

# Rajarshi Shahu Mahavidyalaya, Latur

## ( Autonomous )

### Structured Work Plan for Teaching

(June – 2019 to March . 2019)

#### Details of Classes to be taught

Sr. No.	Class	Name of Asstt. Prof.	Subject	Paper
1	B.Sc. II	Manisha A. Dhotre	Biotechnology	Course Title: Metabolism Course Code : U-MET-401 Course Title: Lab Course XII Course Code: U-LAC-412
2	M.Sc. II			Course Title: Microbial Biotechnology Course Code:P-MIB-335 Course Title: Lab Course X Course Code: P-LAC-339

#### 1. Summary of Lesson Plan

Name of Teacher: Manisha A. Dhotre

Class

: B.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	Metabolism	<b>Unit 1</b> 1.Respiration 2.aerobic respiration – glycolysis and its regulation 3.Krebs cycles and its regulation 4.Substrate Level Phosphorylation 5.oxidative phosphorylation: ETC and its inhibitors 6.Electrochemical proton gradient chemiosmotic theory, ATP synthase, 7.P/O ratio,pasteur effect, warburg effect, respiratory quotient 8. Alcohol and Lactic acid Fermentation, cori cycle.	18-06-19 To 15-07-19	01 02 02 01 03 03 01 02	Classroom Group Discussion	Unit – I 27/07/19 Unit – II 14/08/19 Unit – III 29/08/19

		<p><b>Unit II</b></p> <p>1. Photosynthesis</p> <p>2. photosynthetic pigments, concept of photosynthetic unit, Hill reaction, oxygenic &amp; anoxygenic photosynthesis</p> <p>3. Light reaction: Cyclic and Non Cyclic</p> <p>4. Photophosphorylation</p> <p>5. Dark reaction: C<sub>3</sub>, C<sub>4</sub>, CAM , Photorespiration</p>	<p>15-07-19</p> <p>To</p> <p>07-08-19</p>	<p>01</p> <p>03</p> <p>03</p> <p>01</p> <p>04</p>		
		<p><b>Unit III</b></p> <p>1. Glyoxylate PW.</p> <p>2. Pentose Phosphate Pathway</p> <p>3. Entner-Doudoroff PW</p> <p>4. Carbohydrate metabolism – Gluconeogenesis, Glycogenesis, Glycogenolysis.</p> <p>5. <b>Lipid Metabolism</b> – Biosynthesis of FA</p> <p>6. Fatty acid oxidation, alternative PW of fatty acid oxidation</p> <p>7. Ketone bodies</p>	<p>07-08-19</p> <p>To</p> <p>05-09-19</p>	<p>01</p> <p>02</p> <p>01</p> <p>04</p> <p>04</p> <p>03</p> <p>01</p>		
		<p><b>Unit IV</b></p> <p>1. <b>Amino acid Metabolism:</b> Amino acid synthesis</p> <p>2. Amino acid catabolism</p> <p>3. urea cycle.</p> <p>4. <b>Nucleotide Metabolism</b> Nucleotide synthesis: De-Novo</p> <p>5. Salvage PW</p> <p>6. Nucleotide degradation.</p>	<p>05-09-19</p> <p>To</p> <p>10-10-19</p>	<p>03</p> <p>02</p> <p>01</p> <p>02</p> <p>02</p> <p>02</p>		

Sr. No.	Subject	Practicals	Date	No. of Practicals
1	Metabolism	Hydrolysis of Sucrose and Starch	02/07/19 To 24/10/19  Batch B,C,D	03
2		Qualitative Test for Amino Acids		03
3		Qualitative Test for Proteins		03
4		To Perform Fatty acid Titration		03
5		Estimation of Ketone Bodies		03
6		Determination of Urinary Titrable acidity		03
7		Estimation of Urinary Creatinine		03
8		Estimation of Enzyme activity of Acid Phosphatase		03
9		Estimation of Enzyme activity of $\beta$ -amylase		03
10		Estimation of Total Serum Cholesterol by Zak and Henley's method		03
11		Determination of Serum Bilirubin by Van de Bergh reaction		03
12		Solution of Problems in Biochemistry and Metabolism		03

