BIEN 3320 - Data Science for Biology and Medicine (3 credits)

Items of Course Outlines

1. Instructor (s) – Name and Contact Details
   Jiguang Wang, jgwang@ust.hk

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

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

L1	Tuesday	12:00	13:20	Rm 5404, Lift 17-18
L1	Thursday	12:00	13:20	Rm 5404, Lift 17-18
T1	Tuesday	18:00	18:50	G001, CYT Bldg

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

This course is crafted to familiarize undergraduate and early-year graduate students from diverse academic backgrounds with the fundamental principles of data science, a variety of high-throughput biomedical data types, commonly utilized bioinformatics techniques, and practical illustrations demonstrating the utilization of data science methodologies in the fields of biology and medicine. A prerequisite for enrollment in this course includes a foundational knowledge of biology, mathematics (with an emphasis on probability and statistics), and a basic grasp of programming concepts.

Students are required to bring their personal computers to actively engage in hands-on programming exercises during both lecture sessions (approximately 50%) and tutorial segments (the remaining time). The course curriculum will cover a range of topics through lectures and tutorial sessions, encompassing areas such as data acquisition and preprocessing, exploratory data analysis, statistical methodologies, data visualization, and introductory machine learning studies. Student performance will be assessed through attendance at lectures, performance on In-class quizzes, homework assignments, and a student presentation.

5. Intended Learning Outcomes

(State what the student is expected to be able to do at the end of the course according to a given standard of performance)

[1] Obtain a basic understanding of data science as a discipline;
[2] Understand high-throughput biomedical data of various types;
[3] Visualize, analyze and interpret biomedical data with sound statistical principles;
[4] Apply and develop computational methods for biomedical data analytics.

6. Assessment Scheme

Assessment *(Percentage + assessment tasks)*	Assessing Course ILOs *(Respective course ILOs)*
30% In-class engagement and quizzes	[1-2]
30% Homework assignments (coding and implementation)	[1-4]
40% Open-ended project (practice and presentation)	[1-4]

7. Student Learning Resources - Lecture Notes, Readings

   Lecture notes and supplementary reading materials will be made available on canvas.

8. Teaching and Learning Activities

Teaching Activities	Course ILOs
Lectures (50%)	[1-4]
Tutorials (50%)	[3-4]
Others, pls specify	/

   Weekly scheduled activities: 4 hrs

9. Course Schedule

   Keyword Syllabus:

   - Introduction to data science in biology and medicine
   - Data acquisition and preprocessing
   - Exploratory data analysis
   - Statistical analysis
   - Machine learning techniques
   - Bioinformatics and genomics
   - Medical data analysis
   - Case studies and applications