BIOINFORMATICS

Semester	Subject code	Category	Lecture		Theory		P	C
V	21CBT5E	Elective-II	4hrs per week	60	4 hrs per week	60	-	3

COURSE OBJECTIVE: To provide students the knowledge on fundamentals of bioinformatics and update them with proteomics, microarray techniques and protein expression tools.

COURSE OUTCOMES: Upon successful completion of the course, students will able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL (K1-K4)
CO1.	Remember the fundamentals of bioinformatics and Understand different types of biological database	K1 & K2
CO2.	Apply the obtained information through the experiments and also study the various database arrangements .	K3
CO3.	Analyze how cells reproduce by cell cycle, mitosis and meiosis.	K4
CO4.	Understand the structural and functional aspects of different proteins	K2
CO5.	Identify and understand the principles of protein expression	K1& K2

Knowledge Level: K1- Remember, K2- Understand, K3- Apply, K4-analyze

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	S	M	S	M
CO2	S	M	S	M	M	S
CO3	S	S	S	M	M	M
CO4	S	S	M	M	S	M
CO5	S	S	S	S	M	S

S-Strong, M-Medium, L-Low

UNIT -I
OVERVIEW OF BIOINFORMATICS **12 Hours**

Bioinformatics: Introduction, History and scope of bioinformatics, Biological database –Types of biological database. Primary databases, Secondary databases, Composite databases. Nucleic acid and protein sequence databases.

UNIT –II
SEQUENCE ALIGNMENT **12 Hours**

General introduction to Sequence Alignment –Types of a sequence alignment, Methods of sequence alignment, Dot matrix method. Pair wise and multiple sequence alignment,Global alignment, blast, Applications of bioinformatics in research.

UNIT –III
PROTEOMICS & GENOMICS **12 Hours**

The proteome – the Proteome and the Genome, the life cycle of a protein, protein as modular structures, functional protein families, deduces the proteome from the Genome, gene expression, and Retrieving protein sequences from databases.

Genomics- structural genomics, comparative genomics & functional genomics

UNIT IV
MICROARRAY **12 Hours**

Microarray: Introduction, History of microarray, Basic Principle of microarray. DNA microarray technology Storing information in sequence database, Types of DNA microarray and microarray databases, Protein- Protein docking, Insitu oligonucleotide array format, Applications of microarray technology.

UNIT V
PROTEIN EXPRESSION **12 Hours**

ProteinExpression and purification: Introduction of protein expression Mining proteomics, protein expression profiling, identifying protein–protein interaction, protein structure databases and protein complexes.

Distribution of Marks: Theory 80% and Problems 20%

TEACHING METHODOLOGY:

- Class room teaching
- Assignments
- Discussions
- Homework
- PPT presentations

- Seminars
- Models and charts

TEXT BOOKS:

S.no.	Authors	Title	Publishers	Year of publication
1.	Marketa JZ and Jeremy OB	Understanding Bioinformatics,	Garland Science, Taylor & Francis Group, USA.	2008
2.	ClaverieJM,Notredame C,	Bioinformatics for Dummies	Wiley Publishing Inc., Indiana, USA.	2006
3.	Anna Tramontano	The Ten most wanted solutions in protein bioinformatics	CRC Press	2005
4.	Attwood T.K and Parry Smith. D.J	Introduction to Bioinformatics	Pearson Education India	1999
5.	David W. Mount	Bioinformatics	Cold Spring Harbor Lab Press	2001

REFERENCE BOOKS:

S.no.	Authors	Title	Publishers	Year of publication
1.	Lesk AM	Introduction to Bioinformatics	OUP, Oxford, UK.	2002
2.	HoomanRashidi, Lukas K. Buehler	BioinformaticBasics: Applications in biological Sciecne and medicine	CRC press and Taylor and Francis group	2005
3.	Andreas D. Baxevanis and Francis Ouellette	Bioinformatics	John Wiley & Sons	2004
4.	Lukas K. Buehler and Hooman H. Rashidi	Bioinformatics	CRC Press	2005
5.	David W. Mount	Bioinformatics: Sequence and Genome Analysis	Paperback	2004

WEB SOURCES:

1. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4870335/
2. http://bioinformaticsinstitute.ru/sites/default/files/lapidus_1_0.pdf
3. https://www.goodreads.com/shelf/show/bioinformatics
4. https://www.iscb.org/iscb-publications-bioinformatics-review
5. https://books.google.co.in/books?id=90tZDwAAQBAJ

Syllabus Designer:

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