DEPARTMENT OF BIOTECHNOLOGY

COURSE STRUCTURE & SYLLABI
(For the students admitted from year 2023-2024 onwards)

Programme : POST GRADUATE DIPLOMA IN BIOINFORMATICS (P.G.D.B.I)
(COURSE DURATION: ONE YEAR)

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TIRUCHIRAPPALLI – 620 020

POST GRADUATE DIPLOMA IN BIOINFORMATICS (P.G.D.B.I)
(COURSE DURATION: ONE YEAR)

Sem	Course Code	Course Category	Course Title	Ins. Hrs/ Week	Credit	Marks		Total
						CIA	ESE	
I	23PDBI1CC1	Core - I	Fundamental of Bioinformatics	6	4	25	75	100
	23PDBI1CC2	Core - II	Statistics for Bioinformatics	6	4	25	75	100
	23PDBI1CC3	Core - III	Basic Structural Biology	6	4	25	75	100
	23PDBI1CC4	Core - IV	Computer Programming	6	4	25	75	100
	23PDBI1CC5P	Core - V	C Programming and Web Publishing - Practical	6	4	20	80	100
	Total			**30**	**20**	**120**	**380**	**500**
II	23PDBI2CC6	Core - VI	Database Management Systems	6	4	25	75	100
	23PDBI2CC7	Core - VII	Genomics and Proteomics	6	4	25	75	100
	23PDBI2CC8	Core - VIII	Computational Biology	6	4	25	75	100
	23PDBI2CC9	Core - IX	Molecular Modelling and Drug Design	6	4	25	75	100
	23PDBI2CC10P	Core - X	Bioinformatics - Practical	6	4	20	80	100
	Total			**30**	**20**	**120**	**380**	**500**
Grand Total				**60**	**40**	**240**	**760**	**1000**

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23PDBI1CC1	Core - I	6	4	25	75	100

Course Title	Fundamental of Bioinformatics

SYLLABUS		
Unit	**Contents**	**Hours**
I	Bioinformatics – an Overview, Definition – Scope and History of Bioinformatics Networks – Internet in Bioinformatics, *EMBnet – Commercial Databases and Software's*, Intranet and Internet Packages. Role of Bioinformatics	18
II	Languages – Basics of C Programming, Array, Structure and Function. Perl – Basics, String handling. HTML – Basics, Text handling, Image handling, Links and Tables. *XML – Basics, data binding and record sets*.	18
III	Introduction to Biological database – Protein Information Resources – Biological Databases, Primary Sequence Databases, Protein Sequence Databases, and Nucleotide Sequence Database- *Secondary Databases, Metabolic pathway databases*.	18
IV	Genome Information Resources – DNA sequence Databases – EMBL DDBJ, Genbank GSDB (Genome, Sequence Database), *UniGene-Comprehensive microbial Resource*, Sequence alignment – local and global alignment.	18
V	Evolution of Bioinformatics – Scope – Potentials of Bioinformatics, Human Genome Project – Application of Bioinformatics *Bioinformatics in India – Future of Bioinformatics*. Cheminformatics – Ayurinformatics.	18

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Text Book(s):

1.Attwood T.K and D.J. Parry-Smith, Introduction to Bioinformatics, Pearson Education Ltd., New Delhi, 2004.

2 .Arthur M. Lesk, Introduction to Bioinformatics, Oxford University Press, NewDelhi2003.

Reference Book(s):

1. S.R. Swindell, R.R. Miller and G.S.A. Myers (Eds.), Internet for the Molecular Biologist, Horizon Scientific Press, Wymondham, UK, 1996.
2. Andrea Cabibbo, Richard Grant and Manuela Helmer-Citterich (Eds.), The Internet for Cell and Molecular Biologists (2nd Edn.), Horizon scientific Press, Norwich, UK, 2004.

