



Shiv Chhatrapati Shikshan Sanstha's  
**Rajarshi Shahu Mahavidyalaya, Latur**  
**(Autonomous)**  
**Department of Biotechnology**  
**Structured Work Plan for Teaching**  
**Academic Year 2018-19 (Term-I)**

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

| Sr. No. | Class    | Name of Asstt. Prof. | Subject       | Paper  |
|---------|----------|----------------------|---------------|--|
| 1       | M.Sc. II | S. S. Kshirasagar    | Biotechnology | <b>Course Title: Plant Biotechnology</b><br><b>Course Code : P-PLB-337</b><br><br><b>Course Title:</b><br><b>Lab course XII</b><br><br><b>Course Code:</b><br><b>P-LAC-341</b> |

**2. Summary of Lesson**

| 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       | Plant Biotechnology | <b>UNIT I</b><br><b>Plant Tissue Culture-I</b> <ul style="list-style-type: none"> <li>➤ Introduction to cell and tissue culture</li> <li>➤ Tissue culture media: Composition and Preparation.</li> <li>➤ Initiation and maintenance of callus and suspension culture</li> <li>➤ Organogenesis: Principle, Concept and Applications of Somatic embryogenesis</li> <li>➤ Rapid clonal propagation and production of virus free plants.</li> </ul> | 22-06-18<br>To<br>14-07-18 | 03<br><br>02<br><br>02<br>02<br>01<br><br>01 | Group Discussion                    | Unit – I<br>16/07/18<br>Unit – II<br>20/08/18<br>Unit – III<br>3/09/18 |

|  |  |   |                            |  |  |  |
|--|--|---|----------------------------|--|--|--|
|  |  | <b>UNIT II</b><br><br>➤ Protoplast culture: Importance, Isolation of protoplasts, method of protoplast culture, culture media, Growth and division of protoplast, regeneration of plants<br><br>➤ Embryo culture and embryo rescue<br>➤ Anther, Pollen and Ovary culture for production of haploid plants and homozygous lines<br>➤ Cryopreservation, slow growth and DNA banking for germ plasm conservation<br>➤ Commercial application of tissue culture technology, examples: banana and Sugarcane. | 16-07-18<br>To<br>04-08-18 | 02<br><br><br>02<br><br>03<br>03<br><br>02<br><br>02<br><br>03 |  |  |
|  |  | <b>UNIT III</b><br><b>Plant molecular biology</b><br>➤ Gene structure, expression, and regulation in plants<br>➤ <i>Agrobacterium tumefaciens</i> and the genetic engineering of plants   | 06-08-18                   | 02<br><br>02<br><br>02   |  |  |

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|--|--|--|----------------------------|--|--|--|
|  |  | <ul style="list-style-type: none"> <li>➤ Mechanism of gene transfer from <i>Agrobacterium</i> to plants</li> <li>➤ Strategies for gene transfer in plants</li> <li>➤ Molecular markers and marker assisted selection</li> </ul>  | To<br>10-09-18             | 04   |  |  |
|  |  |  |                            | 04   |  |  |
|  |  | <b>UNIT IV</b><br><br><b>Transgenic Crops</b> <ul style="list-style-type: none"> <li>➤ Crops with Tolerance / resistance to biotic stresses, viruses, fungal and bacterial diseases:</li> <li>➤ Crops with Tolerance / resistance to abiotic stresses (Herbicides and drought conditions):</li> <li>➤ GM crops,</li> <li>➤ Medical applications of GM plants</li> <li>➤ Terminator technology</li> <li>➤ Ecological risk assessment of genetically modified crops</li> </ul> | 11-09-18<br>To<br>15-10-18 | 02<br><br>02<br><br>02<br><br>02<br><br>01 |  |  |

| Sr. No. | Subject | Practicals                             | Date                      | No. of Practicals |
|---------|---------|--|---------------------------|-------------------|
| 1       |         | Plant tissue culture laboratory design | 2/07/18<br>To<br>15/10/18 | 05                |
| 2       |         | Plant tissue culture laboratory design |                           | 05                |
| 3       |         | Aseptic techniques                     |                           | 05                |
| 4       |         | Media preparation                      |                           | 05                |
| 5       |         | Micro propagation                      |                           | 05                |



|    |  |                      |             |    |
|----|--|----------------------|-------------|----|
| 6  |  | Anther culture       | Batch B,C,D | 05 |
| 7  |  | Plant DNA isolation  |             | 05 |
| 8  |  | Protoplast isolation |             | 05 |
| 9  |  | Embryo culture       |             | 05 |
| 10 |  | RAPD                 |             | 05 |



