

LIFS 3320 Data Science for Biology and Medicine [Alternative code: BIEN 3320]

Items of Course Outlines

1. Instructor (s) – Name and Contact Details

Jiguang Wang, jgwang@ust.hk

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

Yoonhee Nam, ynam@connect.ust.hk

Ming Hong Lui, mhluiaa@connect.ust.hk

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

Date/Time: Monday (10:30-11:50); Wednesday (10:30-11:50); Friday (Tutorials, 18:00-18:50)

Venue: 6602

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

•Credit points: 3

•Prerequisites: 1. MATH 2411 or LIFS 3150 or ISOM 2500; 2. COMP 1021 or COMP 1022P or COMP 1022Q or COMP 2011

•Exclusions: NIL

•Brief description: This is an introductory course for the application of data science in biology and medicine. The course will introduce the fundamental principles on data science, the technologies and implementations of data mining, as well as the modeling of several practical questions in biomedicine. The topics include introduction to biomedical data, data visualization, regression methods and classification methods.

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 computational methods and software tools in data science in the context of biomedicine

[5] Develop mathematical models for scientific questions

6. Assessment Scheme

<i>(Percentage + assessment tasks)</i>	<i>(Respective course ILOs)</i>
10% Attendance	NA
30% In-class quizzes	[1-5]
30% Individual project	[1-5]
30% Team Project (including presentation)	[1-5]

7. Student Learning Resources - Lecture Notes, Readings

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

8. Teaching and Learning Activities -
 - a. Lectures: focus on methods and case studies
 - b. Tutorials (optional): focus on Q&A

9. Course Schedule

2019 Spring

Jan 30: Introduction of data science

Feb 1: Tutorial: Q&A

Feb 4: Holiday: Chinese New Year's week

Feb 6: Holiday: Chinese New Year's week

Feb 8: Holiday: Chinese New Year's week

Feb 11: Basic math and statistical hypothesis test

Feb 13: Basic math and statistical hypothesis test

Feb 15: Tutorial: Q&A

Feb 18: Introduction to network biology/medicine

Feb 20: Introduction to network biology/medicine

Feb 22: Tutorial: Q&A

Feb 25: **1st In-class quiz and individual project announcement**

Feb 27: Correlation analysis and network construction

Mar 1: Tutorial: Q&A

Mar 4: Correlation analysis and network construction

Mar 6: Correlation analysis and network construction

Mar 8: Tutorial: Q&A

Mar 11: Clustering and dimension reduction

Mar 13: Clustering and dimension reduction

Mar 15: Tutorial: Q&A

Mar 18: Classification and regression

Mar 20: Classification and regression

Mar 22: Tutorial: Q&A

Mar 25: **2nd In-class quiz & Individual project summary & Team project announcement**

Mar 27: Introduction to AI-driven biology/medicine

Mar 29: Tutorial: Q&A

Apr 1: Introduction to AI-driven biology/medicine

Apr 3: Other topics in machine learning

Apr 5: Holiday: Ching Ming Festival

Apr 8: Other topics in machine learning

Apr 10: Other topics in machine learning

Apr 12: Tutorial: Q&A

Apr 15: Next-generation sequencing

Apr 17: Next-generation sequencing

Apr 19: Holiday: Good Friday

Apr 22: Holiday: Easter Monday

Apr 24: Introduction to Cancer genomics/evolution

Apr 26: Tutorial: Q&A

Apr 29: **3rd In-class quiz & Introduction to Cancer genomics/evolution**

May 1: Holiday: Labor Day

May 3: Tutorial: Q&A

May 6: **Team project presentation**

May 8: **Team project presentation**