Web Resource(s):

1. https://www.epictraining.ca/course/15958/biological databases/-distance
2. https://bioinformatics.mit.edu/

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Identify the scope of Computational Biology and Bioinformatics.	**K3**
CO2	Ability to design programs with interactive Input and Output program c.	**K5**
CO3	Demonstrate the biological information. Retrieval methods for DNA sequence.	**K4**
CO4	Gain the knowledge Major Biological Databases and Information.	**K6**
CO5	Determine the analysed molecular biology, clinical medicine and other disciplines.	**K4**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	**3**	**2**	**2**	**2**	**2**	**2**	**1**	**2**	**3**	**2**	**2.1**
CO2	**3**	**2**	**3**	**2**	**2**	**1**	**1**	**2**	**3**	**2**	**2.1**
CO3	**2**	**3**	**2**	**3**	**3**	**1**	**1**	**3**	**3**	**2**	**2.3**
CO4	**2**	**3**	**2**	**3**	**2**	**1**	**1**	**3**	**2**	**3**	**2.2**
CO5	**3**	**3**	**2**	**3**	**2**	**3**	**1**	**2**	**3**	**2**	**2.4**
Mean Overall Score											**2.2**
Correlation											**Medium**

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. J. Sebastin Raj

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23PDBI1CC2	Core - II	6	4	25	75	100

Course Title	Statistics for Bioinformatics

SYLLABUS		
Unit	**Contents**	**Hours**
I	Measures of central Tendency – Arithmetic Mean – Median – Mode – Quartiles – Range – *Quartile deviation – Mean deviation* Quartiles – Calculation of Quartiles – Standard Deviation.	**18**
II	Probability – Frequency Theory of Probability – Limitations – View of Probability – Addition Theorem – Multiplication Theorem - *Baye's Theorem and related problems*.	**18**
III	Theoretical Distributions – Binomial, Poisson and Normal – Importance of Normal Curve * fitting of the Distributions and its properties - Z-score, P-value and E-value*.	**18**
IV	Theory of Attributes – Introduction – Dichotomy – Consistency of Data – Independence of Attributes – Association of Attributes – *Rules coefficient of Association*.	**18**
V	Sampling Distributors – Large and small sample tests – Theories of probability, Student's t^2 test, X^2 test, F-test – and chi square test for goodness of fit.*Normal test and their applications*.	**18**

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Text Book(s):

1. Pillai R.S.N and V. Bagavathi and S. Chand Statistics, 1984.
2. Gupta S.C and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11th Edition, Sultan Chand & Sons, New Delhi, 2002.

Reference Book(s):

1. Robert R. Sokal and F.J. Rohlf, Introduction to Biostatistics (Biology- Statistics Series), W.H. Freeman & Company, New York, 1987.
2. Forthofer, L., Introduction to Biostatistics, Academic Press, 1995.
3. Gupta, S.P., Statistical Methods, Sultan Chand & Sons, 1996.

Web Resource(s):

1. https://nptel.ac.in/courses/statistics 102103012/

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Determine the category of measures of central tendency, dispersion and correlation for analysis of data.	**K5**
CO2	Improve the new concepts of probability and random variables.	**K6**
CO3	Identify the application some standard distributions and their properties.	**K3**
CO4	Gain the knowledge about frequency theory of probability and its related problems.	**K5**
CO5	Intellectual about the rule's coefficient of association.	**K3**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	2	2	2	2	2	3	2	2.2
CO2	3	2	3	2	2	2	2	2	3	2	2.3
CO3	2	3	2	3	3	2	2	3	3	2	2.5
CO4	2	3	2	3	2	2	1	3	2	3	2.3
CO5	3	3	2	3	2	3	1	2	3	2	2.4
Mean Overall Score											**2.34**
Correlation											**medium**

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. T. Nargis Begum

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23PDBI1CC3	Core - III	6	4	25	75	100

