



STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086
DEPARTMENT OF BIOINFORMATICS

Programme Learning Outcomes/Intended Programme Learning Outcomes

Graduates of a Master's Degree of Stella Maris College will have a comprehensive knowledge of their disciplines, with indepth knowledge of the underlying principles and concepts in one or more disciplines as a basis for independent lifelong learning.

At the end of a postgraduate programme students will be able to

- Demonstrate mastery in the discipline
- Demonstrate deep understanding of the broad principles of science and technology and apply them in varied contexts
- Demonstrate knowledge, understanding and professionalism required for the discipline
- Demonstrate capability to locate, evaluate, manage, and use information/data and research to develop and guide their own knowledge, learning, and practice
- Demonstrate the ability to organise a presentation in a coherent fashion
- Demonstrate the literacy and numeracy skills necessary to understand and interpret information/data and communicate according to the context
- Draw on multiple, relevant/interrelated fields of study to understand, analyse and solve problems
- Exhibit principled decision making and reasoning to identify creative solutions to ethical problems
- Practice/act in ways that show a commitment to social justice and the processes of peace/conflict resolution
- Demonstrate the skills to appropriately interact with people from a range of cultural, linguistic, and religious backgrounds
- Demonstrate an understanding of local, regional, national, and global issues
- Identify themselves as agents of change
- Demonstrate the ability to solve an issue
- Show self-awareness and emotional maturity
- Demonstrate career and leadership readiness
- Exhibit the ability to work in teams
- Demonstrate sensitivity and readiness to share their knowledge and capabilities with the marginalised and oppressed in their communities

PROGRAMME DESCRIPTION

The M.Sc. programme in Bioinformatics at Stella Maris College was started in the year 2002. The programme gives a strong interdisciplinary foundation to Biology and Informatics with courses like Molecular Biology, and ensures adequate Programming skills in C++, Perl, R and Python. The programme includes recent advancements and internationally demanding research cum job courses like Next Generation Sequencing Analysis, Big Data Analysis and Molecular Modeling and Computer Aided Drug Design. Other courses like Data Mining, Algorithms, Clinical Research Management and Systems Biology cover not only the theoretical aspects of the field, but also the practical essentials of Bioinformatics. The Summer Internship is an integral part of the course, and is done at the end of the first year where the students intern in reputed institutions such as IGIB, IBAB, NCBS, IIT-M, IISc, etc., where they are involved in live projects, and acquire hands-on experience in both wet lab and dry lab techniques and learn work ethics as well. The students are encouraged to choose their area of interest and work under the guidance of the faculty for their Master's Dissertation during the fourth semester.

PROGRAMME SPECIFIC LEARNING OUTCOMES

On successful completion of the Course, students will be able to

- Foster interdisciplinary research in the fields such as computer science, biosciences, mathematics, chemistry and physical sciences
- Interpret biological information computationally
- Develop programming skills in the languages of C++, Perl, Python and R
- Analyse genomic data and contribute to personalised medicine
- Demonstrate entrepreneurial skills
- Establish Bioinformatics start-ups
- Prepare scientific reports to publish and present quality research
- Evaluate the experimental raw data to infer molecular models

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI 600 086
M.Sc. DEGREE : BIOINFORMATICS
COURSES OF STUDY
(Effective from the academic year 2019-2020)
CHOICE BASED CREDIT SYSTEM

