K. L. E. SOCIETY'S S.NIJALINGAPPA COLLEGE

DEPARTMENT OF BIOTECHNOLOGY

Value Added course
ON
BIOINFORMATICS

Submitted By
H.O.D
Department of Biotechnology

Submitted to
Principal
K.L.E Society's S. Nijalingappa College, Rajajinagar, Bangalore-10

COURSE DETAILS

VALUE ADDED COURSE ON BIOINFORMATICS :

- **Year :** From the Academic year 2018-2021
- **Eligibility :** Candidates who have completed two year pre-University course of Karnataka or equivalent & Students studying at B.Sc combination with at least one life science subject
- **Duration :** The course study will extend over a period of 6 months
- **Teaching hours :**50 Hrs (includes both theory,practicals & Field/industrial visits)
- **Maximum Marks:**100
- **Certificate course admission fees :**Nil
- **Maximum intake :** 65 Students
- **Medium of Instruction**: The medium of instruction shall be English and the candidate must answer the examination in English.
- **ATTENDENCE:**A student must satisfy the requirement of attendance for the course ,if he/ she has attend less then 75% of attendance in the course then student shall not be permitted to take the examination.
- **PEDAGOGY**: It will be a blend of lectures,seminars,guest lectures,Field visits designed by the H.O.D .There will be 40 theory hours and 60 practical hours .
- **Examination:**
  Paper I: Theory examination of 3 hours duration (100 marks reduced to 40 marks)
  Paper II: Practical examination of 4 hours duration (40 marks)
  Viva voce on Field visit and lab report (20 marks)

Introduction :

Bioinformatics is an interdisciplinary field mainly involving molecular biology and genetics, computer science, mathematics, and statistics. Data intensive, large-scale biological problems are addressed from a computational point of view. Bioinformatics aids in analysing various biological processes at molecular level. Making inferences from data collected. Bioinformatics is a novel science giving a platform to study mainly proteins & nucleic acid. This study forms a basis for the evolution of proteomics and genomics. It is an excellent to tool to understand the evolutionary relationship between the species by analysing and comparing the sequences, It provides a backbone to study the three dimensional structure of novel molecules .It is used as an indispensable tool to study various diseases at genetic level. Bioinformatics plays a vital role in the field of drug discover

OBJECTIVES:

- . To develop professional in the area of Bioinformatics
- To give students an insight on Bioinformatics
- The students will be exposed technically to various skills on Bioinformatics
- To understand how 3D model of biomolecules is generated.
- To make students enable to learn the basics of sequencing.

Outcome/ Scope:

- Self employability
- Enterprenuership
- Jobs in MNC
- Research Associate Fellowship in R&D/Research projects/Major & minor projects

COURSE MATRIX:

OUTLINE OF SYLLABUS –THEORY UNITS

Slno	Topics	No.of hours
1)	**INTRODUCTION-** Bioinformatics-Definiton, History, Scope and applications.Opportunities in bioinformatics, emerging areabioinformatics.	2
2)	**Computers in bioinformatics-** Internet, search engines Google, yahoo	1
3)	**Overview of molecular biology**- role of bioinformatics	2
4)	**Human Genome project-** Introduction, mile stones, goals, pioneers, mapping strategies-RFLP,RAPD, AFLP ,Vectors- (BAC, YAC)**,**Sequence strategies-Cloning, PCR Sequence techniques - Shortgun sequencing method,Sanger sequencing method.Outcome of Human Genome Project.Application of Human Genome Project –Gene therapy	6
5)	**Biological databases**Objective of Database**,**Database Architecture**,**Primary database-Genome database, Protein database, Complex database**,**Secondary database Features of database	5
6)	**Protein & nucleotide database-** Protein Database-NCBI, Swissprot, PIR, PDB, Uniprot, Ramchandran plot Nucleotide database- EMBL, Genbank, NCBI	4
7)	**Sequence Alignment** Introduction, Sequence similarity, homology and alignment-definition, principles,types(Global and local), Based on number- Pairwise alignment, multiple sequence alignment	5
8)	**Methods of Sequencing** – Clustal, FASTA, BLAST,Clinical significance	4
9)	**Phylogenetic analysis** Introduction –Similarity-types of similarity ,Evolutionary relationship Common Terminologis, Types –Rooted, Unrooted Computational methods to analyse phylogenetic trees	6