Course Title	Basic Structural Biology

SYLLABUS		
Unit	**Contents**	**Hours**
I	Cell Structure and Ultra cell structure of Prokaryotic and Eukaryotic cells – Cell wall – cell membrane – Biomembranes – Organelles. – Diffusion – *Active and Passive Transport*.	**18**
II	Carbohydrates – Classification Types – Structure – Function. Lipids – Classification Types – Structure – Function.	**18**
III	Introduction and Physiochemical Properties of Nucleic Acids – DNA and RNA. Watson and Crick Model of DNA and the different forms of DNA.RNA structure – Principles and Prediction.*Gene Structure*.	**18**
IV	Classification of amino Acids. Classification and three - Dimensional structure of proteins. Overview of protein structure – Primary, Secondary, Tertiary and Quaternary structures.*Ramachandran plot and bonds stabilizing protein structure*.	**18**
V	Principles of Structural Organization and Conformational Analysis. Prediction of protein structure - Modeling homology, Chou and Fasman method. Basic Principles of X-ray Diffraction Studies, *NMR, Mass Spectroscopy in Identifying Protein Conformation*.	**18**

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Text Book(s):

1. Horst FriebolinWitey, Basic One & Two dimensional NMR Spectroscopy–VCH – 1990.
2. Van Holde, Principles of Physical Biochemistry –Prentice Hall. 2006.

Reference Book(s):

1. Lehninger, David L. Nelson, Michael M. Cox., Principles of Biochemistry – 3rd Edition Macmillan worth Publishers, 2000.
2. G.E. Shultz and R.H. Schirmer, Principles of Protein structure, Springer –Verlag, New York. 2002.

Web Resource(s):

1. https://nptel.ac.in/courses/102103012/

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Adapt the basic and fundamental concepts of cell biology.	**K6**
CO2	Explain the knowledge in basic energy sources.	**K5**
CO3	Apply the principle, Physiochemical properties, structure of nucleic acids.	**K3**
CO4	Appraise the basic science of Protein structure including mechanisms.	**K5**
CO5	Formulate the key experimental processes required to evaluate protein structure, functions and to apply them to solve biochemical problems.	**K6**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	3	3	2	3	3	2	3	3	3	2.8
CO2	3	2	3	2	2	2	2	2	3	2	2.3
CO3	2	3	2	3	3	2	2	3	3	2	2.5
CO4	2	3	2	3	2	2	2	3	2	3	2.4
CO5	3	3	2	3	2	3	2	2	3	2	2.5
Mean Overall Score											2.5
Correlation											High

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. K. Gobalan.

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23PDBI1CC4	Core - IV	6	4	25	75	100

Course Title	Computer Programming

SYLLABUS		
Unit	**Contents**	**Hours**
I	Block diagram of computer (input and output devices) generation – advantages and limitations of computers – Basics of operating systems DOS, Windows NT and XP, UNIX – *Application software's*.	**18**
II	Introduction to internet, service on internet – internet tools, HTML, text formatting –Adding images – Tables – Frames to web pages. Web services – WWW, URL, DNS – Servers, WEB servers, Browsers, IP Addressing, Communication Technology – Networking: LAN, *WAN and MAN, wireless communication*.	**18**
III	Identifiers and keywords – Constants, Variables and data types – *Operations and Expression – Data input and output*.	**18**
IV	Control structure – If and Switch statement – While, Do – While and for statements – Goto statement, *Arrays - 1 D array -2 D array*.	**18**
V	Web Publishing Internet – WWW – Designing web site – Basics of creating a web page with HTML – Linking – Text formatting – *Adding Images and background to HTML pages – Tables– Image maps*. Function – User defined functions – Defining and assessing functions – Passing arguments - Functions prototypes – character strings – string functions – recursion – storage classes – structure – union.	**18**

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Text Book(s):

1: Balagurusamy E., Object Oriented Programming with C++" — TMH-2000.
2: Monica D'Souza & Jude D'Souza "Web Publishing" — TMH– 2001.

Reference Book(s):

1. Robert Lafore., Object Oriented Programming in C++ - Galgotia.2000.
2. Yeshwant Kanetkar., let us C++ -– BPB. 2001
3. Steve Wright., Instant HTML Programmer's Reference — WROX Press Ltd.2011.