C-Credit, L-Lecture Hours, T-Tutorial Hours, P- Practical Hours, Ex-Exam Hours, CA- Continous Assessment Marks, ES-End Semester Marks, M-Maximum Marks									
Subject Code	Title of Course	C	L	T	P	Ex	CA	ES	M
SEMESTER-I									
19BI/PC/BM14	Biomolecules and Biochemistry	4	4	1	0	3	50	50	100
19BI/PC/EB14	Essentials of Bioinformatics	4	4	0	2	3	50	50	100
19BI/PC/CP14	Programming in C++ and Perl	4	3	0	2	3	50	50	100
19BI/PC/DB14	Database Management Systems	4	3	0	2	3	50	50	100
	SAP / SL	2	2	0	0	-	50	-	100
	Department Elective I								
SEMESTER-II									
19BI/PC/MB24	Molecular Biology	4	4	1	0	3	50	50	100
19BI/PC/PI22	Molecular Biology-Practical	2	0	0	3	3	50	50	100
19BI/PC/GP24	Genomics and Proteomics	4	3	0	2	3	50	50	100
19BI/PC/RM24	Research Methodology	4	4	1	0	3	50	50	100
CD / ET	Value Education	2	2	0	0	-	50	-	100
19BI/PK/SS22	Soft Skills	2	2	0	0	-	50	-	100
	Department Elective II								
	Common Elective I								
SEMESTER-III									
19BI/PC/PR34	Python and R Programming	4	4	1	0	3	50	50	100
19BI/PC/P232	Python and R Programming-Practical	2	0	0	3	3	50	50	100
19BI/PC/AL34	Algorithms for Bioinformatics	4	4	1	0	3	50	50	100
19BI/PC/MC34	Molecular Modeling and Computer Aided Drug Design	4	4	1	0	3	50	50	100
19BI/PC/P332	Molecular Modeling and Computer Aided Drug Design-Practical	2	0	0	3	3	50	50	100
CD / ET	Value Education	2	2	0	0	-	50	-	100
19BI/PN/SI32	Summer Internship	2	2	0	0	-	50	-	100
	Common Elective II								
SEMESTER-IV									
19BI/PC/AB44	Advances in Bioinformatics	4	4	1	0	3	50	50	100
19BI/PC/BD44	Big Data Analysis	4	4	1	0	3	50	50	100
19BI/PC/P442	Advances in Bioinformatics-Practical	2	0	0	3	3	50	50	100
19BI/PC/DS47	Dissertation	7	0	0	9	0	50	50	100
	Department Elective III								
Postgraduate Elective Courses Offered to Parent Department									
19BI/PE/CG15	Cell Biology and Genetics	5	4	1	0	3	50	50	100
19BI/PE/BS15	Biomathematics and Biostatistics	5	4	1	0	3	50	50	100
19BI/PE/DM15	Data Mining	5	4	1	0	3	50	50	100
19BI/PE/IM15	Immunoinformatics	5	4	1	0	3	50	50	100
19BI/PE/CR15	Basics of Clinical Research Management	5	4	1	0	3	50	50	100
19BI/PE/CI15	Cheminformatics	5	4	1	0	3	50	50	100
19BI/PE/BP15	Biophysics	5	4	1	0	3	50	50	100

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Postgraduate Elective Courses Offered to Other Departments									
19BI/PE/IB23	Introduction to Bioinformatics	3	3	0	0	3	50	50	100
19BI/PE/AP23	Applications of Bioinformatics	3	3	0	0	3	50	50	100
19BI/PE/CD23	Computer Aided Drug Design	3	3	0	0	3	50	50	100
Independent Elective Courses									
19BI/PI/PG24	Pharmacogenomics	4	0	0	0	3	0	100	100
19BI/PI/SB24	Systems Biology	4	0	0	0	3	0	100	100

BIOMOLECULES AND BIOCHEMISTRY

CODE: 19BI/PC/BM14

CREDITS: 4

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To understand the concepts of the structure of biomolecules
- To understand the basics of metabolism and enzyme kinetics
- To give a basic understanding about the forces that determines the structure of biological macromolecules
- To provide knowledge about the techniques used in studying biological structure and function

COURSE LEARNING OUTCOMES

On Successful completion of the course, the student will be able to

- Understand the importance of structural studies in bioinformatics and
- Gain an insight about the forces that determines the structure of biological macromolecules
- Apply the knowledge gained to interpret the properties of biological macromolecules
- Apply the recent advances in Biochemistry and Biophysical techniques in Clinical Chemistry and Life science Research

