



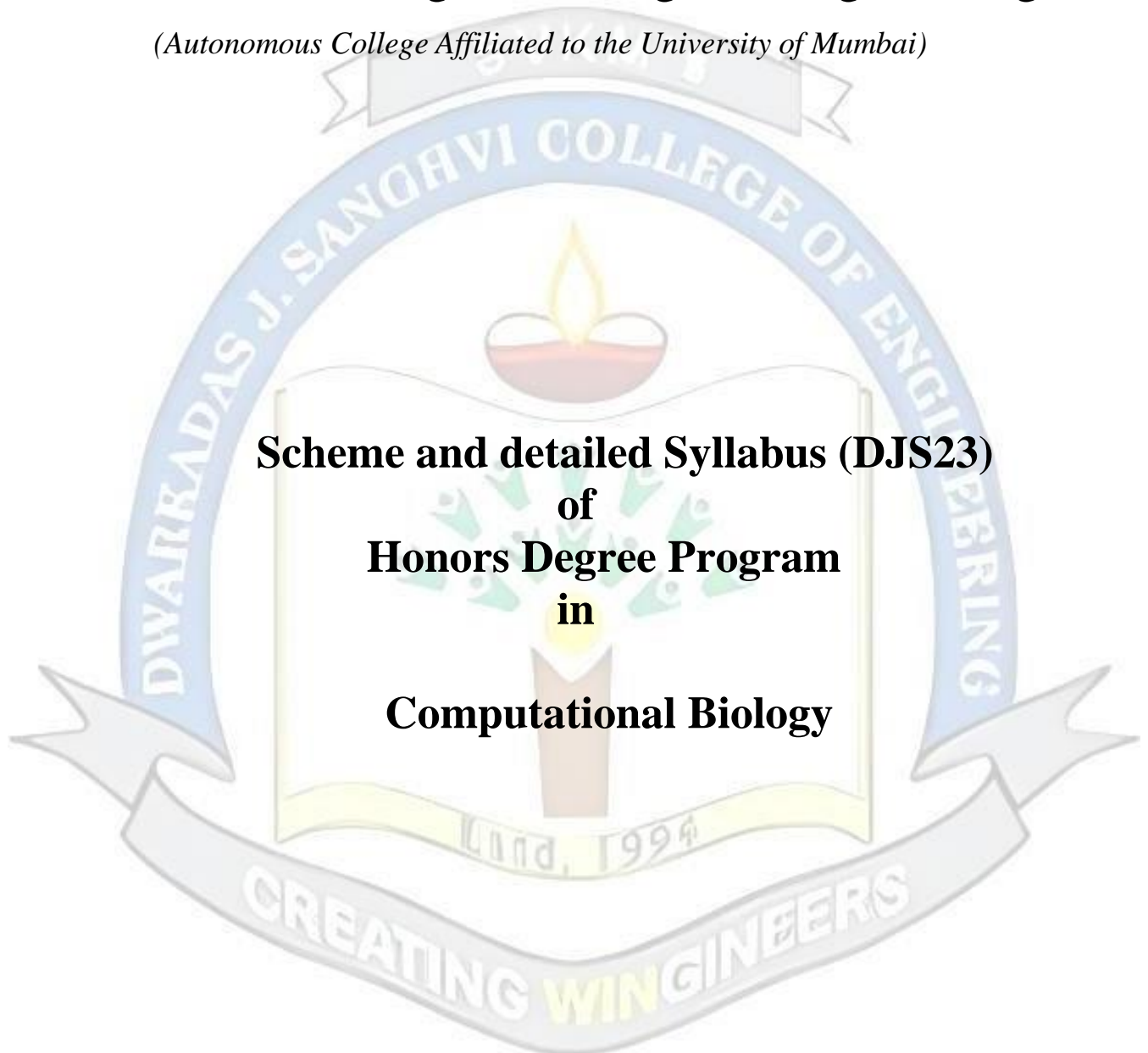
Shri Vile Parle Kelavani Mandal's
DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING
(Autonomous College Affiliated to the University of Mumbai)
NAAC Accredited with "A" Grade (CGPA : 3.18)



Shri Vile Parle Kelavani Mandal's

Dwarkadas J. Sanghvi College of Engineering

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With effect from the Academic Year: 2024-2025



Proposed Scheme Honors Program in Computational Biology: Semester III (Autonomous)