Web Resource(s):

1. https://ocw.mit.edu/courses/computer program /7-06- -spring-2007.
2. https://ocw.mit.edu/courses/biology/7-06-computer application-spring-2010/

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Develop the foundation for higher studies in the field of Computer Application.	**K6**
CO2	Adapt the ability to design programs with Interactive Input and Output	**K6**
CO3	Choose to develop responsive web applications	**K6**
CO4	Design different web extensions and web services standards.	**K6**
CO5	Creation of web site considering both client and server-side programming.	**K6**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	3	3	3	3	2	2	2	3	2	2.6
CO2	3	2	3	2	2	2	1	2	3	2	2.2
CO3	2	3	2	3	3	2	2	3	3	2	2.5
CO4	2	3	2	3	2	2	1	3	2	3	2.3
CO5	3	3	2	3	2	3	2	2	3	2	2.5
Mean Overall Score											2.4
Correlation											Medium

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. S. Deborah

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23PDBI1CC5P	Core - V	6	4	20	80	100

Course Title	C Programming and Web Publishing – Practical

SYLLABUS		
Unit	**Contents**	**Hours**
1	Factorial of a given number.	**90**
2	Sorting and merging two arrays of numbers.	
3	Sorting names in alphabetical order.	
4	Reversing a given string.	
5	Checking for palindrome.	
6	String Manipulation – String copy, String length, String concatenation, String comparison and String reverse.	
7	Mean, median, mode and standard deviation calculations.	
8	Storing and retrieving amino acid sequences using structure data types.	
9	Swapping two values using pointers.	
10	File Processing – Creation and simple processing.	
11	Computing amino acid composition of a given protein sequence.	
12	Enumerate RNA Secondary Structure.	
13	***Web Publishing* 1:** Create a web page for your University / College using HTML. The opening page should provide hyperlinks to other pages (add animation and sound effects appropriately).	
14	***Web Publishing 2*:** Creating a web page to get protein sequence data and compute and display amino acid composition.	
15	***Web Publishing3*:** Creating a web page to get nucleic acid sequence data and compute and display base composition.	

Text Book(s):

1. E. Balagurusamy. Object Oriented Programming C++. Third Edition 2006.
2. A. Jitender. Introduction to HTML. “Web Publishing” – Monica D’Souza & Jude TMH– 2001.Third Edition 2008.

Reference Book(s):

1. Gary J. Bronson (A First Book of ANSI C Third Edition 2001).
2. Jitender Kumar Chakra, Programming with C and C++.(Second Edition 2006).
3. Steve Wright., Instant HTML Programmer’s Reference — WROX Press Ltd. 2011.

Web Resource(s):

1. https://www.youtube.com/watch?v=c program/k1pp
2. https://www.youtube.com/watch?v=html /k1O9jBHgsxs

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Discuss the C programming concepts like Structures, Pointers and	**K6**
CO2	Command line arguments and data structures	**K6**
CO3	Identify the application of some basic programs in C and Web based application.	**K3**
CO4	Assess the knowledge Practice the use of conditional and looping statements.	**K5**
CO5	Illustrate the structure; implement arrays, functions and pointers.	**K2**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	2	2	2	2	2	3	2	2.2
CO2	3	2	3	2	2	3	2	2	3	2	2.4
CO3	2	3	2	3	3	3	2	3	3	2	2.6
CO4	2	3	2	3	2	3	2	3	2	3	2.5
CO5	3	3	2	3	2	3	2	2	3	2	2.5
Mean Overall Score											**2.44**
Correlation											**medium**

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Ms.M. Habibunisha

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23PDBI2CC6	Core - V I	6	4	25	75	100

Course Title	Database Management Systems

SYLLABUS		
Unit	**Contents**	**Hours**
I	Data base: Introduction – Basic Technology and Data Basics – *Objective of a Data base organization – Entities & Attributes*.	**18**
II	Data Models: Introduction – Schemes & Sub Schemes – Data base Management Systems – File Database – Tree Structures. *Relational Databases – Normal Forms*.	**18**
III	Data Base Languages: Introduction – Data Description Languages – the CODASYL Data Description Language – *Query Languages – Data Dictionaries*.	**18**
IV	Physical Organization: Introduction – Criteria affecting physical organization – Differences between physical & logical organization – *Addressing Techniques – Index sequential organization – Hashing*.	**18**
V	Database security: Data Classification– Database access Control – Types of Privileges –Cryptography- Statistical Databases- Distributed Databases-Processing. *Object Oriented Databases-XML Databases*.	**18**

