

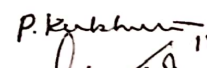
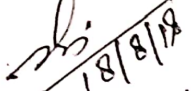
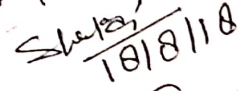

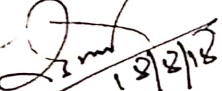
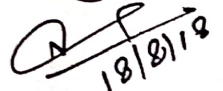




ग्वालियर, दिनांक 18 अगस्त, 2018

बायोइ-फरमेटिक्स विभाग
अध्ययन मंडल की बैठक का कार्यवाही विवरण

नवीन सत्र 2018-19 हेतु बायोइ-फरमेटिक्स विषय से सम्बंधित
अध्ययन मण्डल की बैठक आज दिनांक 18 अगस्त, 2018 को प्रातः 11:00 बजे
वनस्पति विभाग में आयोजित की गई, जिसमें निम्नानुसार उपस्थिति रही -

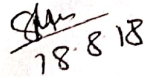
1. डॉ. स्नाथना पांडेय 
2. डॉ. जी. एम कुलशेखर
3. डॉ. मधुलक्ष्मी शर्मा  18.8.18
4. डॉ. प्रीति कुलशेखर  P. Kulkarni 18/8/18
5. डॉ. एस एस कुशैली  18/8/18
6. डॉ. शक्ति मारुटाज  Shakti 18/8/18
7. डॉ. जी. एम डे एस प्रसाद  18/8/18
8. डॉ. वैद प्रकाश  18/8/18
9. डॉ. किशोर विंदे - अनुपस्थित
10. डॉ. विशाल कदम  18/8/18
11. डॉ.
12. डॉ.

अध्ययनमंडल की बैठक की कार्यवाही निम्नानुसार रही -

1. ~~बायोइन्फरमेटिक्स~~ विषय के स्नातक स्तर के प्रथम एवं द्वितीय वर्ष का पाठ्यक्रम अंक योजना सहित सत्र 2018-2019 हेतु अध्ययनमंडल द्वारा मान्य किया जाता है।
2. ~~बायोइन्फरमेटिक्स~~ विषय के स्नातक स्तर के पंचम एवं षष्ठ सेमेस्टर के पाठ्यक्रम अंक योजना सहित सत्र 2018-2019 हेतु अध्ययनमंडल द्वारा मान्य किया जाता है।
3. ~~बायोइन्फरमेटिक्स~~ विषय की सत्र 2018-2019 में होने वाली परीक्षाओं हेतु संलग्न परीक्षकों की सूची को अध्ययनमंडल द्वारा मान्य किया जाता है।
4. विभाग में सत्र 2018-2019 में यदि कोई शोध संगोष्ठी/कार्यशाला/अधिवेशन/अध्ययन भ्रमण आदि के आयोजन का प्रस्ताव है तो उसका विवरण एवं अनुमोदन
~~रक्षानीय शैक्षणिक/शोध संस्थानों में प्रथम~~
~~विषय विशेषज्ञों द्वारा व्याख्यान (05)~~
~~र-विस्तार ईक्स पर प्रतियोगिताएं।~~
5. यदि अन्य कोई विषय हो तो उसका विवरण एवं अनुमोदन।

हस्ताक्षर अध्ययन मंडल अध्यक्ष एवं समस्त सदस्य


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2017 – 2020

Structure of B.Sc. Programme (3 Years Degree Course)

Subject – Bioinformatics (as one subject)

YEAR	PAPER(S)	Maximum Marks		
		Total	CCE	External
I	BI 101 : Introduction to Bioinformatics	100	10	40
	BI 102: Concepts in Bioinformatics		10	40
	BI 103: Practical	50	-	50
II	BI 201: Introduction to Computers and Programming	100	10	40
	BI 202 : Structural Bioinformatics		10	40
	BI 203 :Practical	50	-	50
III	BI 301 : Biostatistics	100	10	40
	BI 302 : Mathematics for Biological Sciences		10	40
	BI 303 : Practical a) Practical Work b) Project Work	50	-	50 25 25

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B.Sc. FIRST YEAR
THEORY PAPER 1

BI 101: INTRODUCTION TO BIOINFORMATICS

mm - 40

Objectives: To enable students to learn important databases and tools commonly employed to Bioinformatics.

UNIT I Introduction

Definition, History, Branches of Bioinformatics, Aims, Scope & research Areas, Human genome project, Role of computer in Bioinformatics, Bioinformatics in India, BIO-IT-The Flourishing future. Application of bioinformatics.

