

<b>Course title:</b> Plant Biotechnology Laboratory – Part 2			
<b>Course code:</b> BBP 102	<b>No. of credits:</b> 7	<b>L-T-P:</b> 0-0-196	<b>Learning hours:</b> 196
<b>Pre-requisite course code and title (if any):</b> None			
<b>Department:</b> Department of Biotechnology			
<b>Course coordinator:</b> Dr.Anandita Singh		<b>Course instructor:</b> Dr.Anandita Singh/Dr. Udit Soni/Dr. Chaithanya Madhurantakam / Dr.Shashi Bhushan Tripathi	
<b>Contact details:</b> asingh@terisas.ac.in /udit.soni@terisas.ac.in /chaithanya.madhurantakam@terisas.ac.in /shashi.tripathi@terisas.ac.in			
<b>Course type:</b> Core			
<b>Course offered in:</b> Semester 2			
<b>Course description:</b> This laboratory course has been designed to expose students to key methodologies employed in plant biotechnology research. In the first module, hands-on training will be provided in plant tissue culture techniques. The focus will also be to demonstrate the impact of hormones and other chemical reagents on plant growth and development. Finally, application of tissue culture techniques in crop improvement viz. genetic transformation and breeding will be introduced. Production of secondary metabolites and other economically important biochemical will also be covered. The second and third module have been included to expose the students to theoretical and practical aspects of enzymology and immunochemistry employed in experimental plant biology.			
<b>Course objectives:</b> 1. To familiarize students to Plant Tissue Culture (PTC) laboratory setup. 2. To provide training in plant tissue-culture and micropropagation techniques. 3. Importance of media composition and selection in plant tissue culture 4. To demonstrate centrality of plant regeneration techniques in crop improvement and production of secondary metabolites of economic importance. 5. To develop the mechanistic understanding of enzyme and enzyme-catalysed processes. 6. Application of principles of immunotechnology to various research and diagnostic procedures.			
<b>Course contents</b>			
<b>S.No</b>	<b>Topic</b>	<b>L</b>	<b>T</b>
<b>Module 1</b>	<b>Plant regeneration and micropropagation techniques (Introduction and methodology)</b>		
<b>1</b>	Introduction to Plant Tissue Culture Laboratory Nutritional components of Tissue Culture Media		
<b>2</b>	Introduction to aseptic techniques Introduction to different types of explants Surface sterilization techniques Callus initiation and Maintenance		
<b>3</b>	Cell suspension cultures		
<b>4</b>	Organogenesis		
<b>5</b>	Axillary branching		
<b>6</b>	Somatic Embryogenesis		
<b>7</b>	Generation and molecular analysis of transgenics		
<b>Module 2</b>	<b>Enzymology</b>		
<b>1</b>	Enzyme kinetics and factor affecting, inhibitors, protein extraction and estimation, colorimetric assays, enzyme crystallization		
<b>Module 3</b>	<b>Immunochemistry</b>		
<b>1</b>	Antigen-antibody interactions, ELISA, immunodiffusion, protein-protein interaction studies		
	<b>Total</b>		

**Evaluation criteria:**

1. Attendance : 5%
2. Discipline and Good Lab Practices : 5%
3. Preparation of report(s) / Lab record(s) : 20%
4. Experiment(s) conducted : 30%
5. Spotting : 20%
6. Viva-voce : 20%

**Learning outcomes:**

Proficiency in PTC techniques.

2. Ability to adapt and apply PTC techniques to research problems in plant biology,.
3. Ability to understand and analyse enzymatic reactions in living systems.
4. Ability to grasp the molecular interactions and mechanistic details of various immunotechnology methods.

**Materials:**

**Additional information (if any):** Coordinator may choose experiments from this list, which should be considered merely representative, not exhaustive. The objective is to give students sufficient exposure to several aspects of experimental modern biology as per the coverage in the first semester.

**Student responsibilities:**

1. Class attendance.
2. Study of course materials as specified by the instructor.
3. Timely Laboratory record maintenance

**Course reviewers**

Reviewed and commented on by the following experts.

1. Dr. Prem P. Jauhar, Research Geneticist, USDA
2. Dr. J.S. Virdi, Professor, University of Delhi