Department of Bioinformatics
School of Earth, Biological and Environmental Sciences
Central University of South Bihar
Syllabus of M.Sc. Bioinformatics
Session-2022-2023 onwards

Introduction

Bioinformatics is a field of interdisciplinary study at the interface of biology and information technology. As such, Bioinformatics brings together molecular biology with areas from statistics, mathematics, and computer science. Bioinformatics now entails the creation and advancement of biological databases, algorithms, computational and statistical techniques, and theory to solve formal and practical problems arising from the management and analysis of biological data. Considering the interdisciplinary nature of Bioinformatics, this master programme shall have a major component from related subjects under one umbrella.

Objectives

The core objective of the programme is to provide quality education to the graduates, who want to pursue their career in the areas of Bioinformatics and Computational Biology.

- To serve as a nodal point for Bioinformatics and its applications
- To provide industry interface to the students for research projects
- To build skilled manpower to solve biological problems utilizing computational approaches

Outcome

- Students completing the course can efficiently provide bioinformatics solutions for biological research
- Learn problem-solving skills and to develop new algorithms
- Perform biological research utilising computational approaches

Target Group and Eligibility

Bachelor's degree in Biological Sciences/ Agricultural Science/ Pharmaceutical Science/ Veterinary Science/ Medical Science/ Mathematics/ Physics/ Chemistry/ Computer Science/ Information Technology or Integrated B.Sc. B.Ed. with 55% marks for General/OBC /EWS candidates and 50% marks for SC/ST/PWD candidates from any recognized University.

Duration: Two Years (Four Semester) – Full Time

Course Structure
M.Sc. Bioinformatics (02 Year)
Total Credits: 80

Semester - I					
		Credits			**Total Credits**
DBCC*	**Course title**	**L**	**T**	**P**	
BIS 8 1 DC 001 04	Linux and Bioinformatics	2	1	1	4
BIS 8 1 DC 002 04	Biochemistry and Molecular Biology	4	0	0	4
BIS 8 1 DC 003 04	Mathematics & Statistics with R	2	1	1	4
BIS 8 1 DC 004 04	Programming with Python	2	1	1	4
Open elective@	Other department / SWAYAM / NPTEL				4
	Total Credits				**20**

*Discipline Based Core Course – DC   **@Open elective (Interdisciplinary) Course - OE**

OE - Students shall earn 04 Credit from other department / SWAYAM / NPTEL

Semester – II					
		Credits			**Total Credits**
DBCC	**Course title**	**L**	**T**	**P**	
BIS 8 2 DC 005 04	Algorithms in Bioinformatics	2	1	1	4
BIS 8 2 DC 006 04	Biomolecular Modelling and Simulations	3	0	1	4
BIS 8 2 DC 007 04	Introduction to Research Methodology	3	1	0	4
BIS 8 2 DC 008 04	Genomics and Transcriptomics	3	0	1	4
DBCE*	Any one from the list	2	1	1	4
	Total Credits				**20**
DBCE courses					
BIS 8 2 DE 009 04	Evolution and Molecular Phylogeny	2	1	1	4
BIS 8 2 DE 010 04	Programming with Perl	2	1	1	4
MENC@					
BIS 8 2 ME 011 00	**ICT and Digital Skills** / Other department / SWAYAM / NPTEL	Non-credit course equivalent to 2 credits			

*Discipline Based Core Elective Course – DE

@Mandatory Elective Non-Credit Course - ME

Students who exit after the successful completion of M.Sc. first year (I and II semesters) shall be awarded 01 year Post-Graduate Diploma in Bioinformatics.

Students wish to go for summer training (non-credit) may join the same at the end of II semester and present work done during summer training within one week of the commencement of semester III.

Experts from industry / alumni placed at various institutions may be called for guest lecture and interaction to get update on requirement in industry.

Educational/Industrial tour or Excursion may be made to visit institutes/industries/laboratories based on availability of funds or otherwise. If excursion took place, student shall submit a report (10 marks) within a week that will be the part of continuous assessment of a specific course decided by the department committee.

Semester -III					
		Credits			**Total Credits**
DBCC	**Course title**	**L**	**T**	**P**	
BIS 9 1 DC 012 04	Chemoinformatics and Drug Design	2	1	1	4
BIS 9 1 DC 013 04	DBMS and WEB Technology	2	1	1	4
BIS 9 1 DC 014 04	Applications of Bioinformatics	0	0	4	4
DBCE	Any one from the list	2	1	1	4
Open elective	Other department / SWAYAM				4
	Total Credits				**20**
DBCE courses					
BIS 9 1 DE 015 04	Systems Biology	2	1	1	4
BIS 9 1 DE 016 04	Exome Sequence Data Analysis	2	1	1	4
MENC					
BIS 9 1 ME 017 00	**Research & Publication Ethics** / Other department / SWAYAM / NPTEL	Non-credit course equivalent to 2 credits			

Semester - IV					
		Credits			**Total Credits**
DBCC	**Course title**	**L**	**T**	**P**	
BIS 9 2 DC 018 20	Dissertation	-	-	20	20
	Total Credits				**20**

Student would have choice to carry out dissertation internally or externally to be evaluated by a committee of faculties at the end of semester. An elective will run if opted by 33% of the students enrolled in the programme.

List of open electives

Open electives	Course title	Credits			Total Credits
		L	**T**	**P**	
BIS 8 1 DC 001 04	Linux and Bioinformatics	2	1	1	4
BIS 8 2 DE 009 04	Evolution and Molecular Phylogeny	2	1	1	4
BIS 8 2 DE 010 04	Programming with Perl	2	1	1	4
BIS 9 1 DE 015 04	Systems Biology	2	1	1	4
BIS 9 1 DE 016 04	Exome Sequence Data Analysis	2	1	1	4

List of Swayam / NPTEL courses:

- Intellectual property
- Introduction to cell biology
- Mind education
- Environmental studies
- Immunology
- Indian society- social problems and issues
- Ecology and environment
- Academic writing
- Any other relevant course

Course code for SWAYAM/NPTEL courses will be taken as such, if given, or just name of portal will be mentioned otherwise. Students may register one (4 credits) or multiple courses (2 + 2 credits) from SWAYAM / NPTEL to complete the credit requirement.