UNIVERSITI TEKNOLOGI MARA

BMS551: PRINCIPLES OF BIOINFORMATICS

Course Name (English)	PRINCIPLES OF BIOINFORMATICS APPROVED
Course Code	BMS551

MQF Credit	3

Course Description	This course is designed to equip students with the necessary theoretical knowledge and practical skills in bioinformatics. Students will be introduced to 3 major concepts in bioinformatics namely the resources, databases and tools. In resources, students will learned type of biological resources and their level of studies, background, method in human genome project and its important result to mankind. In databases students will explored type and varieties of biological databases and their unique characteristics. In tools, students will have an apportunity in analysing biological data such as sequence alignment and phylogenetic tree reconstruction

Transferable Skills	computer skills self-learning skills

Teaching Methodologies	Lectures, Practical Classes, Web Based Learning, Computer Aided Learning

CLO		
	CLO1	Describe bioinformatics and its various level of study e.g genomics, proteomics, transcriptomics, metabolomics etc.
	CLO2	Explain human genome project and its importance to the mankind
	CLO3	Categorise type of biological databases and their unique characteristics
	CLO4	Plan and retrieved data from various publicly available biological databases
	CLO5	Analyze biological data using sequence alignment tools and inferring phylogenetic tree

Pre-Requisite Courses	No course recommendations

Topics

1. Introduction to Bioinformatics and the –omics Technology
1.1) Definition and relationship to other science discipline
1.2) Technology and application in bioinformatics
1.3) Genomics and its research field
1.4) Proteomics and its research field
1.5) Metabolomics and its research field

2. The Human Genome Project, genome organisation and gene recognition
2.1) Background and stages-genetic, physical and sequencing mapping
2.2) Techniques used in publicly and privately funded organisation
2.3) Genome of procaryotes
2.4) Genome of eucaryotes
2.5) Gene structure and recognition

3. DNA Polymorphisms
3.1) Defination of single nucleotide polymorphisms
3.2) Types and effect of DNA polymorphisms
3.3) Smoking and susceptability to lung cancer
3.4) SNP application

4. Biological database
4.1) Characteristics of biological database
4.2) Categories of biological databases
4.3) Archives and information retrieval
4.4) Navigating database Information retrieval system

5. Sequence alignment
5.1) Pairwise Vs. multiple sequence alignment
5.2) Matching Vs. Alignment
5.3) Alignment score
5.4) Algorithms of sequence alignment
5.5) Local Vs. Global alignment
5.6) Application of sequence alignment

6. Phylogenetic Tree Reconstruction
6.1) Introduction and terminologies
6.2) Modern Vs. traditional tree
6.3) Kind of Trees
6.4) Rooted Vs. unrooted tree
6.5) Distance based tree
6.6) Character based tree

Assessment Breakdown	%
Continuous Assessment	50.00%
Final Assessment	50.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Practical	LAB REPORT 1- Data Analysis of Nucleotide Sequence 1 and 2	6%	CLO2
	Practical	LAB REPORT 2- Database searches	7%	CLO3
	Practical	LAB REPORT 3- Sequence alignment and phylogenetic tree reconstruction	7%	CLO5
	Quiz	QUIZ 1-covers chapter 1	3%	CLO1
	Quiz	QUIZ 2-covers chapter 2	3%	CLO2
	Quiz	QUIZ 3- covers chapter 4 n 5	4%	CLO4
	Test	TEST 1- covers chapter 1,2,3.	10%	CLO2
	Test	TEST 2-covers chapter 4,5,6	10%	CLO5

Reading List	Recommended Text	• Arthur Lesk 2014, *Introduction to Bioinformatics*, 4th. Ed., Oxford University Press [ISBN: 9780199651566]
	Reference Book Resources	• Arthur Lesk 2017, *Introduction to Genomics*, 2nd. Ed., Oxford University Press UK [ISBN: 9780199564354] • Choudhuri, Supratim, 2014, *Bioinformatics for Beginners: Genes, Genomes, Molecular Evolution, Databases and Analytical Tools* 1st. Ed., Elsevier Inc, Germany [ISBN: 978-012410471]
Article/Paper List	This Course does not have any article/paper resources	
Other References	This Course does not have any other resources	