UNIT II Introduction to database

Introduction to genomics & proteomic data, Post genomics era, Data acquisition –functions and purposes, Biological databases-relational and object orient concepts. Information retrieval, concepts of digital libraries, information retrieval from biological databases ENTREZ-SRS, Methods for presenting large quantities of data, sequence viewer, structure viewer, RASMOL, ligand explorer.

UNIT III Introduction to Nucleic Data Bases

Primary & Secondary Data Base, gene banks, ENBC nucleotide, sequence data bank- DDBJ- RNA sequence data bases: 16S & 23S rRNA, Mutation data bases, HIV sequence data base, NON CODE sequence submission tools, sequin, webin, sqkura, bank etc.

UNIT IV Protein sequence data bases

Protein sequence data bases – PIR, SWISSPROT, UNIPROT-Tr EMBL, EXPASY, NCBI, Protein, Databases – PRF, UNIPROT-MIPS-O/P-protein sequence motif database, E blocks- eblocks- PROSITE, PROTEIN DOMAIN, databases, ADDA, INTERPRO, Pfam-protein

UNIT V Introduction to structure data bases

PDB- PDBSum SCOP-CATH-MMDB-EMSD-SWISS-MODEL repository-ModBase-Protein MODEL portal, Eurocarb DB-DIP-BNND, STRNG

Books Recommended:

- 1 Orpita Basu & Simminder Kaur, Thakural " Bioinformatics Databases, Tools, Algorithm, 2007 Oxford University Press"
- 2 Higgins, D. Willie, Taylor " Bioinformatics; Sequence, Structure and Data bank, A Practical Approach, 2000, 1st Ed, Oxford University Press
- 3 Allwood T, David Parry-Smith ; Introduction to bioinformatics, 2008 Pearson Education, Singapore D.ED.
- 4 Murthy, C.S.V., 2016, Himalaya Publishing House

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THEORY PAPER 2

BI 102: CONCEPTS IN BIOINFORMATICS

MM - 40

Objectives: To provide students with foundation in the important concepts of Bioinformatics.

UNIT I

Introduction, sequence alignment, Scoring matrix, PAM, BLOSUM, Gaps and Gap penalties, Different Gap weights, Biological significance of Gaps.

UNIT II

Pairwise sequence alignment, DotPlot analysis, Dynamic programming, Needleman-Wunch algorithm, Smith-Waterman algorithm, Edit distance dynamic programming, Database similarity search, BLAST, FASTA.

Multiple sequence alignment, sum of pairs, Divide and Conquer, Progressive and Iterative alignment, ClustalW, TCPFFEE, Profile methods, Gribskov profile, PSI_BLAST.

UNIT III

Phylogenetic relationships, Clustering and Phylogeny, Phylogenetic analysis, Concept of Phylogenetic Tree, Methods of Phylogeny analysis, Distance and character based methods, Motif detection, Protein family databases.

UNIT IV

Data mining, Introduction, Definition, Data mining problems, Cluster analysis, Data mining techniques, Tools and Methods. Management of Databases. DBMS, Difference between DBMS and file system.

UNIT V

Metabolic pathway database (KEGG pathway database), Concept of Metabolome and Metabolomics, Drug discovery and Design, Target identification, Target validation, Lead identification, Lead Optimization, Preclinical Pharmacology and Taxology, Chemoinformatics tools for Drug discovery, Chemical structure representation (SMILE & SMART), Chemical databases: CSD, ACD, WDI, ChEMBL, PUBCHEM.

Books Recommended:

- 1 Orpita Basu & Simminder Kaur, Thakural " Bioinformatics Databases, Tools, Algorithm, 2007 Oxford University Press"
- 2 Higgins, D. Willie, Taylor " Bioinformatics; Sequence, Structure and Data bank, A Practical Approach, 2000, 1st Ed, Oxford University Press
- 3 Allwood T, David Parry Smith; Introduction to bioinformatics, 2008 Pearson Education. Singapore D.ED.
- 4 Murthy, C.S.V., 2016, Himalaya Publishing House
- 5 Ghosh, Z and Mallick, B, 2008, Bioinformatics - Principles and Applications

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BI 103: PRACTICAL**LIST OF PRACTICALS**