ESSENTIALS OF BIOINFORMATICS

CODE: 19BI/PC/EB14

CREDITS: 4

L T P: 4 0 2

TOTAL TEACHING HOURS: 78

OBJECTIVES OF THE COURSE

- To provide an integrative approach to the understanding of both theory and practice of bioinformatics
- To apply biological concepts at different levels to study gene / protein analysis, and the proteins implicated in diseases
- To understand the evolution of the life

COURSE LEARNING OUTCOMES

On successful completion of the course, the student will be able to

- Better understanding of the bioinformatics concepts
- Applications of the gene and protein sequence analysis
- Apprehending the different databases in bioinformatics
- Perform a complete analysis of the genes and protein
- Compare and identify the differences in sequences

PROGRAMMING IN C++ AND PERL

CODE: 19BI/PC/CP14

CREDITS : 4

L T P : 3 0 2

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To facilitate the students in gaining programming skills.
- To enable the students to design and execute C++ and Perl scripts
- To interpolate biological demands through programming

COURSE LEARNING OUTCOMES

On successful completion of the course, the student will be able to

- Learn the basics of programming
- Relate the necessity for programming in biology
- Handling biological concepts with C++ and Perl scripts
- Apply programming to analyze genomic sequences
- Understand Bio-Perl and their application in bioinformatics to handle the complex data

DATABASE MANAGEMENT SYSTEMS

CODE : 19BI/PC/DB14

CREDITS : 4

L T P : 3 0 2

TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- To introduce the basic concepts of Relational Database Management System and Client/Server Environment

- To be trained in designing databases and manipulating them for biological applications
- To understand the working knowledge of Linux environment

COURSE LEARNING OUTCOMES

On successful completion of the course, the student will be able to

- Understand data models and schemas in DBMS
- Skills to Create, update, retrieve and Manage data
- Handle files and databases
- Gain efficient skills on Atomicity, Consistency, Isolation, and Durability
- Clear understanding and usage of SQL language

MOLECULAR BIOLOGY

CODE: 19BI/PC/MB24

CREDITS : 4

L T P : 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To understand the general principles of gene organization and expression
- To explore the various levels of gene regulation and protein function
- To analyse the various genetic and molecular changes occur in a normal cell

COURSE LEARNING OUTCOMES

On successful completion of the course, the student will be able to

- Represent and illustrate the structural organization of genes and the control of gene expression
- Explore the prokaryotic and eukaryotic protein synthesis mechanism
- Conceptualize mechanisms of signal transduction, cell cycle and cell death
- Link the concepts of cell and molecular biology to a better understanding of diseases, including cancer

MOLECULAR BIOLOGY PRACTICAL

CODE: 19BI/PC/P122

CREDITS : 2

L T P : 0 0 3

TOTAL HOURS : 39

OBJECTIVE OF THE COURSE:

- To identify subcellular structures, organelles and understand their functions
- To provide practical experience of the various techniques involved in Molecular Biology and Biochemistry
- To perform a range of molecular techniques used for the isolation, estimation, purification of biomolecules

COURSE LEARNING OUTCOMES

On successful completion of the course, the student will be able to

- Utilize laboratory skills to enhance understanding of cell structure and function while participating in a group environment
- Develop responsible conduct of laboratory skills appropriate to the field of cell and molecular biology
- Apply the molecular biology techniques to biotechnological approaches

GENOMICS AND PROTEOMICS

CODE: 19BI/PC/GP24

CREDITS : 4

L T P : 3 0 2

TOTAL CONTACT HOURS: 65

OBJECTIVES OF THE COURSE

- To provide an insight into the complete genome sequences of a few organisms as well as the Human genome through Comparative and Functional genomics
- To acquaint knowledge on functional genomics techniques such as microarrays, EST, SAGE and interpret data obtained through high throughput expression studies
- To develop an understanding of the entire protein complement of a cell through analytical approaches, Data mining and other software tools

