Items of Course Outlines

1. Instructor (s) – Name and Contact Details

Jiguang Wang
Email: jgwang@ust.hk
Office: Room 4352 (Lift 13/15)
Division of Life Science and Department of Chemical and Biological Engineering

2. Teaching Assistant (s) - Name and Contact Details

To be determined.

3. Meeting Time and Venue – Lectures, Tutorials/ Laboratory

Lectures: LIFS 6000A-Data Science for Biology and Medicine

Date/Time: Tuesday (15:00 – 17:50)

Venue: LSK1033

4. Course Description - Credit Points, Pre-requisite, Exclusion, Brief Information/synopsis

- Credit points: 3
- Prerequisites: NIL
- Exclusions: NIL
- Brief description: This will be an introductory course for the application of data science in biomedical research. The course will introduce the fundamental principles of data science, the technologies, and implementations of data analytics, as well as the mathematical modeling of several practical questions in biomedical research. The topics include an introduction to high-throughput biomedical data, statistical hypothesis testing, regression/classification methods, gene ontology analysis, biological networks, data visualization and the application of machine learning methods.

5. Intended Learning Outcomes

(a) Obtain a basic understanding of data science
(b) Understand high-throughput biomedical data
(c) Become familiar with the most popular computational methods
(d) Apply computational software to solve practical problems
(e) Enhance the ability of modelling scientific questions

6. Assessment Scheme

Assessment		Assessing Course ILOs
10%	*Attendance*	*NA*
20%	*Presentation*	*(a) (b)*
30%	*Team Project 1*	*(a) (b) (c) (d)*
40%	*Team Project 2*	*(a) (b) (c) (d) (e)*

7. Student Learning Resources - Lecture Notes, Readings
   Lecture notes and supplementary reading materials will be made available on canvas.

8. Teaching and Learning Activities -
   Scheduled activities: 3 hrs (lecture)

9. Course Schedule

February 6: *Introduction*
February 13: *High-throughput data in biology and medicine*
February 20: *Basic math and statistical hypothesis test*
February 27: *Correlation analysis and its applications*
March 6: *Principle component analysis and clustering*
March 13: *Linear regression and other regression methods*
March 20: *Mid-term Presentation*
March 27: *Gene ontology analysis*
April 3: *Introduction to complex networks*
April 10: *Network biology and practical applications*
April 17: *Reconstruction of transcriptional regulatory networks*
April 24: *Data visualization*
May 8: *Brief introduction to machine learning methods*