

CS2220: Intro to Computational Biology Course Briefing

Wong Limsoon



NUS
National University
of Singapore

National University of Singapore

Recommended “pre-requisites”

Data Structures and Algorithms

Basic statistics

Biochemistry of Biomolecules

Molecular Genetics

You may also find the following to be a useful hands-on complement to CS2220:

LSM2241 Introductory Bioinformatics

Objectives

Develop flexible and logical problem-solving skill

Understand bioinformatics problems

Appreciate techniques and approaches to bioinformatics

To achieve these goals, students are exposed to case studies on gene feature recognition, gene expression and proteomic analysis, sequence homology interpretation, phylogeny analysis, etc.

Time table

Lecture: Thursday 10am – 1pm, COM1 VCRM

Tutorial: Integrated into each lecture

Email: wongls@comp.nus.edu.sg

Consultations: Any time; just make appt

Course syllabus

Layman's molecular biology

Knowledge discovery essence

Feature selection techniques

Supervised learning techniques

Classifier evaluation

Gene feature recognition

Feature generation, selection, & integration

Translation initiation site (TIS) recognition

Transcription start site (TSS) recognition

Gene expression analysis

Microarray & transcriptomics basics

Gene expression profile normalization

Classification of gene expression profiles

Sequence comparison

Dynamic programming

Pairwise alignment

Multiple alignment

Sequence database search

BLAST and FASTA

Scoring matrices

Useful guidelines

Phylogenetic tree construction

Phylogeny reconstruction methods

One or two other topics (e.g. motif finding.)

Course webpages

NUS Canvas

Lecturer's own lecture-slides repository

<https://www.comp.nus.edu.sg/~wongls/courses/cs2220/2024>

Professors

Wong Limsoon

Prof of Comp Sci

Prof of Pathology



Somyyeh Koohi

Visiting A/Prof of Comp Sci

A/Prof of Comp Eng, Sharif U of Tech



Teaching style

Bioinformatics is a broad area

Need to learn a lot of material by yourself

Reading books

Reading papers

Practice on the web

Don't expect to be told everything

Tentative assessment plan

Assignments (35% of marks)

3 assignments

Simple programming required

This may be replaced by an assignment

Project (15% of marks)

Based on material associated with self-learning

8-10 pages of report / ppt slides expected

Exam (50% of marks)

1 final open-book exam

Be honest

Exam

Absence w/o good cause results in ZERO mark

Cheating results in ZERO mark

Discussion on assignments is allowed

Blatant plagiarism is not allowed

Offender gets ZERO mark for assignment or exam

Penalty applies to those who copied AND those who allowed their assignments to be copied

Use of e.g. chatGPT w/o acknowledgment is plagiarism

Background readings

References are provided in the lecture slides; please look them up

What comes after CS2220

CS2220 Introduction to Computational Biology

Understand bioinformatics problems; interpretational skills

CS4220 Knowledge Discovery Methods in Bioinformatics

Metagenomics, cancer genomics

CS4330 Combinatorial Methods in Bioinformatics

Genome assembly, genome annotation

CS5238 Advanced Combinatorial Methods in Bioinformatics

Sequence comparison, structure comparison, genome rearrangement

Course materials right infringements

All course participants (including permitted guest students) who have access to the course materials on NUS Canvas or any approved platforms by NUS for delivery of NUS modules are not allowed to re-distribute the contents in any forms to third parties without the explicit consent from the module instructors or authorized NUS officials

| **Any questions?**

I hope you will enjoy this class 😊