

Certificate course: Introductory Bioinformatics

COURSE CO-ORDINATOR: Dr. Sanyukta Kumar, Department of Biotechnology, St. Xavier's College (Autonomous) Ranchi.

OBJECTIVE OF THE COURSE:

Bioinformatics is an interdisciplinary field of science for analyzing and interpreting vast biological data using computational techniques. In this course, we aim to give a walkthrough of the major aspects of bioinformatics such as DNA and protein sequence databases and analysis, secondary structures and 3D structural analysis. This course is designed to nurture skills and knowledge required for aspiring students and young biologists to understand algorithms and tools in bioinformatics.

OUTCOME:

On completion of this course the student will be able to:

1. Understand different biological databases and tools.
2. Apply algorithms for searching the biological databases.
3. Use sequence alignment methods.
4. Gain the knowledge of how to utilize basic bioinformatics resources.

INTENDED AUDIENCE: UG/PG Students of Sciences (Botany, Zoology, Chemistry, Biotechnology etc.)

PRE-REQUISITES: Basic knowledge of Molecular Biology

COURSE FEES: 2000/-

Start Date :	1 st week of January 2027
Enrollment Ends :	4 th December 2026
Exam Registration	April 2027
Exam Date :	Last week of April 2027

Duration of the course: Theory(T):18Hrs, Practical(P): 24Hrs

Week 1: Introduction to Bioinformatics, Structure and function of DNA, Central Dogma – (2T)

Week 2: DNA sequence Databases: GenBank, ENA (2T, 3P)

Week 3: Protein, protein sequence databases- UniProt (2T, 3P)

Week 4: Pairwise sequence alignment, Global and local alignment (2T, 3P)

Week 5: Scoring Matrices: PAM matrix, BLOSUM matrix (2T)

Week 6: BLAST: features and scores (2T, 6P)

Week 7: Protein secondary structures, Ramachandran plot, propensity, secondary structure prediction (2T, 3P)

Week 8: Protein structure, Protein Data Bank (2T, 3P)

Week 9: Multiple sequence alignment, Protein and Gene Family, CLUSTAL (2T, 3P)

Week 10: Examination