pptx?dl=0) [↗](https://www.dropbox.com/s/8tg9bkguhphvpi9/Phylogeography.pptx?dl=0)

5/30 (Only directed/rooted perfect phylogeny)

Week 10 Final Project Presentations

6/11/2024 Final (In class) 8am - 11am

Notes and Questions

Practice Final

(solutions on Wednesday, June 7)

Extra-End

Extra Introduction to proteomics with mass spectrometry

[MassSpec - isotopes](https://www.dropbox.com/s/smjy7f326jssx3s/ms_intro.pptx?dl=0) [↗](https://www.dropbox.com/s/smjy7f326jssx3s/ms_intro.pptx?dl=0)

[pdf](https://www.dropbox.com/s/8wsh6n0jaizvokv/ms_intro.pdf?dl=0) [↗](https://www.dropbox.com/s/8wsh6n0jaizvokv/ms_intro.pdf?dl=0)

[Mass Spec Peptide ID](https://www.dropbox.com/s/125ysnvtxbh14yf/ms.pptx?dl=0) [↗](https://www.dropbox.com/s/125ysnvtxbh14yf/ms.pptx?dl=0)

[pdf Peptide Id](https://www.dropbox.com/s/pbskoroovkoias9/ms.pdf?dl=0) [↗](https://www.dropbox.com/s/pbskoroovkoias9/ms.pdf?dl=0)

Expression

array data

analysis

Extra Linear

5/28/2020 Algebra

Classification

Linear Algebra, Expression classification 

<https://www.dropbox.com/s/5vww6led70nug9I/LinAlgebraClassification.pptx?dl=0>

(pdf)  <https://www.dropbox.com/s/usxjhgc5fnnv9316/LinAlgebraClassification.pdf?dl=0>