**Course Teacher**



**HoD  
Head**

Department of Biotechnology  
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(Autonomous) Latur-413 53



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**Structured Work Plan for Teaching**  
**Academic Year 2018-19 (Term-I)**

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

| Sr. No. | Class    | Name of Asstt. Professor | Subject       | Paper  |
|---------|----------|--------------------------|---------------|--|
| 1       | B.Sc. II | S. S. Kshirasagar        | Biotechnology | <b>Course Title: Environment Biotechnology</b><br><b>Course Code: U-ENB-400</b><br><b>Course Title: Lab Course XI</b><br><b>Course Code: U-LAC-404</b> |

**2. Summary of Lesson**


| 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       | Environment Biotechnology | <b>Unit I</b><br><br><b>Components of Environment and Global Environmental Problems</b><br><b>08</b><br>Hydrosphere, lithosphere, atmosphere and biosphere – definitions with examples; Interaction of man and environment;<br>Environmental Studies as a multidisciplinary subject.<br>Green House Effect, Acid rain, El Nino Effect, | 22-06-18<br>To<br>11-07-18 | 04<br><br><br>04<br><br><br>04 | Classroom<br><br><br>Group Discussion | Unit – I<br>11/07/18<br>Unit – II<br>20/08/18<br>Unit –III<br>03/09/18 |


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|--|--|--|----------------------------|--|--|--|
|  |  | Ozone depletion,<br>Biodiversity loss  |                            |  |  |  |
|  |  | <b>Unit-II:</b><br><b>Environmental pollution and Environmental Management 10</b><br>Pollution of air, water and land with reference to their causes, nature of pollutants & impact<br>Environmental damage by agriculture,<br>Perspectives of pollution in urban, industrial and rural areas.<br>Habitat Pollution<br>Environmental diseases – infectious (Water and air borne) and pollution related,<br>Solid waste management. | 13-07-18<br>To<br>31-07-18 | 04<br><br><br><br><br>02<br><br>02<br><br>03 |  |  |
|  |  | <b>Unit-III :</b><br><b>Waste water treatment and management</b><br><b>Domestic Waste Water Treatments:</b> Preliminary, Primary, Secondary and Tertiary.<br><b>Waste water treatment Reactors:</b> Introduction and types in brief<br><b>Aerobic Biological Treatments:</b> Activated sludge process, Lagoons<br><b>Anaerobic Biological Treatments:</b> upflow anaerobic sludge blanket (UASB) reactor, Fluidized bed reactor.   | 02-08-18<br>To<br>30-08-18 | 04<br><br><br><br><br>04<br><br><br><br>03   |  |  |
|  |  | <b>Unit IV</b><br><b>Biodegradation and Bioremediation</b><br><br><b>Biodegradation of Hydrocarbon</b>   | 03-09-18<br>To<br>3-10-18  | 06   |  |  |



|  |  |   |  |    |  |  |
|--|--|---|--|----|--|--|
|  |  | <b>Xenobiotics biodegradation-pesticide biodegradation</b><br><br><b>Bioremediation:</b> Introduction, Definition and Concept,<br><br>Methods of Bioremediation (In Situ and Ex Situ Methods)<br><br><b>Phytoremediation:</b> Concept and Types |  | 06 |  |  |
|--|--|---|--|----|--|--|

| Sr. No. | Subject | Practicals  | Date  | No. of Practicals |
|---------|---------|---|---|-------------------|
| 1       |         | Determination of Dissolved oxygen(D.O.)                           | 02/07/18<br>to<br>15/10/18<br><br>Batch A and B | 02                |
| 2       |         | Determination of carbon dioxide( $\text{CO}_2$ )                  |   | 02                |
| 3       |         | Determination of Biochemical oxygen demand (BOD).                 |   | 02                |
| 4       |         | Presumptive test  |   | 02                |
| 5       |         | Confirmed test  |   | 02                |
| 6       |         | Completed test  |   | 02                |
| 7       |         | Determination of Chemical Oxygen demand (COD)                     |   | 02                |
| 8       |         | Determination of Hardness of given water sample.                  |   | 02                |
| 9       |         | Determination of $\text{pH}$ of given water sample                |   | 02                |
| 10      |         | Determination of alkalinity and chlorinity of given water sample. |   | 04                |

  
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**Structured Work Plan for Teaching**  
**Academic Year 2018-19 (Term-II)**

