Academic Course Description

BHARATH UNIVERSITY

Faculty of Engineering and Technology

Department of Electronics and communication Engineering

BBM054- BIO INFORMATICS

Sixth Semester, 2016-17 (Even Semester)

Course (catalog) description

- To introduce Bioinformatics-Elementary commands and Protocols, ftp, telnet, http. Primer on information theory
- Analyze the problems and solutions to bio informatic application problems.
- Apply principles of best practice in biometric design and management.
- Identify and define technical challenges for biotechnology applications and assess their importance.

Compulsory/Elective course: Elective for ECE students

Credit & contact hours : 3 & 45

Course Coordinator : Dr T.Jayalakshmi, Professor

Instructors :

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@ bharathuniv.ac.in	Consultation
Dr T.Jayalakshmi	Final Year	SA 019			9.00 - 9.50 AM
Ms.Priya	Final Year	SA 020		priyams@yahoo.co.in	12.45 - 1.15 PM

Relationship to other courses:

Pre –requisites **:** Biology for Engineers.

Assumed knowledge : The students will have a electronics and biological background obtained at a high school (or Equivalent) level. In particular, working knowledge of image processing include Biometric systems, computing systems are assumed.

Following courses : Biomedical instrumentation

SYLLABUS CONTENT

UNIT – I BIOINFORMATICS 9

Scope of Bioinformatics-Elementary commands and Protocols, ftp, telnet, http.Primer on information theory.

UNIT – II SEQUENCING ALIGNMENT AND DYNAMIC PROGRAMMING 9

Introduction-Strings-Edit distance two strings-string similarity local alignment gaps-parametric sequence alignments-suboptimal alignments-multiple alignment-common multiple alignment methods.

UNIT – III SEQUENCE DATABASE AND THEIR USE 9

Introduction to databases-database search-Algorithms issues in database search-sequence database searchFASTA-BLAST-Amino acid substitution matrices PAM and BLOSSUM.

UNIT – IV EVOLUTIONARY TREES AND PHYLOGENY 9

Ultrasonic trees-parsimony-Ultrametric problem-perfect phylogeny-phylogenetic alignment-connection between multiple alignment and tree construction.

UNIT – V SPECIAL TOPICS IN BIOINFORMATICS 9

DNA Mapping and sequencing-Map alignment-Large scale sequencing and alignment-Shotgun-DNA sequencing-Sequence assembly-Gene predictions-Molecular predictions with DNA strings.

Total: 45 Periods

Text book:

1.R.D.Lele '"Computer in Medicine" Tata McGraw Hill, Newyork, 1999.

References:

1.S.K.Chauhan "PC Organisation", S.K.Kataria and Sons, Delhi 2000.

2. Harold Sackamn "Bio Medical Information Technology", Academic Press, New York.

3.https://www.lehigh.edu/~inbios21/PDF/Fall2008/Lopresti_11142008.pdf

Computer usage: yes

Professional component

General	-	0%
Basic Sciences	-	0%
Engineering sciences & Technical arts	-	0%
Professional subject	-	100%

Broad area : Instrumentation | Electronics | Transmission Lines and Networks | Biomedical

Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	February 1st week	Session 1 to 12	2 Periods
2	Cycle Test-2	March 2nd week	Session 17 to 25	2 Periods
3	Model Test	April 2nd week	Session 1 to 45	3 Hrs
4	University Examination	TBA	All sessions / Units	3 Hrs.

Mapping of Instructional Objectives with Program Outcome

To develop problem solving skills and understanding of circuit theory through the application of techniques and principles of electrical circuit analysis to common circuit problems. This course emphasizes:	Correlates to program outcome		
	H	M	L
To learn bioinformatics and the protocols.	c		
To learn Strings-Edit distances two strings-string similarity local alignment gaps-parametric sequence alignments.	c,d	f	
To have a clear view on Amino acid substitution matrices PAM and BLOSSUM.	d,f	b	
To learn Ultrasonic trees-parsimony-Ultrametric problem-perfect phylogeny-phylogenetic alignment.	a,d	b	
To DNA Mapping and sequencing-Map alignment-Large scale sequencing.			

