

LIFS 3580: Bioinformatics
Spring 2022 Syllabus

Lectures: Tuesday 9:00-10:20 and Thursday 9:00-10:20

Venue: Online via Zoom (Join via Canvas) or in person in Computer Barn A (Rm 4402) (Subject to University guidelines)

1. Instructors:

Course coordinator: Prof. Danny Leung (DL)

Phone: 3469-2494; Email: dcyleung@ust.hk

Office: Room 5519 (L25/26), Division of Life Science

Prof. Tom Cheung (TC)

Phone: 2358-7306; Email: tcheung@ust.hk

Office: Room 5507 (L25/26), Division of Life Science

2. Course description:

Credit points: 3

Prerequisites: LIFS3140

Exclusions: Nil

Brief description:

This course offers a basic introduction into bioinformatics. Students will be presented with an overview of what bioinformatic analysis entails, its importance in life science research and some applications. There will be several hands-on aspects but will not require experience in computer programming. Students will hopefully have their interests peaked to further explore the field in other courses and projects.

The course materials are primarily delivered through interactive lectures. Students will be able to apply what they learn through a variety of hands-on exercises. Moreover, take-home assignments will task the students to explore topics in greater depth.

3. Course intended learning outcomes (CILOs):

- I. Describe basic concepts and methods in bioinformatic analysis.
- II. Understand how bioinformatics has led to advances in understanding basic biology and human disease.
- III. Become familiar with a range of bioinformatic tools, which are used for an array of life sciences applications.
- IV. Explore how bioinformatics are applied in new research
- V. Evaluate, on a conceptual level, how bioinformatics impact understanding of basic biology

4. Assessment Scheme:

Mid-term exam	40%
Final Exam	40%

Assignments	15%
Class participation	5%

5. Student learning resources:

Lecture notes and supplementary reading materials will be made available on canvas.ust.hk prior to each lecture.

6. Course Schedule:

Week	Date	Topic	Instructor
1	Feb 8 Feb 10	Introduction to bioinformatics/Course overview Tutorial: General software and tools in Life Science	DL, TC
2	Feb 15 Feb 17	Sequence alignment and searching 1 Tutorial: Alignment of unknown genetic sequences	DL
3	Feb 22 Feb 24	Sequence alignment and searching 2 Tutorial: Identify unknown protein sequences	DL
4	Mar 1 Mar 3	Human genetics and genetic disorders 1 Tutorial: Finding disease diagnosis from genetic data	DL
5	Mar 8 Mar 10	Human genetics and genetic disorders 2 Tutorial: Analyzing genetic variants from GWAS	DL
6	Mar 15 Mar 17	Epigenomics Tutorial: Visualizing the epigenome	DL
7	Mar 22 Mar 24	Crash course in Python Tutorial: Applying python to study biology	DL
	TBA	Mid-term exam	
8	Mar 29 Mar 31	Gene Expression Analysis (Array) Tutorial: Microarray analysis	TC
9	Apr 7	Next-Generation Sequencing (NGS)	TC
10	Apr 12	Tutorial: NGS data processing and visualization	TC
11	Apr 19 Apr 21	Motifs and Functional annotations Tutorial: Motif identification and Functional annotations/enrichment of unknown sequences	TC
12	Apr 26 Apr 28	Proteomics (Introduction) Proteomics (Instrumentation)	TC
13	May 3 May 5	Proteomics (Spectral Analysis) Tutorial: Protein Identification Analysis	TC
	TBA	Final Exam	