COURSE LEARNING OUTCOMES

On successful completion of the course, the student will be able to

- Gain an insight of the basic and advanced concepts and applications of sequencing technologies
- Understand the mechanisms of genomics and proteomics and exploit the same in the growing field of omics
- Apply functional genomics techniques to analyse data for biological system
- Implement techniques and database search to analyze complex protein samples
- Analyze the proteomic interactions in complex diseases

RESEARCH METHODOLOGY

CODE: 19BI/PC/RM24

CREDITS : 4

L T P : 4 1 0

TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- To describe and express the role and importance of research in basic and applied sciences
- To facilitate writing of research proposals / projects and apply for grants in the field of bioinformatics
- To understand the analytical tests to be applied for research

COURSE LEARNING OUTCOMES

On successful completion of the course, the student will be able to

- Better understanding of the research methods
- Design an action plan of research
- Acquire skills of writing a research manuscript
- Application of statistical study in research
- Understand the ethics in writing research work

SOFT SKILLS

CODE: 19BI/PK/SS22

CREDITS: 2

L T P: 2 0 0

TOTAL TEACHING HOURS: 26

OBJECTIVES OF THE COURSE

- To empower students and create opportunities for self-development.
- To instill confidence in students to face challenges.

- To manage emotions and resolve conflicts.
- To organize activities and manage time.
- To set goals and plan ahead.

COURSE LEARNING OUTCOMES

- Communicate with confidence and poise.
- Accept themselves and improve on their weaknesses.
- Strengthen their relationships through confronting and solving problems.
- Work more effectively and complete activities on time.
- Plan their future with clarity and focus.

PYTHON AND R PROGRAMMING

CODE: 19BI/PC/PR34

CREDITS : 4

L T P : 4 1 0

TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- Demonstrate how to locate and download files for data analysis involving genes and medicine
- Select datasets, open files and pre-process data using Python and R language
- Develop and write R scripts to replace missing values, normalize data, discretize data, and sample data

COURSE LEARNING OUTCOMES

On successful completion of the course, the student will be able to

- Relate the necessity for programming in biology
- Handling biological concepts with Python and R scripts
- Apply programming to analyse genomic sequences
- Gain efficient programming skills
- Perform genomic data analysis

PYTHON AND R PROGRAMMING PRACTICAL

CODE: 19BI/PC/P232

CREDITS : 2

L T P : 0 0 3

TOTAL HOURS: 39

OBJECTIVE OF THE COURSE

- Demonstrate how to locate and download files for data analysis involving genes and medicine
- Select datasets, open files and pre-process data using Python and R language
- Develop and write R scripts to replace missing values, normalize data, discretize data, and sample data

COURSE LEARNING OUTCOMES

On successful completion of the course, the student will be able to

- Relate the necessity for programming in biology
- Handling biological concepts with Python and R scripts
- Apply programming to analyse genomic sequences
- Gain efficient programming skills
- Perform Microarray data analysis using R language

ALGORITHMS FOR BIOINFORMATICS

CODE: 19BI/PC/AL34

CREDITS : 4

L T P : 4 1 0

TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- To develop a quantitative understanding of how living things are built
- To raise the awareness of the impact of algorithms on the efficiency of the system
- To develop skills to analyse algorithms related to Bioinformatics

COURSE LEARNING OUTCOMES

On successful completion of the course, the student will be able to

- Know the main problems in the field of bioinformatics and computational molecular biology
- Analyse the correctness of algorithms and how it works

- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it.
- Apply the algorithms and design techniques to solve problems
- Analyse the complexities of various problems in different domains

MOLECULAR MODELING AND COMPUTER AIDED DRUG DESIGN

CODE: 19BI/PC/MC34

CREDITS : 4

L T P : 4 1 0

TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- To provide clear concepts on bond angle, bond stretching, bond distance and role on different types of bonds in interactions
- To provide a theoretical background to the various methods of molecular modelling, mechanics and interaction
- To develop and understand the mechanism of drug design using computers