1. To explore NCBI.
2. To explore GenBank .
3. To compare data files from NCBI, DDBJ and EMBL.
4. To Perform Sequence alignment using online Blast.
5. To Perform Sequence alignment using offline Blast.
6. To Perform Sequence alignment using Fasta.
7. To Explore PDB.
8. Perform sequence alignment using clustal w.
9. Study phylogenetic relationship using phylip
10. Draw phylogenetic tree using MEGA
11. Find motif using motif search
12. Study drug bank database
13. Explore secondary database prosite and pfam
14. Study OMIM database

(Note: 75% of the practicals from the prescribed list should be completed every year)

Scheme for Practical Examination

1. Major Exercise	15 Marks
2. Minor Exercise	10 Marks (05+05)
3. Spotting (Related to theory papers)	10
4. Viva-voce Examination	10
5. Lab Journals (Sessionals)	05
TOTAL MARKS	50

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B.Sc. SECOND YEAR

THEORY PAPER 3

MM - 40

BI 201: INTRODUCTION TO COMPUTERS AND PROGRAMMING

Objective: To equip students with fundamental knowledge and concepts of Computers and Basic Programming Skills.

UNIT I Introduction to Computers

Overview and function of computers, Characteristics of computers, History of Computers, Evolution. Generation of Modern Computers, Classification of Computers, Micro-computers, Mini computers, Main Frame, Super computers, Special purpose computer (Comparison in their memory, power, cost and Size), PC types, Tower, Desktop, Notebook, Laptops, Handheld, Palmtop, PDA, Types of Modern Computers, Workstations, Servers.

UNIT II Computer components and Number System

Components of a computer, Input devices, Output device, CPU, Memories (RAM and ROM), Secondary storage devices, Hard Disk, Magnetic tapes, Zip drives, Digital tapes, CD-ROM, DVD, BluRay, Number system , introduction, Decimal , Binary, Octal, Hexadecimal number systems and their inter conversion.

UNIT III Operating system (OS) and software Development

Hardware and Software definitions, Introduction to O/S, Functions, Classification real time, single user single task, single user multi task, Basic description about DOS, WINDOWS, Windows server NT/2000, UNIX/LINUX, MVS, Overview of Software development. Software development phases, problem definition, analysis, algorithm design and representation, coding and debugging (simple description about each phase).

UNIT IV Flow charts, Pseudo codes and Programming Languages

Basic flowchart symbols and their meaning, Pseudo codes, definition and importance, Syntax and Semantics, Programming approaches, Procedural, Object oriented programming languages, Definition, categories, low level languages, Machine language, Assembly language, Advantages and disadvantages, High level languages, Advantages and disadvantages, Interpreters, Compilers and Translators, Overview of compilation process, Types of High level languages. Introduction to Pearl.

UNIT V Multimedia and Internet

Multimedia, Introduction, Characteristics, Elements and Applications, The internet and its resources, World Wide Web(WWW), Associated tools, services, resources and various terminologies, An overview of Computer viruses, virus definitions, symptoms, transmission, danger and general precautions.

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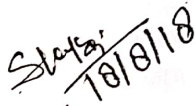
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Recommended Books:

1. Glenn Brookshear J., "Computer Science: An Overview", 2011 11th ed, Addison Wesley Publishers.
2. Alexis Leon & Mathews Leon, "Fundamentals of Information Technology". 2009, 2nd ed, Vikas Publishing House Pvt. Ltd.
3. Rajaraman V, " Fundamentals of Computer", 2004, 4th ed, Prentice Hall India Pvt. Ltd.
4. Francis Glasborrow & Roberta Allen, " A Beginner's Introduction to Computer Programming", 2003, John Wiley and Sons.
5. Anurag Seetha, " Introduction to Computers and Information Technology", 2005 Ram Prasad and Sons Bhopal
6. Basandra S.K., " Computer Today", 2011, 1st ed, Ga

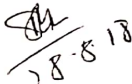

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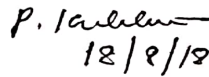

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THEORY PAPER 4

BI 202: STRUCTURAL BIOINFORMATICS

MM-40

Objectives: To understand the levels of structural organization of macro molecules and experimental methods of structural determination. To know the approaches for structural analysis.

UNIT I Macromolecular structure

Nucleic acids – DNA and RNA, Protein-Primary, secondary, tertiary and quaternary structures, Amino acids, Ramchandran plot.

UNIT II Macromolecular Interactions

Protein-Protein, Protein- Nucleic acid, Protein- Carbohydrates, Structure of Ribosome.

UNIT III Principles of Protein folding

Overview of experimental techniques to study macro molecular structure, Methods to study 3D structure – X-ray, NMR, Cryo electron microscopy, Microarray., MALDI-TOFF.