…….. Self Study

Text Book(s):
1. James Martin, Computer Database Organization, Prentice Hall of India, 2016
Reference Book(s):
1.C.J. Date, An Introduction to Database systems, 3rd edition, Narosa Publishing House, 2004 2.James Martin, Principles of Database Management, Prentice Hall of India, 2012
Web Resource(s):
1. https://nptel.ac.in/courses/106105175/

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Assesse the basics, concepts, objectives of Database.	**K5**
CO2	Discuss the fundamental elements of data models and database management systems.	**K6**
CO3	Apply and use data manipulation language to query update and manage a data base.	**K3**
CO4	Analyze the physical and logic database designs and addressing techniques: indexing methods and Hashing.	**K4**
CO5	Construct a simple database system with the understanding of essential DBMS concepts such as Database security.	**K6**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	3	3	3	2	2	2	2	3	2	2.5
CO2	3	2	3	2	2	2	2	2	3	2	2.3
CO3	3	3	2	3	3	2	2	3	3	2	2.6
CO4	3	3	2	3	2	2	2	3	2	3	2.5
CO5	3	3	2	3	2	3	2	2	3	2	2.5
Mean Overall Score											2.48
Correlation											medium

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Ms. S. Geet Andrea

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23PDBI2CC7	Core - VII	6	4	25	75	100

Course Title	Genomics and Proteomics

SYLLABUS

Unit	Contents	Hours
I	The genetic material – Identification of genetic material, genetic code, concept of gene – operon concept – lac and trp operons, *promoters and repressors*.	18
II	Different types of genome maps and their uses, genetic and physical mapping techniques – Genomics – definitions – pharmacogenomics – taxicogenomics – *prokaryotic and eukaryotic genome – genome relationships – human genomics*.	18
III	Genomics Whole genome analysis – Physical methods of sequencing – automated sequencing – genome expression and analysis – serial analysis. *code micro assay and microchips*.	18
IV	Proteomics Definition – Transcriptomics; Proteomics, metabolomics. Techniques of proteomics – 2D PAGE, Multidimensional protein identification (Mud PIT) Isotopically coded affinity Tag (ICAT), Mass spectrophotometer – (MALDI – TOF) MS. *Application of functional genomics in basic biology, target / marker identification, target toxicology*, microbial drug, tumour immunology, vaccine discovery, drug design.	18
V	Proteome and technology – Primary attributes for protein identification – protein super families. A brief account of genetic engineering –Vectors used in genetic engineering-Genomic DNA library-Cloning and modification methods-*Site Directed mutagenesis-Commercial applications*.	18

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Text Book(s):

1. Doolittle RF Molecular evolution, Computer Analysis of Protein and Nucleic acid Sequences, Methods in Enzymology, Academic Press, New York. 1990.
2. Baxevanis AD and B.F.F. Ouellette, Wiley Bioinformatics – A practical guide to the analysis of genes and proteins. (ed) – Interscience, New York, 2001.

Reference Book(s):

1. K. Faber. Biotransformation in Organic Chemistry, Springer Verlag. 1992.
2. P.Gerbardt, R. G.Murray, W. A.Wood, N. R.Kreig. Methods for General and Molecular Bacteriology – American Society for Microbiology Washington D.C., 1994.

Web Resource(s):

1. https://courses.lumenlearning.com/boundless-biology/chapter/genomics-and-proteomics/
2. https://www.ncbi.nlm.nih.gov/books/NBK19861/

