

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

M.Sc. (Bio-Informatics)

Effective From 2007-08

Semester III

Paper No	Paper Title	Th./Pr Per week	External Exam Duration	Marks		
				Int.	Ext.	Total
SEMESTER - III						
BI301	Genomics	4 Hrs.	3 Hrs.	30	70	100
BI302	Proteomics	4 Hrs.	3 Hrs.	30	70	100
BI303	Database search, Analysis & Modeling	4Hrs.	3 Hrs.	30	70	100
BI304	Perl Programming	4 Hrs.	3 Hrs.	30	70	100
BI305	Java Programming	4 Hrs.	3 Hrs.	30	70	100
BI306	Practical	10Hrs.	5 Hrs.	45	105	150

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Semester - III

BI-301 : Genomics

Unit I

Genome Mapping

- Genetic mapping
- Physical mapping: Low resolution Physical mapping
High resolution Physical mapping

Unit II

Genome Sequencing

- Sequencing methods
- Whole genome Sequencing
- Partial sequence Analysis
- Assembly of Map and sequence reads

Unit III

gene prediction and annotation:

- gene prediction in prokaryote & eukaryote genome
- Methods of gene prediction and annotation
- Genome databases

Unit IV

Functional genetics

- Transcriptome analysis methods
- Microarrays and DNA chips
- Database of EST

Reference Book:

- (1) BLAST by Ian koof, M.Yandell, J. Bedell, O'Reilly
- (2) Genomics: Sci. & technol behind HGP (2000)
Edn. C Cantor & C.I. Smith, Wiley Interscience
- (3) Bio informatics: Sequence & Genome Analysis, Edn. David W. Mount
- (4) Genome Analysis: A Practical Approach(1995) by J.M.Daries OX.Uni.Press.
- (5) Genome mapping: A Practical Approach(1997) by P.H. Dear, OUP
- (6) Sequence Analysis by Scoft market &. D. Leon. O'reilly

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BI-302 : Proteomics

Unit-I

- Proteome & genome
- Protein domains & motifs, protein pattern
- Gene Ontology consortium
- Protein localization & function

Unit II

Tools of Proteomics – I

- Protein separation before digestion
- 1- D-SDS-PAGE, 2D-SDS-PAGE, preparative IEF, HPLC
- Tandem LC approaches, capillary electrophoresis

Unit III

Tools of Proteomics-II

- Mass spectrometry for protein & peptide analysis
- Protein identification by peptide mass finger printing
- Protein sequence analysis by TMS
- peptide sequence analysis by TMS-data

Unit-IV

Application of proteomics

- Mining Proteomics
- Protein expression profiling
- Identifying protein Protein interaction and protein complexes
- Mapping protein modifications

Reference Books:

- (1) Introduction to Proteomics: Tools for new Biology, 2002 By D.C. Leibler, Humana Press.
- (2) Proteomics by Palzkill, Timothy-Kluwer Acad-Publ. 2002.
- (3) Bioinformatics & Functional genomics, 2003. By J. Pevsner, Wiley-LISS.
- (4) Proteomics: From Proteins sequence to function, 2001 by Eds. S. Pennington, M.J. Dum, Springer Publ.

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Semester - III

BI-303 : Database search, Analysis & Modeling

Unit-I

- Primary Structure (Sequence)
- Databases
- Genome Database search
- Protein Database search

Unit-II

- Sequence Alignment Analysis
- Pair-wise sequence Alignment
- Multiple sequence alignment

Unit-III

- Phylogenetic Analysis
- Secondary structure analysis
- Motifs, Domains & Profiles
- Protein classification and modelling

Unit-IV

- Disease gene identification
- Genetic variations & genetic diseases
- Genetic testing and therapy

Books:

- (1) Bioinformatics: From genome to drugs by Thomas Lengner.
- (2) Bioinformatics: Sequence and genome analysis by David W. Mount.
- (3) Structural Bioinformatics: By Philip E. Bourne & Helge Weising.
- (4) Fundamentals of Bioinformatics: By Dan E. Krane & Michael L. Raymer.