H: high correlation, M: medium correlation, L: low correlation

Draft lecture schedule

Session	Topics	Problem solving (Yes/No)	Text / Chapter
UNIT I	**BIOINFORMATICS**		
1.	Scope of Bioinformatics	No	[T1]
2.	Elementary commands	No	
3.	Protocols	No	
4.	ftp, telnet	No	
5.	http	No	
6.	Primer on information theory	No	
UNIT II	**SEQUENCING ALIGNMENT AND DYNAMIC PROGRAMMING**		
7.	Introduction-Strings-Edit distance two strings	No	[T1]
8.	string similarity local alignment gaps	No	
9.	alignments-suboptimal alignments	No	
10.	parametric sequence	No	
11.	multiple alignment-	No	
12.	common multiple alignment methods	No	
UNIT III	**SEQUENCE DATABASE AND THEIR USE**		
13.	Introduction to databases-database search	No	[T1]
14.	Algorithms issues in database search-	No	
15.	sequence database search	No	
16.	Protocols	No	
17.	FASTA-BLAST-	No	
18.	Amino acid substitution matrices PAM and BLOSSUM	No	
UNIT IV	**EVOLUTIONARY TREES AND PHYLOGENY**		
19.	Ultrasonic trees-parsimony-Ultrametric problem	No	[T1]
20.	perfect phylogeny-phylogenetic alignment	No	
21.	Model– WDP	No	
22.	connection between multiple alignmen	No	
23.	tree construction	No	
UNIT V	**SPECIAL TOPICS IN BIOINFORMATICS**		
24.	DNA Mapping and sequencing-	No	[T1]
25.	Map alignment-Large scale sequencing and alignment	No	
26.	Shotgun-DNA sequencing	No	
27.	Sequence assembly-Gene predictions	No	
28.	Molecular predictions with DNA strings	No	
29.	Access via WAP	No	

Teaching Strategies

The teaching in this course aims at establishing a good fundamental understanding of the areas covered using:

- Formal face-to-face lectures
- Tutorials, which allow for exercises in problem solving and allow time for students to resolve problems in understanding of lecture material.
- Laboratory sessions, which support the formal lecture material and also provide the student with practical construction, measurement and debugging skills.
- Small periodic quizzes, to enable you to assess your understanding of the concepts.

Evaluation Strategies

Cycle Test – I	-	5%
Cycle Test – II	-	5%
Model Test	-	10%
Assignment /Seminar/online test/quiz	-	5%
Attendance	-	5%
Final exam	-	70%

Prepared by: Dr T.Jayalakshmi, Professor **Dated :**

Addendum

ABET Outcomes expected of graduates of B.Tech / ECE / program by the time that they graduate*:*

a. An ability to apply knowledge of mathematics, science, and engineering

b. An ability to design and conduct experiments, as well as to analyze and interpret data

c. An ability to design a hardware and software system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

d. An ability to function on multidisciplinary teams

e. An ability to identify, formulate, and solve engineering problems

f. An understanding of professional and ethical responsibility

g. An ability to communicate effectively

h. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

i. A recognition of the need for, and an ability to engage in life-long learning

j. A knowledge of contemporary issues

k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Program Educational Objectives

PEO1: PREPARATION

Electronics Engineering graduates are provided with a strong foundation to passionately apply the fundamental principles of mathematics, science, and engineering knowledge to solve technical problems and also to combine fundamental knowledge of engineering principles with modern techniques to solve realistic, unstructured problems that arise in the field of Engineering and non-engineering efficiently and cost effectively.

PEO2: CORE COMPETENCE

Electronics engineering graduates have proficiency to enhance the skills and experience to apply their engineering knowledge, critical thinking and problem solving abilities in professional engineering practice for a wide variety of technical applications, including the design and usage of modern tools for improvement in the field of Electronics and Communication Engineering.

PEO3: PROFESSIONALISM

Electronics Engineering Graduates will be expected to pursue life-long learning by successfully participating in post graduate or any other professional program for continuous improvement which is a requisite for a successful engineer to become a leader in the work force or educational sector.

PEO4: SKILL

Electronics Engineering Graduates will become skilled in soft skills such as proficiency in many languages, technical communication, verbal, logical, analytical, comprehension, team building, interpersonal relationship, group discussion and leadership ability to become a better professional.

PEO5: ETHICS

Electronics Engineering Graduates are morally boosted to make decisions that are ethical, safe and environmentally-responsible and also to innovate continuously for societal improvement.

Course Teacher	Signature
Dr T.Jayalakshmi	

Course Coordinator **HOD/BME**