Sr. No.	Course Code	Course	Teaching Scheme (hrs.)				Continuous Assessment (A) (marks)			Semester End Assessment (B) (marks)					Aggregate (A+B)	Total Credits
			Th.	P	T	Credits	Th.	T/W	Total CA (A)	Th.	O	P	O & P	Total SEA (B)		
SEM III																
1	DJS23SCH1301	Computational Cellular Biology	3	--	--	3	40	--	40	60	--	--	--	60	100	3
SEM IV																
2	DJS23SCH1401	Computational Molecular Biology	3	--	--	3	40	--	40	60	--	--	--	60	100	3
SEM V																
3	DJS23SCH1501	Algorithms for Computational Biology	3	--	--	3	40	--	40	60	--	--	--	60	100	3
	DJS23SLH1501	Algorithms for Computational Biology Laboratory	--	2	--	1	--	25	25	--	--	--	--	25	25	1
SEM VI																
	DJS23SCH1701	Computational Models for Biology	4	--	--	4	40	--	40	60	--	--	--	60	100	4
	DJS23SLH1701	Computational Models for Biology Laboratory	--	2	--	1	--	25	25	--	--	--	--	25	25	1
SEM VII/VIII																
5	DJS23SCH1601	Bigdata in Bioinformatics	3	--	--	3	40	--	40	60	--	--	--	60	100	3
Total			16	4	0	18	200	50	250	300	0	0	0	300	550	18

Th	Theory	T/W	Termwork
P	Practical	O	Oral
T	Tutorial		

Prepared by

Checked by

Head of the Department

Vice-Principal

Principal

**Syllabus for Second Year B.Tech. Program in Artificial Intelligence(AI) and Data Science- Semester III (Autonomous)
(Academic Year 2024-25)**

Program: Second Year Honors in Computational Biology						Semester : III			
Course: Cellular Biology						Course Code: DJS23SCH1301			
Teaching Scheme (Hours / week)				Evaluation Scheme					
				Semester End Examination Marks (A)			Continuous Assessment Marks (B)		Total marks (A+B)
Lectures	Practical	Tutorial	Total Credits	Theory			Term Test 1	Term Test 2	
				60			20	20	40
				Laboratory Examination			Term work		Total Term work
3	--	--	3	Oral	Practical	Oral & Practical	Laboratory Work	Tutorial / Mini project / presentation/	
				--	--	--	--	--	--

Objectives:

- Analyze cell structure the concepts of cellular transportation systems and cell signalling Familiarisation to Molecular Biology

Outcomes: On completion of the course, learner will be able to

- Define and recall the cell structure and functions
- Classify the cell constituents and biomolecules
- Elaborate the principles and regulations of replication, transcription and translation mechanism
- Develop knowledge on genome-level cellular organisation
- Identify the cellular data and apply basic sequencing algorithms

Sr.No	Content	Hours
1	Cell Types, their Structure and Function, Cell - Unit of life, Cell morphology, Difference between bacterial, Plant and Animal cells, Structure and function of membranes, Membrane organization and composition, Structure and functions of cell organelles - Nucleus, Mitochondria, Ribosome, Golgi bodies, Lysosomes, Endoplasmic reticulum, Peroxisomes, Chloroplast and vacuoles.	7
2	Cellular Transport Systems Transport types - Passive and Active transport, Permeases, Na ⁺ /K ⁺ , Ca ²⁺ - ATPase pumps, ATP dependent proton pumps Cotransport, Symport, Antiport, Role of lysosomal and vacuolar membrane in cellular transport, Transport into prokaryotic cells, Endocytosis and Exocytosis, Entry of viruses and toxins into the cells.	7
3	Cell Signaling Types - Autocrine, Paracrine, and Endocrine signaling molecules, Secondary signaling molecules G-protein coupled signal transduction pathways involving cAMP, cGMP, IP3, DAG and Ca ²⁺ as second messengers.	6
4	Genome Organization Structure of DNA - Nucleotides, Nucleosides, Sugar, Bases, Bonds involved in double stranded DNA; Chargaff's rule; Genome organization in prokaryotes and eukaryotes; Chromosome structure – Different types of histones and chromosome packing; Central dogma of life; DNA and RNA as genetic material; Differences between DNA and RNA	7
5	Types of Data in Cellular Biology: Genomic Data, Proteomic Data, Metabolomic Data, Imaging Data, Signal	5

**Syllabus for Second Year B.Tech. Program in Artificial Intelligence(AI) and Data Science- Semester III (Autonomous)
(Academic Year 2024-25)**

	Transduction Data Data Analysis Techniques: Hypothesis testing, Regression Analysis, Survival Analysis (Kaplan-Meier curves and Cox), False Discovery Rates	
6	Sequence Alignment Algorithms: Needleman-Wunsch Algorithm: Used for global sequence alignment, such as aligning DNA or protein sequences to identify similarities and differences. Smith-Waterman Algorithm: Used for local sequence alignment, useful for identifying regions of similarity between sequences. Sequencing Applications	4
	Total	36