Sr. No.	Class	Name of Asstt. Prof.	Subject	Paper
1	B.Sc. II	Manisha A. Dhotre	Biotechnology	<b>Course Title: Metabolism</b> <b>Course Code : U-MET-401</b> <b>Course Title: Lab Course XII</b> <b>Course Code: U-LAC-412</b>
2	M.Sc. II			<b>Course Title: Microbial Biotechnology</b> <b>Course Code: P-MIB-335</b> <b>Course Title: Lab Course X</b> <b>Course Code: P-LAC-339</b>

Name of Teacher: Manisha A. Dhotre

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	Microbial Biotechnology	<b>Unit 1</b> <b>Microbial Production of Organic Acids:</b> Production, recovery and applications of: 1. Citric acid 2. Lactic acid  <b>Microbial Production of Organic Solvents:</b> Production, recovery and applications of: 1. Alcohol 2. Glycerol 3. Acetone  <b>Microbial Production of Vitamins:</b> Production, recovery and applications of vitamins: 1. Vitamin-B12 2. Riboflavin	18-06-19 To 10-07-19	04  04	Classroom  Group Discussion	Unit – I 30/07/19 Unit – II 16/08/19 Unit –III 29/08/19
		<b>Unit II</b> <b>Microbial Production of Amino Acids:</b> Production, recovery and applications of amino acids:	10-07-19	04		

		<p>1.L-Glutamic acid 2.L-Lysine 3.L- Tryptophan</p> <p><b>Production of insulin and erythropoietin</b></p> <p><b>Biogas production from biomass:</b> Methane</p> <p><b>Bioleaching:</b> Mechanism of Bioleaching with example. <b>Biosorption</b> <b>Microbial recovery of petroleum</b></p>	<p>To 08-08-19</p>	<p>02</p> <p>02</p> <p>03</p>		
		<p><b>Unit III</b></p> <p><b>Production of Chemotherapeutic Agents</b> :Production, recovery and applications of antibiotics:</p> <p>1. Penicillin 2. Tetracycline 3. Erythromycin</p> <p><b>Production of microbial polysaccharides:</b>Production, recovery and applications of polysaccharides:</p> <p>1.Xanthan 2.Dextran 3.Alginate</p> <p><b>Production of Polyhydroxyalkanoates:</b></p> <p>1. Polyhydroxybutyrate (PHB) 2. Biopol-a biodegradable plastic</p>	<p>08-08-19 To 31-08-19</p>	<p>04</p> <p>04</p> <p>03</p>		
		<p><b>Unit IV</b></p> <p><b>Enzyme Technology:</b></p> <p>1. Immobilization of enzymes and cells. 2. Production and applications of : Proteases, Pectinases, Cellulase, amylase.</p> <p><b>Biotransformation:</b></p> <p>1. Types of bioconversion reactions: Oxidation, Reduction, Hydrolytic</p>	<p>31-08-19 To 10-10-19</p>	<p>06</p> <p>06</p>		

		reactions, Condensations <b>2.</b> Transformation of steroids and sterols <b>3.</b> Transformation of nonsteroid compounds: L-Ascorbic acid, Prostaglandins, Antibiotics.				
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Sr. No.	Subject	Practicals	Date	No. of Practicals
1	Microbial	Fermentative production of amylase by <i>Bacillus subtilis</i> .	01/07/190 to 24/10/19  Batch A and B	02
2	Biotechnology	Fermentative production of alpha amylase from fungi <i>Aspergillus niger</i>		02
3		Production of Sauerkraut by microorganism		02
4		Ethanol fuel production from Tissue Paper Waste or Molasses.		02
5		Estimation of Alcohol by specific gravity method		02
6		Estimation of Alcohol by Idometry test		02
7		I] Isolation and identification of lipase producer. II] Production and estimation of lipase producing organism.		02
8		Production of alkaline protease from <i>Bacillus</i> species.		02
9		I] Isolation and screening of Lactic acid producing bacteria II] Production and estimation of Lactic acid.		02
10		Isolation and Characterization of microorganisms used as Biofertilizer		04
11		Production of Extracellular Polysaccharide from <i>Rhizobium</i> Species isolated from leguminous Plant ( <i>Glycine max</i> )		04
12		Production of fermented milk by Lactobacillus.		04