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Semester - III

BI-304 : Perl Programming

UNIT - I

- Introduction to Perl
 - What is Perl?
 - Perl Interpreter
 - Variables and Data Types
- Arrays and Hashes
 - Arrays
 - Array Manipulation
 - Hashes
 - Maintaining Hash
- Control Structures
 - Comparison
 - Branching
 - Loops

UNIT - II

- Subroutines
 - Creating Subroutine
 - Arguments
 - Passing arguments with reference
- String Manipulation
 - Array Based Character Manipulation
 - Regular Expression
 - Patterns
- Input and Output
 - File I/O
 - Filehandles
 - Built in file handles
 - File Safety
 - Input Operators
 - Binary I/O
 - Inter process Communication
 - Processes
 - Process Pipes
 - Creating Processes
 - Monitoring Processes
 - Implicit Forks

UNIT - III

- Modules and Packages
 - Modules
 - Packages
 - Combining Modules and Packages
 - Included Modules
 - Comprehensive Perl Archive Network (CPAN)

UNIT - IV

- Object Oriented Perl
 - Perl Objects
 - Rule Number One
 - Rule Number Two
 - Rule Number Three
 - Methods
 - Constructors
 - Accessors
- Bioperl
 - Sequences
 - SeqFeature
 - Annotation
 - Sequences I/O
 - Cool Tools

Reference Books

1. D. Curtis Jamison, “Perl Programming for Bioinformatics and Biologist”, Wiley – Dreamtech India
2. James Tisdall, “Beginning Perl for Bioinformatics”, O-Reilly
3. Cynthia Gibs, “Developing Bioinformatics Computer Skills”, O-Reilly
4. Randal L Schwartz, Tom Phoenix, “Learning Perl”, O-Reilly
5. Larry Wall, Tom Christiansen, Jon Orwant “Programming Perl”, O-Reilly
6. Sriram Srinivasan “Advance Perl Programming”, O-Reilly

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Semester - III

BI-305 : Java Programming

UNIT - I

- Internet and Java Language
 - Introduction to Internet
 - Introduction to Java Phenomenon
 - Features of Java
 - Java Developer's Kit
 - Java Compiler
 - Java Interpreter
 - Java Debugger
 - Applet Viewer
 - Comparison of Java with C++
- Java Language Introduction
 - Variables
 - Data Types
 - Arrays
 - Operators
 - Flow Control

UNIT – II

- Classes and Objects
 - Simple Class
 - Fields
 - Access Controls
 - Object Creation
 - Construction and Initialization
 - Methods
 - This
 - Overloading Methods
 - The main method
 - Extended Class and constructor in Extended Class
 - Inheriting and redefining members
 - Type computability and conversion

UNIT – III

- Interfaces
 - Introduction to Interfaces
 - Interface declaration

- Inheriting and Hiding Constants
- Inheriting Overloading and Overriding Methods
- Interface Implementation
- Exceptions
 - Introduction to Exception
 - Creating Exception Types
 - throw
 - throws
 - try, catch and finally
- Strings
 - Basic String Operations
 - String Comparison
 - StringBuffer Class

UNIT – IV

- Threads
 - Introduction to Threads
 - Creating Threads
 - Runnable
 - Synchronization
 - wait, notify and notifyall
 - Thread scheduling
 - Deadlocks
 - volatile
 - Threads and Exceptions
- Garbage Collection and Memory
 - Garbage Collection
 - Finalization
 - Interacting with Garbage Collector
 - Reachability States and Reference Objects
- Packages
 - Package Naming
 - Type Imports
 - Package Access
 - Package Contents
 - Package Object and Specification
- The I/O Package
 - Byte Stream
 - Character Stream
 - InputStream reader and OutputStream Reader
 - Stream Classes
 - The data byte stream
 - Files
 - Object Serialization
 - IOException Classes
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UNIT - V

- Applets
 - Introduction to Applets
 - Applet Life Cycle
 - Abstract Window Toolkit (AWT) Class
 - Labels
 - Buttons
 - Text Fields
 - Text Areas
 - Check Boxes
 - Choice List
 - Layout Managers
 - Event Handling
- Networking
 - Inetaddress
 - Datagrams
 - Socket for Clients
 - Socket for servers
 - Client Server Interaction with Stream Socket Connection
 - URL Manipulation
 - Overview of Java Database Connectivity

Reference Books

1. Java Programming Language Third Ed., Arnold James Gosling, David Holmes, Addition Wesley
2. Java – The Complete Reference, Patrick Naughton, Tata McGraw Hill
3. Experiments with Java : An Introductory Lab Manuals, S.A. Robelsky – Addition Wesley
4. Java 2 From Scratch, Stevens Halmes, PHI
5. Complete Reference, Peter Naughten, Tata McGraw Hill

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BI-306 : Practicals

Practical shall be based on paper no. 303 to 305. Separate journal are to be prepared for each subject individually.