UNIT IV Proteomics

Proteomics, Homology modelling, Protein tertiary structure, Prediction, Methodology

UNIT V Genomics

Introduction, Genome mapping, assembly annotative and comparison, Comparative Genomics, Free of life and some completed Genomics, Drug research in the era of Genome sequencing.

Books Recommended:

- 1 Watson, J.D., Baker, T.A., Bell, S.P. et al., 2008, Molecular Biology of the Gene, Cold Spring Harbor, New York.,
- 2 Sheehan, D. 2010, Physical Biochemistry: Principles and Applications, Wiley Blackwell
- 3 Baxevanis, A.D. and Ouellette, B.F., 2005, Bioinformatics – A Practical Guide to the Analysis of Genes & Proteins, John Wiley & Sons, Inc, USA.

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BI 203: PRACTICAL

LIST OF PRACTICALS

1. String concatenation
2. Using perl perform translation
3. Using Perl perform transcription
4. Perform parsing of BLAST output and PDB file using perl.
5. To perform C/C++ line/circle Computer Graphic program.
6. Find ORF's in all six reading frames of a given DNA sequence.
7. To access the SCOP database to study protein classification.
8. To access CATH database.
9. To determine similarities and differences between the PDB entries of the protein which have been identified by X-ray crystallography and NMR.
10. To conduct secondary structure prediction using J-Pred secondary structure prediction server.
11. Predict secondary structure using GOR server.
12. Explore HSSP or FSSP databases.

(Note: 75% of the practical from the prescribed list should be completed every year)

Scheme for Practical Examination

1. Major Exercise	15 Marks
2. Minor Exercise	10 Marks (05+05)
3. Spotting (Related to theory papers)	10
4. Viva-voce Examination	10
5. Lab Journals (Sessionals)	05
TOTAL MARKS	50

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B.Sc. III YEAR (BIOINFORMATICS)

Semester -V

Session -2017-18

Paper-V-Computer Graphics , Machine Learning and Bioperl

M.M. 85

Unit I

- Color Models: CMY,HSV, RGB, Visualization techniques,
- Graphics display devices, Raster and Random scan devices, color CRT monitors, LCD and LED.
- Generation of lines , circles, Polygons and color filling using standard functions in C.
- Geometric transformations : Rotation, Scaling, Translation (2D)

Unit II

- Artificial Neural networks,
- Genetic algorithm,
- Bayesian Modeling,
- Monte Carlo Simulation method,
- Markov Models and their application.

Unit III

- Perl basic: Variables, Perl operations, A program to store DNA sequence, Concatenating DNA fragment, transcription : DNA to RNA.
- Subroutines, scoping and subroutines,
- Command-line arguments and arrays passing data to subroutines.
- Modules and libraries of subroutines, fixing bugs.

Unit IV

- Random number generators a program using randomization,
- A program to simulate DNA Mutation, generating random DNA, analyzing DNA,
- Hashes, data structures and algorithms for biology, the genetic code.

Unit V

- Translating DNA into proteins reading DNA from files in FASTA format, reading frames,
- Regular expressions, restriction maps and restriction enzymes, Genbank files,
- Genbank libraries, separating sequence and annotation parsing, Annotations indexing, parsing PDB files, parsing BLAST files.
- Concept of Bioperl

Practical List

1. Explore species 2000
2. String concatenation
3. Using perl perform translation
4. Using Perl perform transcription
5. Perform parsing of BLAST output and PDB file using perl.
6. To perform C/C++ line/circle Computer Graphic program.
7. Find out evolutionary relationship using Treeview/phylip package.

Practical Exam Scheme

Any three practicals from the above list each carrying 8 marks

Spotting

Viva

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10
5+5

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B.Sc. III YEAR (BIOINFORMATICS)

Semester -VI

Session -2017-18

Paper-VI- Informatics in Genomics and application

M.M. 85

Unit I

- Genomics: Genome Annotation, Genome Assembly, Structural and Functional Genomics, Comparative genomics.
- Microarray : technique, Design, Analysis,
- Drug target identification.

Unit II

- System Biology: Introduction, associated disciplines, Interactomics (PPI), Fluxomics, Biomics,
- Metagenomics : Introduction, metagenome, shotgun metagenomics (pyrosequencing). Tool's in metagenomics, MEGAN, MG-RAST and SEED. Application : gene survey, Environmental genomes, Microbial diversity

Unit III

- Metabolic pathway database (KEGG pathway database), Concept of metabolome and metabolomics,
- Drug Discovery and Design: Target identification, target Validation, Lead Identification, Lead Optimization, preclinical Pharmacology & taxonomy.

