

Division of Life Science, The Hong Kong University of Science and Technology

LIFS4580 Bioinformatics (2016/2017 Spring Semester)

Date/Time: Monday (12:00 – 13:20 pm)

Wednesday (12:00 – 13:20 pm)

Venue: Computer Barn C Teaching Area, Rm. 4402 (Lift 17-18)

Course Coordinator: Prof. Hannah Xue (hxue@ust.hk; 23588707)

Prerequisite: LIFS2210

Course Goals

This course will provide you with knowledge of bioinformatics and the application of bioinformatics tools in biological and medical studies.

Learning Outcomes

By the end of this course, you will be able to:

1. Understand the basic concepts in bioinformatics and how this is related to biological knowledge discoveries and applications.
2. Have a general appreciation of how new discoveries made with bioinformatics can improve ways to diagnose and treat human diseases.
3. Acquire ability to use knowledge in bioinformatics for daily life decision-making and problem solving.
4. Recognize that the importance of continuous scientific research in bioinformatics and how this will benefit our society.

Course Description

This course introduces the students to Bioinformatics, which uses computer databases to store, retrieve and assist in understanding biological information. Genome-scale sequencing projects have led to an explosion of genetic sequences available for automated analysis. These gene sequences are the codes, which direct the production of proteins that in turn regulate all life processes. The student will be shown how these sequences can lead to a much fuller understanding of many biological processes, which may allow pharmaceutical and biotechnology companies to determine for example new drug targets or to predict if particular drugs are applicable to all patients. Students will be introduced to the basic concepts behind Bioinformatics tools. Hands-on sessions will familiarize students with the details and use of the most commonly used online tools and resources. The course will cover the use of NCBI's Entrez, BLAST, ClustalW and the PDB.

Teaching Approach

This course is primarily delivered through interactive lectures. Learning is an active process and students are expected to read course materials and ask questions in lectures. Assignments will be given to help student understand basic concepts in bioinformatics. Hands-on sections embedded in the course will help students to develop decision making and problem solving skills with the use of knowledge acquired in bioinformatics.

Assessment Scheme

You will be assessed as summarized in the followings:

| Components | Percentage |
|---------------|------------|
| Mid-term exam | 40% |
| Final exam | 60% |
| Total | 100% |

Textbook

Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins (Third Edition) Andreas D. Baxevanis, B. F. Francis Ouellette

Course Outline

| <i>Date</i> | <i>Content</i> |
|-------------|--|
| Feb. 1 | Introduction |
| Feb. 6 | Biological database and data retrieval |
| Feb. 8 | Ditto |
| Feb. 13 | Ditto |
| Feb. 15 | Ditto |
| Feb. 20 | Molecular sequence analysis |
| Feb. 22 | Ditto |
| Feb. 27 | Ditto |
| Mar. 1 | Ditto |
| Mar. 6 | Midterm Review |

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| Mar. 8 | Midterm examination |
| Mar. 13 | Molecular evolution and phylogenetics |
| Mar. 15 | Ditto |
| Mar. 20 | Ditto |
| Mar. 22 | Ditto |
| Mar. 27 | Genomics and medicine |
| Mar. 29 | Ditto |
| Apr. 3 | Ditto |
| Apr. 5 | Ditto |
| Apr. 10 | Ditto |
| Apr. 19 | Ditto |
| Apr. 24 | Bioinformatics Applications |
| Apr. 26 | Ditto |
| May 8 | Review/Tutorial |