

Course General Description:

This course is designed to highlight technological advances in genomics and bioinformatics. This course will cover the theoretical and practical bioinformatics applied to genetics and genome. Also, Explore technological developments and experimental methods relevant to genomics. The student will learn to use tools and software in bioinformatics used in genome analysis. topics include biological databases, whole genome alignment and characterization, structure and function of the genome, genome rearrangement, genome sequencing projects, genome variations and evolution, next-generation sequencing, transcriptome, epigenetics, cancer-omics and applications, and uses of genomic data in human health, disease, medicine, and biotechnology. Also, the course will introduce the use of bioinformatics and technological developments for communication of the results in genomics studies.

Course Main Objective(s):

- Discuss the advanced principles of molecular biology regarding genome and biological data
- Understand the scope of research and methods in genomics and bioinformatics
- Understand the major topics in the field of bioinformatics and genome sequence analysis
- Understand the latest tools and software used in genomics and bioinformatics

Course Content:

1. Bioinformatics and biological database
2. Bioinformatics methods and algorithms
3. Sequence and structure analysis
4. Sequence alignment and homology
5. Molecular phylogeny and evolution
6. Genomes, Transcriptomes, and Proteomes
7. Genome composition and structure
8. Genome-wide gene expression
9. Molecular genetics and epigenetics
10. Genome variations and mutations
11. SNPs and copy number variations
12. Functional genomics
13. Genome analysis
14. Genome sequencing and projects
15. Next sequencing generation and data analysis
16. Genomic data
17. Comparative genomics
18. Genome applications

19. Genome and disease

20. Cancer genomics

21. Genome and biotechnology