GOVT. COLLEGE FOR WOMEN, PARADE GROUND, JAMMU-180001, J&K.
(Erstwhile Maharani Mahila College
Autonomous College affiliated to the University of Jammu
College with Potential for Excellence, 2016
(Estd. 1944)

Syllabus and Course of Study in Zoology - M.SC. Semester-III

For examinations to be held in 2024-25, 2025-26 and 2026-2027.

Core Course No:	**PSZOTC-313**
Course Title:	**Basics of Bioinformatics**
Credits:	**02**
Maximum Marks:	**50**
Minor Test I:	**10**
Minor Test II:	**10**
Major Test:	**30**
Duration of External Exam:	**2 Hrs.**
Date of BOS	**12-06-24**

Course Learning Objective:

The aim of incorporating "Basics of Bioinformatics" as a paper is to introduce the students to the myriad applications of this field in modern biology. The digitalisation of biological methods is at an all-time high and the students of biology must be acquainted with the emergence of technology so that they are well prepared to take up research in a better way. Bioinformatics has already established itself as a backbone of the modern research and diagnostics and no research is possible without making use of bioinformatics in modern times.

Course Learning Outcomes:

Students studying this course will be able to handle high throughput proteomic and genetic data. They will be able to understand the maintenance of computers, server and big data files. This course will make them suitably knowledgeable to undertake the computer jobs in the offices in the hospitals, scientific academies, funding agencies in addition to the teaching institutions.

SYLLABUS

UNIT-I: Basic Concepts of Bioinformatics **(10 Hrs)**

1.1 Goals, scope and applications of Bioinformatics

1.2 History of Bioinformatics, Genome sequencing projects (Human Genome Project).

1.3 Basic molecular concepts: Types of Nucleotide Sequence: Genomic DNA, Complementary DNA (cDNA), Recombinant DNA (rDNA), Expressed sequence tags (ESTs), Genomic survey sequences (GSSs). Gene expression data.

Unit-II: Bioinformatics Database **(10 Hrs)**

2.1 Biological Databases; Primary, Secondary & Composite databases.

2.2Nucleotide Sequence Databases; Gen Bank, EMBL, DDBJ, NCBI Data Model.

2.3 Protein Sequence Databases; SWISS-PROT protein sequence database, Translated EMBL (TrEMBL), UniProt, PROSITE, Pfam.

Unit III: Retrieval and Sequence Similarity Search **(10 Hrs)**

3.1 Retrieval Systems:

3.1.1. SRS

3.1.2. ENTREZ and

3.1.3. NCBI Search,

3.2 Sequence Similarity Search:

3.2.1. BLAST

3.2.2. FASTA

3.2.3. CLUSTALW.

Note for Paper Setting:

Examination Theory	Syllabus to be covered in Examination	Time Allotted for Exam	% Weightage (Marks)
Minor Test-I	**Upto 20%**	**1 Hr.**	**10**
Minor Test-II	**21-40%**	**2Hr.**	**10**
Major Test	**41-100%**	**2 Hrs.**	**30**

- Major test shall comprise of two sections A & B.
- Section A shall comprise of five (5) multiple choice question of 1 mark each covering the entire syllabus of 3 units and 5 short answer questions of 1 mark each from the entire syllabus. (A Sec = 10 marks)
- Section B comprises of 4 questions from 2 units and candidate has to attempt one question from each unit. (2 x 10 = 20)

Teaching and Learning Process:

Classroom lectures using Power point presentations enabled with related photographs of insect vectors will clarify the concepts related to insects. Group discussions on various unique physiological processes in Insects will develop interest among students to pursue higher studies in the field. Observations based on actual handling of insects and their body parts, visits to observe insects in their natural environment and entomology museum will develop curiosity among learners about insect diversity.

Assessment Method:

The learners/ students can be assessed in many different ways.

Formative feedback throughout the course and summative feedback as mid-semester and semester-end evaluation.

Presenting the topics in the class via blackboard teaching/presentations, group discussions etc.

Students would be provided feedback on their work with a view to improve their academic performance.

From time to time, learners will be given practical problems and neuro-images to test their theoretical skills and promote practical knowledge.

They would be provided feedback on their work with a view to improve their academic Performance.

Books recommended:

1. Introduction to Bioinformatics by Teresa Attwood, David Parry-Smith, 1999, 1st edition; Prentice Hall.

2. Baxevanis, A.D. and Francis Onellete, B.F. (2001). Bioinformatics. Wiley Interscience. John Wiley and Sons Inc. New York.

3. Biostatistics: A Manual of Statistical Methods for Use in Health, Nutrition And Anthropology. K. VisweswaraRao. Jaypee Brothers Medical Publishers (P) Ltd.

4. Fundamentals of Biostatistics. By Irfan A Khan.

5. An introduction to Biostatistics. By PSS Sunder Rao.

6. Introduction to the Practice of Statistics By Moore and McCabe.

7. Principles of Biostatistics. Marcello Pagano.

8. Veer BalaRastogi (2006) Fundamentals of Biostatistics, New Delhi, Ane Books India.

9. Dhar, M.K. and Kaul, S. (1997). Statistics in Biology. Malhotra Brothers, Jammu.

10. Snedecor, G.W. and Cochran, W.G. (1989). Statistical methods. Iowa State University Press, Ames.

11. Ye, Q. S. (2008). Bioinformatics: A practical approach. Champman& Hall/ CRC.

12. Tramontano Anna (2008). Introduction to Bioinformatics. Chapman & hall/ CRC

Committee members (External)

1	Prof. (Dr.) Seema Langer Head, Department of Zoology & Dean, Life Sciences, University of Jammu	
2	Dr. N. K. Tripathi, Professor (Retd.) Department of Zoology, University of Jammu	
3	Dr. Surya Partap Singh,Assistant Prof. & Head, Department of Zoology, GDC Basholi	
4	Dr. Shvetambri Jasrotia, Assistant Prof., Department of Zoology, Central University of Jammu	
5	Mr. Munish Sharma Assistant Director Fisheries, Jammu.	
6	Col. (Retd.) Sunil Sambyal ,Biofloc Expert & Entrepreneur	

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LAB COURSE II

Course Code: PSZOPC-316

Exercise 1: To retrieve the FASTA sequence of gene of interest from a nucleotide database.

Exercise 2: To perform sequence alignment using the Basic Local Alignment Search Tool (BLAST) to identify similarities between a query sequence and database sequences.

Note: There will be one practical paper of 50 marks (comprising Lab Course II; based on Course No. 311, 313 and 314). 50% (25 marks) shall be reserved for internal assessment including 20% marks (5 marks) for attendance, 20% (5 marks) for viva and 60% (15 marks i.e., 7 marks for internal assessment and 8 marks for day-to-day performance). In case of the regular students, internal assessment received from the college will be added to the marks obtained by them in the final examination (Major test) and in case of private candidates, the internal assessment marks shall be added proportionately to the marks obtained by them in the major examination in accordance with the statutes/regulations.

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