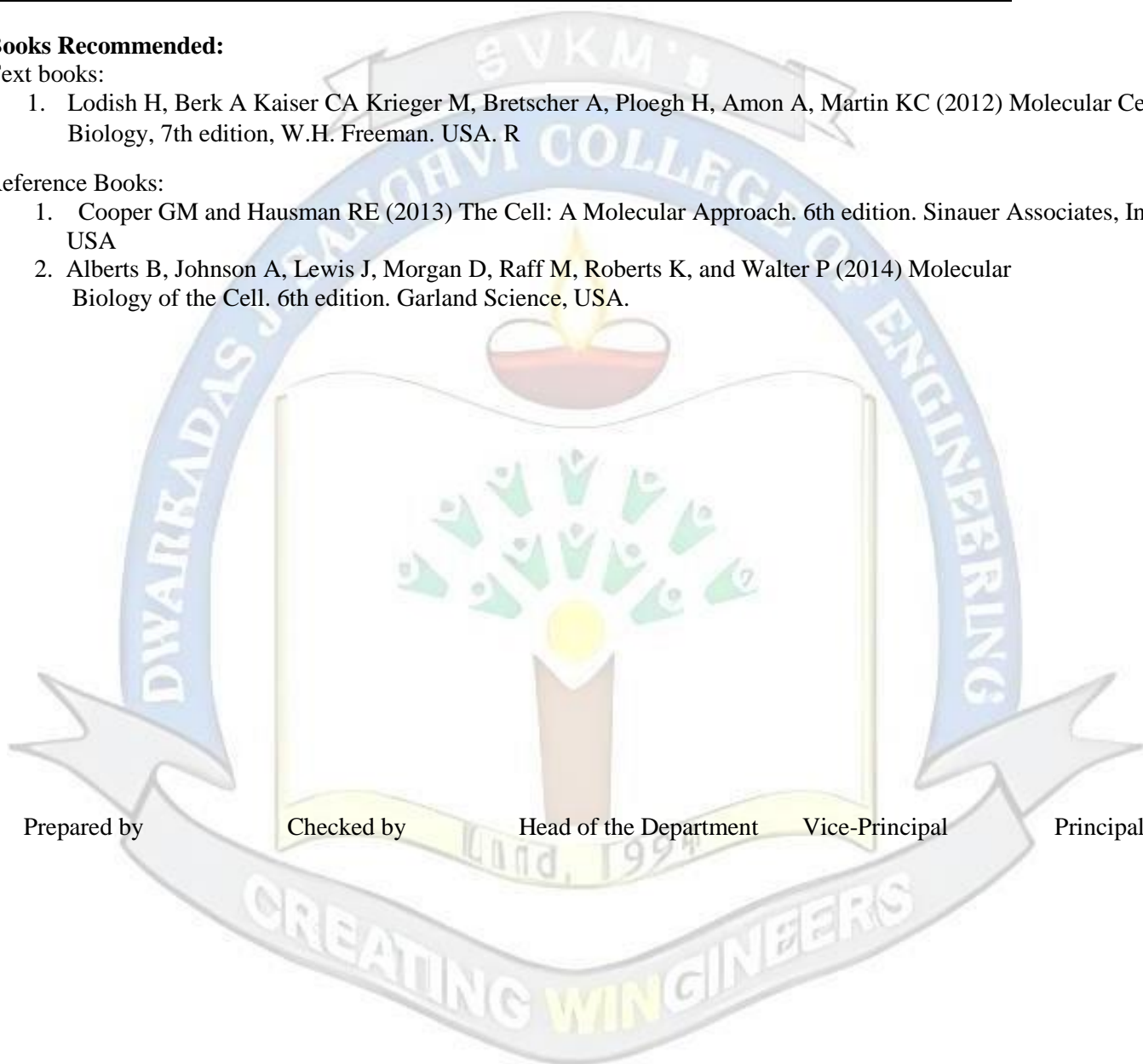
Books Recommended:

Text books:

1. Lodish H, Berk A Kaiser CA Krieger M, Bretscher A, Ploegh H, Amon A, Martin KC (2012) Molecular Cell Biology, 7th edition, W.H. Freeman. USA. R

Reference Books:

1. Cooper GM and Hausman RE (2013) The Cell: A Molecular Approach. 6th edition. Sinauer Associates, Inc. USA
2. Alberts B, Johnson A, Lewis J, Morgan D, Raff M, Roberts K, and Walter P (2014) Molecular Biology of the Cell. 6th edition. Garland Science, USA.



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