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Summarize the basic concepts of genomics, transcriptomics and proteomics.	**K2**
CO2	Discuss the use of genomics and proteomics in human health.	**K4**
CO3	Demonstrate outline solution to theoretical and experimental Problems in Genomics and proteomics fields.	**K4**
CO4	Evaluate the work in core facilities and commercial biological and medical laboratories as well as in their postgraduate studies.	**K4**
CO5	Improve the new skills databases that store various data about genes, proteins, genomes and proteomes.	**K5**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	2	2	2	3	2	3	2	2.3
CO2	3	2	3	2	2	1	3	2	3	2	2.3
CO3	2	3	2	3	3	1	3	3	3	2	2.5
CO4	2	3	2	3	2	1	3	3	2	3	2.4
CO5	3	3	2	3	2	3	3	2	3	2	2.6
Mean Overall Score											**2.42**
Correlation											**Medium**

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Ms. M.S. Sabeena Banu

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23PDBI2CC8	Core - VIII	6	4	25	75	100

Course Title	Computational Biology

SYLLABUS		
Unit	**Contents**	**Hours**
I	Structure of DNA & Protein – Sequence analysis – pairwise sequence comparison – sequence queries against biological databases – BLAST and FASTA – *multifunctional tools for analysis*.	**18**
II	Multiple sequence alignments, Phylogenetic alignment – profiles and motifs – distance and similarity – *evolutionary basis of sequence alignment – scores and gaps*.	**18**
III	Protein structure visualization – tools structure – classification, alignment and analysis.Solvent accessibility and Interactions – Physico-chemical properties, structure optimization.*Protein resource databases*.	**18**
IV	Predicting Protein structure and function from sequence – Determination of structure – feature detection – secondary structure prediction – Predicting 3 D structure. *Protein modelling*.	**18**
V	Genomics and Proteomics – Sequencing genomes – sequence assembly – genome on the web – annotating and analyzing genome sequences. *Proteomics – biochemical pathway databases – submitting sequence to the databases*.	**18**

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Text Book(s):

1. Stephen Misener& Stephen A. Krawetz, Bioinformatics: Methods and Protocols Human Press, New Jersey, 2000.

2. A.D. Baxevanis, B.F.F. Ouellette Bioinformatics: A practical guide to the analysis of genes and proteins– Wiley Interscience – New York, 2001

Reference Book(s):

1. Des Higgins & Willie Taylor, Bioinformatics: Sequence, structure and databanks – Oxford University Press, 2000.

Web Resource(s):

1. https://nptel.ac.in/courses/102/106/102106068/

2. https://onlinecourses-archive.nptel.ac.in/noc18_bt22/preview

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Elaborate different types of biological database and sequence submission tools.	**K6**
CO2	Adapt the basics of sequence alignment and various approaches in phylogenetic analysis.	**K6**
CO3	Assess the structure, properties and interactions of protein and its databases.	**K5**
CO4	Explain the structure and various approaches in 3D structure prediction.	**K5**
CO5	Classify and explain the tools and algorithms used for genome sequencing assembly.	**K4**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	2	2	2	3	2	3	2	2.3
CO2	3	2	3	2	2	3	3	2	3	2	2.5
CO3	2	3	2	3	3	3	3	3	3	2	2.7
CO4	2	3	2	3	2	3	3	3	2	3	2.6
CO5	3	3	2	3	2	3	3	2	3	2	2.6
Mean Overall Score											**2.5**
Correlation											**High**

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr.T. Nargis Begum

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23PDBI2CC9	Core – IX	6	4	25	75	100
Course Title	**Molecular Modelling and Drug Design**						

SYLLABUS		
Unit	**Contents**	**Hours**
I	Recent advances in drug design methodologies, bimolecular structure, Structure activity relationship, *Pharmacokinetics, structure-based drug design*.	**18**
II	Molecular basis of drug action, Pharmacophoric pattern, ADME Properties, quantitative structure activity relationship, *Use of genetic algorithms and principle component analysis in the QSAR equations*.	**18**
III	Molecular modelling, quantum mechanical and molecular orbital methods, introduction to semi-empirical, molecular mechanics and abintio techniques. Simulation techniques, potential energy surfaces, *docking and modelling substrate – receptor interactions*.	**18**
IV	Historic development of drug discovery, Modern drug discovery Software tools for Modelling bio-molecules. *Molecular electrostatic potentials, charge analyses. Protein conformations, folding and mutation through modelling*.	**18**
V	Use of Genomics and Proteomics for understanding diseases at molecular level strategies for target identification and *lead design*.	**18**

…….. Self Study

Text Book(s):

1. Andrew Leach, Molecular Modelling: Principles and Applications, 5nd Edition, Addison Wesley Longman, Essex, England, 2015.

