

## Academic Course Description

<b>BHARATH UNIVERSITY</b> Faculty of Engineering and Technology Department of Electronics and communication Engineering <b>BBM054- BIO INFORMATICS</b> <b>Seventh Semester, 2016-17 (odd Semester)</b>
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### 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:** Selective elective for ece students

Credit hours : 3 credits

Course Coordinator : Ms Geetha, Assistant Professor

**Instructors :**

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@bharathuniv.ac.in)	Consultation
Mr.Kumaravelu	Final Year Students	SA 019		Kumar65@yahoo.com	9.00 - 9.50 AM
Ms.Priya	Final Year Students	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](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 1 <sup>st</sup> week	Session 1 to 12	2 Periods
2	Cycle Test-2	March 2 <sup>nd</sup> week	Session 17 to 25	2 Periods
3	Model Test	April 2 <sup>nd</sup> 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

Session	Topics	Problem solving (Yes/No)	Text / Chapter
<b>UNIT I</b>	<b>BIOINFORMATICS</b>		
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	
<b>UNIT II</b>	<b>SEQUENCING ALIGNMENT AND DYNAMIC PROGRAMMING</b>		
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	
<b>UNIT III</b>	<b>SEQUENCE DATABASE AND THEIR USE</b>		
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	
<b>UNIT IV</b>	<b>EVOLUTIONARY TREES AND PHYLOGENY</b>		
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	
<b>UNIT V</b>	<b>SPECIAL TOPICS IN BIOINFORMATICS</b>		
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	-	10%
Cycle Test – II	-	10%
Model Test	-	25%
Attendance	-	5%
Final exam	-	50%

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**Prepared by:** Ms.Geetha,,Assistant Professor , Department of BME

**Dated :** 1 -7-2017

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**Addendum****ABET Outcomes expected of graduates of B.Tech /BME / 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 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:** Graduates will gain knowledge regarding the various laws and principles associated with Bio systems.

**PEO2:** Graduates will gain knowledge regarding finger print systems and apply them for practical problems.

**PEO3:** Graduates will gain knowledge on mobile systems and various types' of technology.

**PEO4:** Graduates will acquire knowledge in using the concepts in the field of Bio medical instrumentation system.

<b>Course Teacher</b>	<b>Signature</b>
Ms.Geetha	

**Course Coordinator**

(Ms.Geetha)

**Academic Coordinator**

( )

**Professor In-Charge**

(Dr. )

**HOD/BME**

(Dr.S.Vasuki)