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

| Sr. No. | Class   | Name of Asstt. Professor | Subject       | Paper   |
|---------|---------|--------------------------|---------------|---|
| 1       | M.Sc. I | S. S. Kshirasagar        | Biotechnology | <b>Course Title: Immunology &amp; immunotechniques</b><br><b>Course Code : P-IMI-233</b><br><b>Course Title: Lab course VI</b><br><b>Course Code: P-LAC-237</b> |

**2. Summary of Lesson**

| 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       |         | <b>UNIT I</b><br>Historical perspective and importance of Immunology<br>Innate and Adaptive Immune response.<br>Hematopoiesis, Cells of Immune system and their biological role.<br>Humoral and cell mediated Immunity.<br>Primary and Secondary immune responses.<br>The Primary and secondary lymphoid organs and their interaction,<br>MHC molecules,<br>Antigen processing and presentation (antigen presenting cells, endocytic, cytosolic pathway).<br>BCR and TCR (structure and properties),<br>Cytokines & signal transduction. | 03-12-18<br>To<br>04-01-19 | 15L<br>01<br>02<br>03<br>01<br>01<br>03<br>01<br>01<br>01<br>01 | Group Discussion                    | Unit – I<br>06/01/19                         |





|  |  |  |   |                 |                       |
|--|--|--|---|-----------------|-----------------------|
|  |  | <b>UNIT II</b><br><b>Antigen:</b> Characteristics of antigen & its types, Factors that Influence Immunogenicity, Epitopes, Haptens and the Study of Antigenicity, adjuvant and its types.<br><br>Antigen engineering for better immunogenicity, Antigenicity and Immunogenicity,<br><br>Biology of superantigens.<br><br><b>Antibody:</b> Discovery of antibody structure by chemical and enzymatic Methods.<br><br>General Structure of antibody molecule, Function of antibody molecule. Affinity and Avidity, Valency of Antibody.<br><br>Antibodies- Types, variation in structure of antibody and their biological significance. Organization and Expression of Immunoglobulin Genes.<br><br><b>Antigen – Antibody Interaction:</b> Strength of Antigen-Antibody Interactions, Cross-Reactivity.<br><br>Precipitation and Agglutination reactions, Radioimmunoassay, ELISA, Western Blotting, Flow cytometry and Fluorescence, Immunoprecipitation, | 12L<br>01<br><br>05-01-19 To 29-01-19<br><br>01<br><br>01<br><br>01<br><br>01<br><br>01<br><br>01<br><br>04 | Home Assignment | Unit – II<br>01/02/19 |
|--|--|--|---|-----------------|-----------------------|


|  |  |   |                            |  |                  |                        |
|--|--|---|----------------------------|--|------------------|------------------------|
|  |  | Immunoelectronmicroscopy, chemiluminescence assay.  |                            |  |                  |                        |
|  |  | <b>UNIT III</b><br><br><b>Complement system:</b> Activation of Complement systems (alternative, classical & lectin pathway) and its Functions.<br><br><b>Hypersensitivity:</b> Hypersensitivity reactions and its types.<br><br><b>Immunodeficiency Conditions:</b> Primary immunodeficiency (SCID), Secondary immunodeficiency (AIDS).<br><br><b>Autoimmunity:</b> Organ specific autoimmune diseases and Systemic autoimmune diseases.<br><br><b>Immunity to infectious diseases:</b> Immune response during bacterial (tuberculosis), parasitic (malaria) and viral (HIV) infections.<br><br><b>Tumor Immunology:</b> Tumor Antigens, Cancer Immunotherapy | 30-01-19<br>To<br>26-02-19 | <b>10L</b><br><br>02<br><br><br>01<br><br><br>01<br><br><br>02<br><br><br>02<br><br><br>02 | Quiz             | Unit – III<br>28/02/19 |
|  |  | <b>UNIT IV</b><br><br><b>Transplantation Technology:</b> Types of graft (auto, Iso, Allo, and xeno graft), Specificity and memory of rejection response, Mechanisms involved in graft rejection ,Bone marrow chimera.   | 27-02-19<br>To<br>21-03-19 | <b>08L</b><br><br>02   | Group discussion | Unit – IV<br>23/03/19  |

|  |  |   |  |    |  |  |
|--|--|---|--|----|--|--|
|  |  | <b>Vaccine Technology:</b> Active and Passive Immunization, Live attenuated vaccines, subunit vaccines, conjugate vaccines, multivalent subunit vaccines, DNA vaccines, Recombinant vector vaccines, edible vaccines. |  | 02 |  |  |
|  |  | <b>Antibody engineering:</b> Monoclonal antibody, Purification of antibodies, Chimeric antibodies, phage display, large scale production of MAb antibodies, Applications of MAb in diagnosis and therapy.             |  | 04 |  |  |