Total hours allotted:35Hrs

PRACTICALS

Sl. No	Topics	No. of hours
1	Searching bibliographic database for relevant information	2
2	Retrieval of nucleotide sequence from EMBL	3
3	Retrieval of protein sequence from protein information source (PIR)	3
4	Retrieval of protein sequence from uniprot	3
5	Analysing the similarity of sequences using similarity. Search tools (BLAST and FASTA)	3
6	Sequence alignment	2
7	Multiple sequence alignment	2
8	Protein Data bank retrieval and visualization	1
9	Ramachandran plot	1

Total hours allotted: 20 Hrs

Total Teaching Hours Of Theory = 35 Hrs.
Total Hours of Practical = 20 Hrs

Grand Total = 55 Hrs.

Laboratory works will be conducted at Department of Biotechnology Laboratory Faculty:

1. H.O.D & Faculty from department of Biotechnology
2. Resource person from Universities /Different Tissue culture laboratory /Premier Research institute

REFERENCES:

- **"**Bioinformatics: Methods and Applications: Genomics, Proteomics and Drug Discovery" by Rastogi
- "Bioinformatics: Principles and Applications" by Zhumur Ghosh and Bibekanand Mallick
- "Introduction to Bioinformatics" by Lesk
- Bioinformatics: Basics, Algorithms and Applications" by Ruchi Singh^Richa Sharma

I) SCHEME OF EXAMINATION:

There shall be examination at the end of the course.

3. Evaluation of each paper shall be for 100 marks comprising of 40 marks in theory and 40 marks in practical and 20 marks for Viva voce on Field visit and lab report
4. The composition of the theory paper including written
5. The duration of examination for the theory paper of 40 marks shall be 3 hours.
6. The duration of examination per practical paper of 40 marks shall be 4 hours.
7. In case of practical examinations, the students will be assessed on the basis of knowledge of processes, skills, operations involved, results and observations and reporting. Practical records will be evaluated during the examination.
8. The minimum for pass in the examination is 40 % per paper inclusive of theory and practicals.

V) EXAMINATION VALUATION:

The question paper for the examination shall be set by the college. The candidate shall take the examination as per the syllabus and the scheme of examination in force.

VI) PATTERN OF QUESTION PAPER:

Each theory paper shall ordinarily consist of three sections to test conceptional skills, understanding skills, comprehensive skills and application skills.

SECTION A – Answer All Questions (Multiple Choice)
(10 x 1 MARK = 10)
SECTION B-Answer all the questions (One sentence answer**)**
(1 x 5 MARKS = 5)
SECTION C– Answer Any Five Questions (Out Of 7) (Short Answer Questions)
(5 x 3 MARKS = 15)
SECTION D–Answer Any Two Questions (Out Of four) (Medium Length Answers)
(2 x 5 MARKS = 10)

VII) CLASSIFICATION OF SUCCESSFUL CANDIDATES:

SUCCESSFUL CANDIDATES SHALL BE CLASSIFIED AS FOLLOWS:

- FIRST CLASS: Those who obtain 60% and above of the aggregate marks.
- SECOND CLASS: Rest of the successful candidates who obtain 50% and above of the aggregate marks.

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DEPARTMENT OF BIOTECHNOLOGY

Board of Studies (BOS)

Board of Studies (BOS) for value added course in Biotechnology on "BIOINFORMATICS "

is constituted with the following members for a period of one year from the date of this notification.

1. Dr.Prathibha .K.S - HOD of Biotechnology Department
2. Prof.Sujatha.M. - HOD Department of Biotechnology, MES Degree college
3. Dr. Jyothi - HOD Department of Biotechnology, S.J.R.C.W
4. Smt. Nivetha Mala .M. - Co-ordinator
5. Smt.Pallavi Prasad M.S. - Member
6. Dr. Uma S. - Member
7. Smt. Mangala .S .Totad. - Member
8. Mr.Rajeev R. Potadar - Member
9. Dr.Joy H. Hoskeri - Technical Advisor

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1. Dr.Prathibha.K. S. - HOD of Biotechnology Department
2. Prof.Sujatha.M , - HOD Department of Biotechnology, MES Degree college
3. Dr.Jyothi - HOD Department of Biotechnology, S.J.R.C.W
4. Smt.Nivetha mala.M - Co-ordinator.
5. Mr.Rajeev R. Potadar - Faculty