



### Bioinformatics

Course Code	Course Num.	Course Name	Credit Hours	Lec	Lab	Tut	Prerequisites
BIO	434	Bioinformatics	3	2	2	0	STA217

#### Objectives:

Bioinformatics is an interdisciplinary field that develops methods and software tools for understanding biological data. As an interdisciplinary field of science, bioinformatics combines computer science, statistics, mathematics, and engineering to analyze and interpret biological data.

This course aims to identify the biological sequences data and the analysis of similar DNA sequences and proteins.

So, successful completion of the course , the student will be able :

- To illustrate bio-data sequences.
- To describe similar sequences
- To describe similar protein sequences.

#### Syllabus:

- Class Introduction. Bioinformatics: What and why?
- Genomic sequences. Online databases. Intro to sequence alignment.
- Sequence alignment. Scoring Matrices. Pairwise alignment. Gaps.
- Database searching; BLAST. Limits of detection, significance.
- Advanced BLAST: PSI-BLAST, Genomic DNA. Find-a-gene project.
- Multiple sequence alignment. Relevance to inferences about evolution
- Midterm review; molecular phylogeny introduction.
- Molecular phylogeny and evolution. mRNA and gene expression introduction. Unigene.
- Statistics for differential expression, multiple testing.
- Functional interpretation of array data. Characterizing eukaryotic genomes.
- Human variation and disease. Linking genes and disease.
- Sequence variation, phenologs, comparative genomics.
- Personalized medicine. Multiple testing, revisited.

#### References:

- Marketa Zvelebil Jeremy Baum Understanding Bioinformatics, Publisher: Garland Science; 1 edition (2007), ISBN-10: 0815340249.
- Teresa Attwood, David Parry-Smith Hal Introduction to Bioinformatics. Paperback, 240 pages; ( 1999), 1st edition; Prentice ISBN: 0582327881.