COURSE LEARNING OUTCOMES

On successful completion of the course, the student will be able to

- Perform protein structure prediction and understand energy simulation methods and its importance in drug action
- Gain insight on the molecular dynamics and Monte Carlo simulation methods
- Understand the concept of molecular interactions and QSAR studies
- Apply the knowledge gained to find new targets and design drug to treat diseases
- Learn the concept of drug development

MOLECULAR MODELING AND COMPUTER AIDED DRUG DESIGN

PRACTICAL

CODE: 19BI/PC/P332

CREDITS : 2

L T P : 0 0 3

TOTAL TEACHING HOURS : 39

OBJECTIVE OF THE COURSE

- To provide practical experience in the analysis of protein sequences

- To understand the use of informatics in drug design and development, finding new targets to treat disease; mechanism of drug designing
- To gain insights on protein-ligand docking and knowledge-based scoring functions

COURSE LEARNING OUTCOMES

On successful completion of the course, the student will be able to

- Perform, understand, and interpret the results of the calculations and bring them in a publication ready form
- Understand the importance of drug-like properties and their prediction
- Describe the use of lead candidates and database representations
- Apply Molecular modeling and molecular dynamics methods to study structure from sequence

SUMMER INTERNSHIP

CODE: 19BI/PN/SI32

CREDITS: 2

OBJECTIVES OF THE COURSE

- To enable students to gain experiential learning in the field of Bioinformatics
- To acquire hands on training in Bioinformatics Softwares

The Summer Internship program is for a minimum period of three weeks. The students are expected to have regular attendance in their respective Institutes and submit a report to the Department reporting the experiments they have observed/conducted. The students are expected to give a seminar presentation in the third semester of the work they have observed/conducted.

ADVANCES IN BIOINFORMATICS

CODE: 19BI/PC/AB44

CREDITS : 4

L T P : 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To develop a quantitative understanding of recent and emerging fields of Bioinformatics
- To provide Hands on experience of handling the genomic and proteomic datasets
- To provide a better understanding of data and its applications in Bioinformatics

COURSE LEARNING OUTCOMES

On successful completion of the course, the student will be able to

- Students will be able to analyse the raw reads of sequences
- Understand the analysis of gene expression
- Experiential knowledge on gene editing techniques
- Perform genomic data analysis
- Learn the skills of cancer genomic data analysis

BIG DATA ANALYSIS

CODE: 19BI/PC/BD44

CREDITS : 4

L T P : 4 1 0

TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- To develop a quantitative understanding of how Data Science in Bioinformatics plays a role in current decade
- To understand the various aspects of data science and applying them in health care
- To obtain adequate knowledge of machine learning approaches

OUTCOMES OF THE COURSE

On Successful completion of the course, the student will be able to

- Describe the Big Data landscape including examples of real world big data problems
- Explain the V's of Big Data and impacts of data collection, monitoring, storage, analysis and reporting
- Identify what are and what are not big data problems and be able to recast big data problems as data science questions
- Gain skills of Hadoop technology
- Learn to get value out of bigdata

ADVANCES IN BIOINFORMATICS PRACTICAL

CODE: 19BI/PC/P442

CREDITS : 2

L T P : 0 0 3

TOTAL HOURS: 39

OBJECTIVES OF THE COURSE

- Demonstrate how to locate and download files for data analysis involving genes and medicine
- Select datasets and pre-process data using
- Develop and replace missing values, normalize data, discretize data, and sample data

COURSE LEARNING OUTCOMES

On successful completion of the course, the student will be able to

- Analyse genomic sequences
- Handle raw data
- Understand the steps of data assembling
- Learn RNA sequence analysis
- Understand and design sg RNA for genome editing