| Sr. No. | Subject                       | Practicals                                       | Date  | No. of Practicals |
|---------|-------------------------------|--|---|-------------------|
| 1       | Immunology & immunotechniques | Agglutination reaction                           | 03/12/19<br>To<br>29/03/29<br><br>Batch A & B | 02                |
| 2       |                               | Blood film preparation & Identification of cells |   | 02                |
| 3       |                               | Determination of bleeding time                   |   | 02                |
| 4       |                               | Determination of clotting time                   |   | 02                |
| 5       |                               | VDRL   |   | 02                |
| 6       |                               | Radial immunodiffusion,                          |   | 02                |
| 7       |                               | Simple Double diffusion                          |   | 02                |
| 8       |                               | Ouchterlony Double diffusion                     |   | 02                |
| 9       |                               | Widal  |   | 02                |
| 10      |                               | Rocket immunoelectrophoresis.                    |   | 02                |
| 11      |                               | Microscopic observation of lymphoid organs       |   | 02                |

  
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**Structured Work Plan for Teaching**  
**Academic Year 2018-19 (Term-II)**

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

| Sr. No. | Class    | Name of Asstt. Prof. | Subject       | Paper   |
|---------|----------|----------------------|---------------|---|
| 1       | M.Sc. II | S. S. Kshirasagar    | Biotechnology | <b>Course Title: Environment Biotechnology</b><br><b>Course Code: P-ENB-435</b><br><b>Course Title: Lab Course XIV</b><br><b>Course Code: P-LAC-437</b> |

**2. Summary of Lesson**

| 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       | Environment Biotechnology | <b>Unit-I:</b><br><b>Ecology &amp; Environment:</b><br>Ecosystem structure and functions, abiotic and biotic component.<br><br>Energy flow, food chain, food web. Ecological Pyramids-types.<br><br>Biogeochemical cycles.<br>Ecological succession, Ecads and ecotypes.<br>Ecology and its relevance to man, natural resources.<br>Threats to Environment - Global and regional threats to the | 03-12-18<br>To<br>27-12-18 | 12<br><br>02<br><br>02<br><br>04<br><br>02 | Group Discussion                    | Unit – I<br>28/12/19                         |

|  |  |  |                                     |  |                 |                       |
|--|--|--|-------------------------------------|--|-----------------|-----------------------|
|  |  | <p>environment.</p> <p>Sustainable management and conservation of environment.</p> <p>Agro ecology; cropping pattern as indicators of environments.</p>  |                                     | 02   |                 |                       |
|  |  | <p><b>Unit-II:</b></p> <p><b>Environmental Pollution:</b><br/>Classification of pollutants.<br/>Air pollution and their properties,<br/><br/>Water pollutants and their properties.<br/><br/>Environmental pollution and associated hazards to crops, animals and humans.<br/><br/>Greenhouse effect and global warming<br/><br/>Climate change - International conventions and global initiatives.</p>            | <p>28-12-18<br/>To<br/>22-01-19</p> | <p>11<br/><br/>02<br/>01<br/>02<br/><br/>03<br/>03</p> | Home Assignment | Unit – II<br>23/01/19 |
|  |  | <p><b>Unit-III :</b></p> <p><b>Biotechnological processes:</b><br/>Waste water treatment plant.<br/>Physical, Chemical and Biological unit operations/processes-overview,<br/>Activated Sludge Process, Trickling Filters, Oxidation ponds, anaerobic biological treatment process.<br/><br/><b>Biotechnology in Remediation:</b><br/>Introduction to bioremediation, Advantages, limitations and applications</p> | <p>23-01-19<br/>To<br/>18-02-19</p> | <p>12<br/><br/>02<br/>02<br/><br/>02</p>               | Quiz            | Unit –III<br>20/02/19 |







|    |  |  |                  |    |
|----|--|--|------------------|----|
| 9  |  | Determination of Chemical Oxygen Demand of polluted water. | 28-03-19         | 02 |
| 10 |  | Isolation of pathogens from air                            |                  | 02 |
| 11 |  | Isolation of pathogens from water                          | Batch A and<br>B |    |
| 12 |  | Estimation of alkalinity of given sample.                  |                  | 02 |



Course Teacher



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