2. Alan Hinchliffe, Molecular Modelling for Beginners, John-Wiley, 2003.

Reference Book(s):

1. N. Cohen (Ed.), Guide Book on Molecular Modelling in Drug Design, Academic Press, San Diego, 1996.

Web Resource(s):

1. https://nptel.ac.in/courses/102/106/102106070/
2. https://onlinecourses.nptel.ac.in/noc19_bt22/preview

Course Outcomes

Upon successful completion of this course, the student will be able to:

CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Discuss various techniques and concepts used in structure-based drug design.	**K6**
CO2	Adapt the algorithms used in drug analysis.	**K6**
CO3	Analyze the principles involved in molecular 19 Modelling and drug design.	**K4**
CO4	Classify the various tools employed in drug discovery and its applications.	**K4**
CO5	Plan Systematize about genomics and proteomics in disease analysis at molecular level	**K6**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	3	2	2	3	2	3	2	2.4
CO2	3	2	3	3	2	2	3	2	3	2	2.5
CO3	2	3	2	3	3	2	3	3	3	2	2.6
CO4	2	3	2	3	2	2	3	3	2	3	2.5
CO5	3	3	2	3	2	2	3	2	3	2	2.5
Mean Overall Score											**12.5**
Correlation											**High**

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. S. Deborah

Semester	Course Code	Course Category	Hours/ Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23PDBI2CC10P	Core – X	6	4	25	75	100

Course Title	Bioinformatics – Practical

SYLLABUS		
S.No.	**Contents**	**Hours**
1	Multiple alignments- using CLUSTAL W	**90**
2	Phylogenetic Analysis using NJ plot.	
3	BLAST, FASTA programs for sequence database search.	
4	Small molecule building using che1nDraw or Model. Sketch.	
5	Evaluation of protein structure by Swiss PDB viewer and by other molecular visualization tools.	
6	Calculation of phi – psi angles – Ramachandran plot.	
7	Homology Modelling of a given protein sequence.	
8	Small molecule building using chemSketch.	
9	Metabolic pathway prediction	
10	Docking Using Patch Dock.	

Text Book(s):

1. A. Baxevanis and B.F. Ouellette, Bioinformatics: A practical Guide to the Analysis of Genes and Proteins, Wiley-Inter science, Hoboken, NJ, 1998.
2. D. Andreas, B.F. Baxevanis, Francis Ouellette, Bioinformatics- A Practical Guide to the Analysis of Genes and Proteins, Wiley-Interscience, 3rd edition, 2006.

Reference Book(s):

1. K. Teresa, Attwood and J. David, Parry Smith, Introduction to Bioinformatics, Pearson Education, 1999.
2. S.C. Rastogi, NamitaMendiratta Parag Rastogi. Bioinformatics Concepts, Skills & Applications, CBS Publishers & Distributors, First edition, 2003.

Web Resource(s):

1. https://nptel.ac.in/courses/102/106/102106065/
2. https://nptel.ac.in/content/storage2/courses/102103044/pdf/mod6.pdf

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Explain about sequencing alignment and similar search tool.	K5
CO2	Develop hands on training on various tools and techniques employed in biological sequence analysis.	K5
CO3	Discuss about protein structural analysis using Bioinformatics tools.	K6
CO4	Predict to several DNA and protein databases.	K6
CO5	Classify the methods and tools used for phylogenetic analysis.	K4

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	2	2	2	2	2	3	2	2.2
CO2	3	2	3	2	2	2	2	2	3	2	2.3
CO3	2	3	2	3	2	2	2	3	3	2	2.4
CO4	2	3	2	3	3	3	3	3	2	3	2.7
CO5	3	3	2	3	2	2	2	2	3	2	2.4
Mean Overall Score											**2.4**
Correlation											**Medium**

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Ms. T. Nargis Begum