Course Code	21BTB102T	Course Name	Introduction to Computational Biology	Course Category	B	Basic Sciences	L	T	P	C
							2	0	0	2

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*Mechanical*	Data Book / Codes/Standards		*Nil*	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*
CLR-1 :	*Explain the cell structure and function from its organization*
CLR-2 :	*Define the molecular and biochemical basis of an organism and the impact of human genome project*
CLR-3 :	*Discuss protein structure and its prediction*
CLR-4 :	*Acquire knowledge of neurons and workings of the brain*
CLR-5 :	*Impart the knowledge of immune system and prediction of vaccines*

Course Learning Outcomes (CO):	*At the end of this course, learners will be able to:*
CO-1 :	*Correlate cell growth, reproduction, and differentiation*
CO-2 :	*Categorize the concepts and principles of biochemistry and relate their application in genomics*
CO-3 :	*Solve protein sequence analysis and biological structure prediction using computing techniques*
CO-4 :	*Integrate neuronal mechanisms and computer applications that replicate its workings*
CO-5 :	*Integrate the immune system and its workings to predict vaccine candidates*

Program Learning Outcomes (PO)
(1- Low, 2 – Medium, or High-3)

1	2	3	4	5	6	7	8	9	10	11	12
Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning
-	-	-	*1*	-	-	-	-	-	-	-	-
2	-	-	*2*	-	-	-	-	-	-	-	-
2	*3*	-	*1*	*3*	-	-	-	-	-	-	-
3	*2*	*2*	*1*	*3*	-	-	-	-	-	-	-
3	-	*2*	*2*	*3*	-	-	-	-	-	-	-

Unit-1: CELL AND EVOLUTION **6 Hours**
Cell theory, Whitaker's kingdom classification, cell organelles, and their functions, homeostasis, Replication and cell Division, tissue differentiation, stem cells and their applications, genetic algorithms

Unit-2: BASICS IN BIOCHEMISTRY **6 Hours**
Structure and functions of carbohydrates, lipids, proteins, enzymes, DNA, RNA, and hormones. The human genome project, genomics, Sequence databases, BLAST tool.

Unit-3: STRUCTURE BIOLOGY **6 Hours**
Protein synthesis, Secondary structure of the protein, Structure and function, Structural databases, protein visualizing tools, Secondary structure prediction algorithms

Unit-4: NEUROBIOLOGY **6 Hours**
Basic of Neurons, glial cells, Brain and its parts, Artificial neural networks, concepts, and differences with biological neural networks. – uses of ANN, machine learning, and data mining in biology

Unit-5 : IMMUNOBIOLOGY **6 Hours**
Elements of the immune system, Types of the immune response, Active and passive immunity, Immunoinformatics, epitope prediction tools

Learning Resources

1. Thyagarajan S, N.Selvamurugan, MP Rajesh, RA.Nazeer Richard W Thilagaraj, S Barathi, MK Jaganathan ., Biology for engineers McGraw Hill Education. 2012
2. Parish, and Twyman, Instant notes, Bioinformatics, Westhead (1st edition), Bios Scientific Publishers Ltd., 2003
3. Norman Lewis, Gabi Nindl Waite, Lee R. Waite., Applied Cell and Molecular Biology for Engineers. McGraw-Hill Education. 2007
4. Teresa K. Attwood, David Parry-Smith, Introduction to Bioinformatics, Pearson Education,2001
5. Zvelebil, Marketa J., and Jeremy O. Baum. Understanding Bioinformatics. Garland Science, 2007

	Bloom's Level of Thinking	Continuous Learning Assessment (CLA) - By the Course Faculty				By The CoE	
		Formative CLA-1 Average of unit test (50%)		Life-Long Learning CLA-2 (10%)		Summative Final Examination (40% weightage)	
		Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	15%	-	15%	-	15%	-
Level 2	Understand	25%	-	20%	-	25%	-
Level 3	Apply	30%	-	25%	-	30%	-
Level 4	Analyze	30%	-	25%	-	30%	-
Level 5	Evaluate	-	-	10%	-	-	-
Level 6	Create	-	-	5%	-	-	-
	Total	100%		100%		100%	

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
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