Unit IV

- Chemoinformatics : Chemoinformatics tools for drug discovery, Chemical Structure Representation (SMILE & SMART),
- Chemical databases : CSD, ACD, WDI, ChemBank, hazardous chemical database, PUBCHEM

Unit V

- Quantitative Structure Activity Relationship (2D & 3D), Combinatorial libraries & their design,
- High throughput screening, virtual screening, Lipinski's rule of five,
- Phylogeny, Introduction to phylogenetic analysis, Concept of Phylogenetic tree.

Practical List

1. Explore Kegg Database
2. Explore Drug bank database
3. Explore Pubchem database
4. Explore MG-RAST and SEED
5. Access to the latest curated datasets using SEED viewer
6. Generate a chemical structure using SMILE (Pubchesketcher)

Practical Exam Scheme

Any three practicals from the above list each carrying 8 marks	24
Spotting	06
Viva	10
Practical record/collection	5+5

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INDUSTRIAL MICROBIOLOGY
(UG Self finance Course) 2016-17

LIST OF EXAMINERS

Sr. No.	Name	Address	Mob. No.
1	Prof Shashi Chauhan	Retd.Prof. SOS Jiwaji Uni. Gwl	
2	Prof. Rekha Bhadoria	Prof. SOS Jiwaji Uni. Gwl	
3	Prof. R.M.Agrawal	Prof. SOS Jiwaji Uni. Gwl	
4	Prof. Avinash Tiwari	Prof. SOS Jiwaji Uni. Gwl	
5	Prof. M.K.Gupta	Prof. SOS Jiwaji Uni. Gwl	
6	Dr. Sushil Manderia	SOS Jiwaji Uni. Gwl	
7	Dr. Sapan Patel	SOS Jiwaji Uni. Gwl	
8	Dr. Archana Shrivastava	Director, CHRI Gwalior	
9	Dr. R.A.S. Chauhan	PG College Ambah	
10	Prof. B.M.Kulshreshtha	Govt. KRG College Gwalior	
11	Prof. Madhu Laxmi Sharma	Govt. KRG College Gwalior	
12	Prof. Sadhna Pandey	Govt. KRG College Gwalior	
13	Mrs. Charanjit Mehta	Govt. VRS College Morar	
14		Govt. KRG College Gwalior	
15	Dr. Preeti Kulshreshtha	Govt. KRG College Gwalior	
16	Dr. S.H.Qureshi	Govt. PG College Shivpuri	
17	Dr. A.C.raghuvanshi	Govt. Sci. College Gwalior	
18	Dr. H.O.Sharma	Govt. Sci. College Gwalior	
19	Dr. R.K.S. Kushwaha	Govt. PG College Morena	
20	Dr. R.K.Khare	Govt. Sci. College Gwalior	
21	Dr. V.K.Sewaria	Govt. Sci. College Gwalior	
22	Dr. D.P.Sharma	Govt. Sci. College Gwalior	
23	Prof. Deep Azad	Govt. SLP College Morar	
24	Dr. B.B.Gupta	Govt. SLP College Morar	
25	Dr. J.K.Mishra	Govt. PG College Morena	
26	Dr.R.P.Singh	Govt. PG College Morena	
27	Dr.S.K.Raina	Retd. Prof. PGV College Gwl	
28	Dr. Rajbeer Singh	K.K.College Etawah	
29	Dr. Reena Jain	Boston College Gwalior	
30	Dr. Madhu Gupta	CHRI Gwalior	
31	Dr. Usha Duseja	CHRI Gwalior	
32	Dr. P.P.Deo	Govt. Sci. College Gwalior	
33	Dr. Kusum kashyap	Govt. Girls College Chhatarpur	
34	Dr. K.K.Dubey	Retd . Prof.	
35	Dr. Sushil Sharma	Scientist, DRDO Gwalior	
36	Prof. Ragini Gothwal	Barkatullah Uni. BPL	
37	Dr. Surnhi Shrivastava	Gargi College Delhi	
38	Dr. Sangeeta Shrivatava	Pri. Sci. Indian Institute of Sugarcan Research Lucknow	
39	Dr. Sanjeev Kumar	Pri. Sci. Indian Institute of Sugarcan Research Lucknow	
40	Dr. Alka Pandey	Govt. PG College Betul	
	Kailash Narayan Bhatnagar		

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