# Rajarshi Shahu Mahavidyalaya, Latur

## ( Autonomous )

### Structured Work Plan for Teaching

(Dec. – 2019 to March 2020)

Details of Classes to be taught

Sr. No.	Class	Name of Asstt. Prof.	Subject	Paper
1	B.Sc. II	Manisha A. Dhotre	Biotechnology	Course Title: Enzymology Course Code : U-ENZ-498 Course Title: Lab Course XV Course Code: U-LAC-502
2	M.Sc. II			Course Title: Food and Nano Biotechnology Course Code:P-FNB-434 Course Title: Lab Course XIV Course Code: P-LAC-437

#### 1. Summary of Lesson Plan

Name of Teacher: Manisha A. Dhotre

Class

: B.Sc. BT. II (Fourth 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	Metabolism	<b>Unit I ENZYMES &amp; ENZYME CATALYSIS:</b> 1.General Features of enzymes 2.Characteristics of enzymes 3.Classification - IUB system, rationale, overview and specific examples, 4.Enzyme substrate complex, Concept of active centre, binding sites 5.Types of Specificity 6. Effect of different factors on reaction rate 7.Factors affecting catalytic	10-12-19 To 03-01-20	01 01 02 01 01 02	Classroom  Group Discussion	Unit – I 09/01/20 Unit – II 15/02/20 Unit – III 26/03/20

	<p>efficiency - proximity and orientation effects, distortion or strain, acid - base and nucleophilic catalysis</p> <p>8.Methods for studying fast reactions</p> <p>9. Chemical modification of enzymes</p> <p>10.Isoenzymes and multiple forms of enzymes.</p> <p>11.Examples of Enzymatic Reactions: Lysozyme and Chymotrypsin, Zymogen, Ribozyme.</p>		02		
	<p><b>Unit II.</b> <b>APPLICATION AND CHARACTERISATION OF ENZYMES</b></p> <p>1.Commercial application of enzymes in food pharmaceutical and other industries</p> <p>2. Commercial application of Enzymes for analytical and diagnostic applications</p> <p>3.Production and Purification of Crude Enzyme extracts from plant, animal and microbial sources-some case studies</p> <p>4.Methods of characterization of enzyme</p> <p>5..development of enzymatic assays.</p>	04-01-20 To 22-01-20	02		
	<p><b>Unit III ENZYME KINETICS:</b></p> <p>1.Michaelis - Menten Equation - form and derivation, steady state enzyme kinetics</p> <p>2.Significance of Vmax and Km,</p> <p>3.Bisubstrate reactions</p> <p>4.Graphical procedures in</p>	23-01-20 To 10-02-20	02	01	01
			02		

	<p>enzymology - advantages and disadvantages of alternate plotting</p> <p>5. Enzyme inhibition - types of inhibitors - competitive, non-competitive and uncompetitive, their mode of action and experimental determination. 6.Enzyme activity, international units, specific activity, turnover number</p> <p>7. end point kinetic assay</p>		03		
	<p>Unit IV</p> <p>ENZYME REGULATION &amp; IMMOBILIZED ENZYMES</p> <p>1.Product inhibition, feedback control</p> <p>2.enzyme induction and repression and covalent modification, Allosteric regulation</p> <p>3. Relative practical and economic advantage for industrial use, effect of partition on kinetics and performance with particular emphasis on charge and hydrophobicity (pH, temperature and Km)</p> <p>4.Various methods of immobilization - ionic bonding, adsorption, covalent bonding (based on R groups of amino acids), microencapsulation and gel entrapment. Immobilized multienzyme systems</p> <p>5.Biosensors - glucose oxidase, cholesterol oxidase, urease and</p>	<p>11-02-20</p> <p>To</p> <p>25-03-20</p>	01	03	02
			03		04