CELL BIOLOGY AND GENETICS

CODE: 19BI/PE/CG15

CREDITS : 5

L T P : 4 10

TOTAL TEACHING HOURS:65

OBJECTIVES OF THE COURSE

- To understand the structure and function of the basic unit of life
- To gain knowledge about the Cell and all its components in both Prokaryotic and Eukaryotic cells
- To familiarize the students with the basic concepts of Genetics

COURSE LEARNING OUTCOMES

On Successful completion of the course, the student will be able to

- Understand the functions of the cell at the molecular level
- Represent and illustrate the structural organization of genes and the control of gene expression
- Explore the prokaryotic and eukaryotic protein synthesis mechanism
- Conceptualize mechanisms of signal transduction, cell cycle and cell death
- Link the concepts of cell and molecular biology to a better understanding of diseases, including cancer

BIOMATHEMATICS AND BIOSTATISTICS

CODE: 19BI/PE/BS15

CREDITS: 5

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To enhance the skills in mathematics those are essential for learning Bioinformatics
- To understand and implement various mathematical techniques being applied in analyzing information of biological data
- To understand statistical methods in its several forms is the basis of biological research
- To introduce the various statistical techniques useful for handling quantitative data

COURSE LEARNING OUTCOMES

On Successful completion of the course, the student will be able to

- Understand the importance of mathematics for research based problems
- Apply the different statistical tests for the research
- Learn to solve aptitude based problems in competitive exams
- Gain skills on solving the population genetics equations
- Apply the regression and correlation techniques to interpret Drug activity based on QSAR

DATA MINING

CODE: 19BI/PE/DM15

CREDITS : 5

L T P : 4 1 0

TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- To provide an insight to Data mining
- To introduce the techniques used in data mining
- To understand these techniques in collecting and sorting of data

COURSE LEARNING OUTCOMES

On Successful completion of the course, the student will be able to

- Gain insight into the field of Bioinformatics from theoretical models to finished software
- Understand how software design and methods can be integrated with existing tools to create productive information environment for bioinformatics practice
- Understand how open source can be powerful in creating web-based applications in Bioinformatics

- Understand important roles of programming languages and databases in Bioinformatics software development and service

IMMUNOINFORMATICS

CODE: 19BI/PE/IM15

CREDITS : 5

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To understand the immune system, its components and their functions
- To impart knowledge of immune responses to various pathogens by integrating genomics and proteomics with bioinformatics strategies
- To provide information about the methods used in immunological bioinformatics

COURSE LEARNING OUTCOMES

On Successful completion of the course, the student will be able to

- Understand the application of information technology to immunology
- Study informatics-based approaches for prediction of epitopes and immuno-diagnostic tools
- Gain knowledge about computer aided vaccine design

BASICS OF CLINICAL RESEARCH MANAGEMENT

CODE:19BI/PE/CR15

CREDITS : 5

L T P : 4 1 0

TOTAL PRACTICAL HOURS : 65

OBJECTIVES OF THE COURSE

- To give a basic understanding about clinical research
- To understand the various aspects of clinical research management
- To be conversant with the regulations in clinical management

COURSE LEARNING OUTCOMES

On Successful completion of the course, the student will be able to

- Evaluate critical global regulatory and health care issues that challenge and influence biopharmaceutical product development
- Understand the basic statistical principles, concepts, and methods for clinical data analysis and reporting
- Forecast the resources necessary for developing and managing clinical trials
- Demonstrate advanced critical thinking skills necessary to enhance employment opportunities or advance within the biopharmaceutical industry

CHEMINFORMATICS

CODE: 19BI/PE/CI15

CREDITS : 5

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To introduce the basic concepts of using chemical structure databases
- To apply the concepts and learn the use of Cheminformatics tools
- To understand the applications of Cheminformatics in drug design

COURSE LEARNING OUTCOMES

On Successful completion of the course, the student will be able to

- Gain skills to analyse the properties of small molecules
- Design the biological targets and properties of the small molecule under investigation
- Better understanding of the drug discovery and development process
- Apply the concepts to create novel leads

