



**Shiv Chhatrapati Shikshan Sanstha's**  
**Rajarshi Shahu Mahavidyalaya, Latur**  
**(Autonomous)**  
**Department of Biotechnology**  
**Structured Work Plan for Teaching**  
**Academic Year 2020-21 (Term-I)**

**1. Details of Classes to be taught**

Sr. No.	Class	Name of Asstt. Prof.	Subject	Paper
1	M.Sc. II	Dr. Sachin S. Kulkarni	Biotechnology	<b>Course Title: Genetic Engineering</b> <b>Course Code : P-GEE-334</b> <b>Course Title: Lab Course IX</b> <b>Course Code: P-LAC-338</b>

**2. Summary of Lesson Plan**

**Name of Teacher: Dr. Sachin S. Kulkarni**

**Class : M.Sc. BT. II (Third Semester)**

Sr. No.	Subject	Unit and Chapter to be covered	Date	No. of Lectures	Academic activities to be organized	No. of Test / Assignment with topic and date
1	Genetic Engineering	Unit I 1. Isolation of DNA and RNA. 2. Quantification of nucleic acids. 3. Radiolabelling of nucleic acids: End labelling, nick translation, labelling by primer extension, 4. DNA sequencing: Maxam-Gilbert(Chemical) and Sanger-Nicolson (dideoxy/enzymatic) sequencing method, Pyrosequencing.	18-06-20 To 06-07-20	03 01 03 03	Classroom Seminar Group Discussion	Assignment

		<p>Unit II</p> <ol style="list-style-type: none"> <li>Types of restriction endonucleases, classification and uses.</li> <li>Restriction mapping.</li> <li>DNA modifying enzymes: Nucleases, Polymerases, Phosphatases and DNA ligases.</li> <li>Prokaryotic host. Plasmid vectors,</li> <li>Bacteriophage, other vectors, expression vectors,</li> <li>Construction of genomic and c-DNA libraries,</li> <li>Joining of DNA Fragments to vectors,</li> <li>Homo polymer tailing, cohesive and blunt end ligation, adaptors, linkers.</li> </ol>	<p>18-07-20 To 07-08-20</p>	<p>02 01 02  01  01 02 01  01</p>	<p>Classroom Seminar</p> <p>Group Discussion</p>	<p>Assignment</p>
		<p>Unit III</p> <ol style="list-style-type: none"> <li>Selection, screening and analysis of recombinants.</li> <li>Principle of hybridization. Northern blotting, Southern blotting, Western-blotting.</li> <li>Polymerase chain reaction,</li> <li>Restriction fragments length polymorphism, RAPD, AFLP, MAP</li> </ol>	<p>07-08-20 To 05-09-20</p>	<p>03 04 02 03</p>	<p>Classroom Seminar</p> <p>Group Discussion</p>	<p>Assignment</p>

		Unit IV			Classroom Seminar	
		1. Vector Engineering and codon optimization, host engineering.	05-09-20	03		
		2. Strategies of gene delivery, in vitro translation,	To	02		Assignment
		3. expression in bacteria and yeast, expression in insects and insect cells, expression in mammalian cells,	10-10-20	02	Group Discussion	
		4. expression in plants.		01		
		5. Chromosome engineering,		01		
		6. Targeted gene replacement, gene editing, gene regulation & silencing.		03		

## Practicals

Sr. No.	Subject	Practicals	Date	No. of Practicals
1	Genetic Engineering	Isolation of nucleic acid	08-07-20 & 13-07-20	02
2		Endonuclease digestion of nucleic acid analysis of DNA fragments by agarose gel electrophoresis	15-07-20 & 20-07-20	02
3		Quantification of nucleic acid	22-07-20 & 27-07-20	02
4		Thermal melting of DNA	29-08-20 & 03-08-20	02
5		Isolation of plasmid DNA-i) minipreparation	05-08-20 & 10-08-20	02
6		In vitro DNA ligation, transformation of E. coli.	12-08-20 & 17-08-20	02
7		Separation of poly A+RNA on oligo-dT column.	20-08-20 & 24-08-20	02
8		Protein isolation techniques	26-08-20 & 31-08-20	02
9		Protein electrophoresis	06-09-20 & 09-09-20	02
10		Protein blotting technique	14-09-20 & 16-09-20	02

  
Course Teacher

  
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**Teaching plan for 20-21(summer)**

**Name of Teacher: Dr. Sachin S. Kulkarni**


Sr. No.	Subject Computational Biology	Unit/Chapter	Dates	No. of lectures	activities	test
1	Unit I	Introduction to bioinformatics and data generation	10-02-2021	01	Classroom	Unit – I 12/2/2021
		What is bioinformatics and its relation with molecular biology.	To 26-03-2021	01	Group Discussion	Unit – II 16/03/2021
		Examples of related tools (FASTA, BLAST, RASMOL),		02		Unit –III 26/04/21
		databases (GENBANK, Pubmed, PDB ) and software (RASMOL)				
		Data generation; Generation of large scale molecular biology data (Through Genome sequencing, Protein sequencing, Gel electrophoresis, Applications of Bioinformatics.		04  01 01		
	Unit II	Biological Database and its Types	27-3-2021	03	Classroom	
		Introduction to data types and Source.	To 15-04-2021		Group Discussion	
		Population and sample, Classification and Presentation of Data.		02		
		Quality of data, private and public data sources.		02		
		General Introduction of Biological Databases; Nucleic acid databases (NCBI, DDBJ, and EMBL). Protein databases (Primary, Composite, and Secondary).		03  02		

	Unit III	Sequence Alignments and Visualization	16-04-2021	02	Classroom	
		Introduction to Sequences,	To	02	Group Discussion	
		alignments, Local alignment and Global alignment (algorithm and example),	30-04-2021	04		
		Pairwise alignment (BLAST and FASTA Algorithm) and multiple sequence alignment (Clustal W algorithm).		04		
		Methods for presenting large quantities of biological data: sequence viewers, 3D structure viewers (Rasmol, SPDBv, Chime, Cn3D, PyMol).				
	Unit IV	General introduction to Gene expression in prokaryotes and eukaryote,	31-04-2021	02	Classroom	
		transcription factors binding sites. SNP, EST, STS.	To		Group Discussion	
		General introduction to protein structure, prediction of secondary structure of protein,	20-05-2021	02		
		computational protein modelling		03		
				02		

## Practicals

Sr. No.	Subject	Practicals	Date	No. of Practicals
1	<b>Computational Biology</b>	A guided tour of NCBI/EBI : Data access – standard search engines : data retrievals tools – Entrez, DBGET and SRS (sequence retrieval systems); software for data building, submission of new revised data	11/2/2021 to 24/04/2021  Batch A,B,C,D	04
2		Sequence homology as product of molecular evolution, sequence similarity searches, sequence alignment-global, local, end free-space; measurement of sequence similarity, similarity and homology.		04
3		Multiple sequence alignment		04
4		Phylogeny reconstruction, PHYLIP package		04
5		Getting an amino acid sequence, nucleotide sequence by blasting		04
6		Multiple sequence alignment		04
7		Homology modeling		04
8		Protein identification & characterization with peptide mass fingerprinting data.		04
9		Primary structure analysis of proteins.		04

  
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