		antibodies as biosensors.				
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Sr. No.	Subject	Practicals	Date	No. of Practicals
1	Enzymology	To study effect of $\alpha$ amylase activity on starch	16/12/19 To 31/03/20  Batch C,D,E	03
2		Determination of $\alpha$ amylase activity		03
3		To study effect of pH on $\alpha$ amylase activity		03
4		To study effect of Substrate on $\alpha$ amylase activity		03
5		To study effect of Salt on $\alpha$ amylase activity		03
6		To study effect of Temperature $\alpha$ amylase activity		03
7		To study effect of Time on $\alpha$ amylase activity		03
8		A] Immobilization of Yeast cells by Calcium-Alginate Entrapment method B] Determination of viability of immobilized Cells by invertase activity		03
9		Hydrolysis of sucrose by yeast $\beta$ -Fructofuranosidase		03
10		Determination of Hydrolyzed Sucrose solution by Benedict Method		03
11		Indirect Estimation of Lactate Dehydrogenase		03
12		A] Purification of HRP by Affinity Chromatography B] Estimation of HRP activity		03
13		Problems Based on MM equation and Lineweaver-Burk plot		03



		<p>Applications</p> <ul style="list-style-type: none"> <li>• Sweeteners: Types and Applications.</li> <li>• Causes of food spoilage</li> <li>• Food Preservation Methods</li> </ul>		01 02 02		
		<p><b>Unit-II:</b> <b>Fermented Food Products</b></p> <ul style="list-style-type: none"> <li>• Fermentation technology for traditional food of the Indian subcontinent</li> <li>• Solid state fermentations for food applications</li> <li>• Genetic engineering of bakers yeast Biotechnology of wine yeast</li> <li>• Biotechnology of beta carotene from Dunaliella</li> <li>• SCP: Spirulina and Chlorella</li> </ul>	03-01-20 To 25-01-20	02 01 02 02 02		
		<p><b>Unit-III :</b></p> <ul style="list-style-type: none"> <li>• Molecular evolution and diversity of food borne pathogens</li> <li>• Application of microbial molecular techniques for food systems</li> <li>• Application of ELISA assays for detection and quantitation of toxins in foods and <i>E.coli</i> in food</li> <li>• Biosensors for food quality assessment</li> <li>• Biotechnological approaches to improve nutritional</li> </ul>	27-01-20 To 22-02-20	02 02 02 02		

		<p>quality and shelf life of fruits and vegetables</p> <ul style="list-style-type: none"> <li>• Biotransformation applicable to food industries</li> <li>• Functional foods: Concept of Prebiotics, Probiotics and Nutraceuticals</li> </ul>		02		
		<p><b>Unit IV</b></p> <p><b>Nano Biotechnology</b></p> <ul style="list-style-type: none"> <li>• The nanoscale dimension and paradigm.</li> <li>• Types of nanomaterials and their classifications. D, 2D and 3D etc.</li> <li>• Nanocrystal, Nanoparticle, Quantum dot, Quantum Wire and Quantum Well etc. Polymer, Carbon, Inorganic, Organic and Biomaterials – Structures and characteristics.</li> <li>• Physical and Chemical Fundamentals of Nanomaterial. Green Synthesis of Nanoparticles using bacteria and plants.</li> <li>• Characterization of nanoparticles..</li> </ul>	23-02-20 To 25-03-20	01  02  03  02  02		

Sr. No.	Subject	Practicals	Date	No. of Practicals
1	Food and Nano Biotechnology	Determination of quality of milk sample by methylene blue reduction test	16/12/19 to 31/03/20  Batch A and B	02
2		Determination of physiological properties of milk		02
3		Determination of calcium and phosphorous in milk		02
4		Efficiency of pasteurization of milk by phosphates test		02
5		Quantitative analysis of milk by standard plate count ( SPC) method		02
6		Estimation of Ascorbic Acid		02
7		Isolation and characterization of food fermenting micro-organisms from idli batter		02
8		Isolation of probiotics micro-organisms from various sources		02
9		Effect of temperature on growth of probiotics micro-organisms		02
10		Effect of pH on growth of probiotics micro-organisms		02
11		Effect of salt concentration on growth of probiotics micro-organisms		02
12		Estimation of lactic acid		02
13		Production of nanoparticles		02