BIOPHYSICS

CODE: 19BI/PE/BP15

CREDITS: 5

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To give a basic understanding about the forces that determines the structure of biological macromolecules

- To provide knowledge about the techniques used in studying biological structure and function
- To understand the behaviour and properties of biological macromolecules

COURSE LEARNING OUTCOMES

On Successful completion of the course, the student will be able to

- Understand the importance of structural studies in bioinformatics
- Gain an insight about the forces that determines the structure of biological macromolecules
- Apply the knowledge gained to interpret the properties of biological macromolecules
- Apply the recent advances in Biophysical techniques in Life science Research

INTRODUCTION TO BIOINFORMATICS

CODE: 19BI/PE/IB23

CREDITS : 3

L T P : 3 0 0

TOTAL TEACHING HOURS : 39

OBJECTIVES OF THE COURSE

- To become familiar with bioinformatics and how it's changing complex biological research
- To enable textual mining of biological literature and bioinformatics tools that are required to query biological data
- To understand the application of information technology in biological research

COURSE LEARNING OUTCOMES

On Successful completion of the course, the student will be able to

- Better understanding of the bioinformatics concepts
- Emphasis the application of bioinformatics and biological databases to problem solving in real research problems
- Perform a complete analysis of the genes and protein
- Understand the evolutionary concepts related to biological query

APPLICATIONS OF BIOINFORMATICS

CODE: 19BI/PE/AP23

CREDITS : 3

L T P : 3 0 0

TOTAL TEACHING HOURS: 39

OBJECTIVES OF THE COURSE

- To be familiar with the use of a wide variety of internet applications and biological database
- To understand the basics of pharmacogenomics in the context of variability in drug response
- To introduce the basic concepts of using chemical structure databases
- To understand the application of information technology to immunology

COURSE LEARNING OUTCOMES

On Successful completion of the course, the student will be able to

- Examine factors that affect drug response and the application of pharmacogenetics to drug development and drug treatment
- Apply the immunological data and to the sophisticated computational solutions available for immunological research
- Emphasis the application of bioinformatics and biological databases to problem solving in real research problems

COMPUTER AIDED DRUG DESIGN

CODE: 19BI/PE/CD23

CREDITS : 3

L T P : 3 0 0

TOTAL TEACHING HOURS : 39

OBJECTIVES OF THE COURSE

- To understand the general pathway for drug discovery and development
- To define new methodologies for analysis of ligands with their bound protein target
- To gain an in-depth overview of methods and techniques applied in computer assisted drug design (CADD)
- To learn about computer-aided drug design, safety evaluation, bioavailability and clinical trials

COURSE LEARNING OUTCOMES

On Successful completion of the course, the student will be able to

- Identify the key elements in drug and explain new methodologies for drug design

- Describe the role and importance of the various disciplines involved in the different phases of drug discovery and development
- Review and evaluate preclinical and clinical pharmaceutical studies
- Follow new ideas in utilizing main approaches of ligand screening methods

PHARMACOGENOMICS

CODE:19BI/PI/PG24

CREDITS : 4

OBJECTIVES OF THE COURSE

- To understand the basics of pharmacogenomics in the context of variability in drug response
- To examine factors that affect drug response and the application of pharmacogenetics to drug development and drug treatment
- To analyse the tools and databases related to pharmacogenomics

COURSE LEARNING OUTCOMES

On Successful completion of the course, the student will be able to

- Gain an insight on pharmacology linked to genomics
- Assess genetic polymorphisms and their importance in drug designing
- Understand structural influence in the Drug response
- Analyse different tools for pharmacogenomic analysis including ADME prediction

SYSTEMS BIOLOGY

CODE: 19BI/PI/SB24

CREDITS : 4

OBJECTIVE OF THE COURSE

- To introduce the basic concepts of Systems biology
- To train the students in designing a new organism through modelling network concept and manipulating them for biological applications