

Course title: Immunochemistry				
Course code: BBP 130		No. of credits: 3	L-T-P: 21-21-0	Learning hours: 42
Pre-requisite course code and title (if any): None				
Department: Department of Biotechnology				
Course coordinator: Dr.Chaitanya Madhurantakam			Course instructor : Dr.Chaitanya Madhurantakam	
Contact details: chaithanya.madhurantakam@teriuniversity.ac.in				
Course type: Core			Course offered in: Semester 2	
Course description: This core course seeks to provide fundamental knowledge of immunological techniques routinely used for analysis in plant biotechnology applications. Students will be oriented into developing a basic understanding of the immune system, antigen-antibody interactions and their applications in various immunoassay systems. Further, latest techniques used to study protein-protein, protein-DNA/RNA interactions and tools used in microscopic sectioning and imaging will also be elaborated. The course is aimed at developing an integrated analytical approach for studying the molecular interactions in a biological system.				
Course objectives: 1. To outline an array of immunological techniques routinely used for analysis in plant molecular biology. 2. To introduce the current technological interventions for studying the molecular events in a plant system. 3. To develop an integrated analytical approach for studying the molecular interactions in a biological system.				
Course contents				
S.No	Topic	L	T	P
1	Introduction to immunology Antibodies/ Immunoglobulins- structure and function, antigenic determinants (isotype, allotype, idiotype). Monoclonal antibodies. Hybridoma technology. Antibody engineering, Antigens, Types of antigens, Characteristics of an antigen, Adjuvants Acquired and innate immunity, Raising antibodies in an animal system, Complement system.	4	4	
2	Antigen-antibody reactions Immuno assay systems, Immunoprecipitation reactions, Enzyme-Linked Immunosorbent Assay (ELISA) system, agglutination reactions, complement tests, RIA. Solid-Phase-Immunoassay, Immunofiltration (ELIFA), Fluorescent antibody technique, Western/south-western/ Northwestern techniques, Radial immunodiffusion, (RID), Rocket electrophoresis, Immunoelectrophoresis, Nephelometry, Cell Sorting, Countercurrent electrophoresis..	5	5	0
3	Protein-Protein/DNA interactions Yeast two hybrid, Phage Display, TAP- TAG Technology, Protein Chips, Synthetic lethal screens, Yeast one hybrid, Gel retardation assay, Pull down assays, expression library screening. Bimolecular fluorescence complementation (BiFC), Fluorescence resonance energy transfer (FRET), Label transfer, Quantitative immunoprecipitation combined with knock-down (QUICK), Dual Polarisation Interferometry (DPI), Static Light Scattering (SLS), Surface plasmon resonance, Fluorescence correlation spectroscopy, Protein-protein interaction maps.	8	6	0
3	Immunocytochemistry Tissue Fixation and sectioning, Specimens for LM Immunocytochemistry • Single cells (suspensions cultures), Protoplasts, Sectioning for LM/EM Immunocytochemistry, Cryo-sectioning for Immunolabelling, Resin Embedding for LM/EM Immunocytochemistry, Freeze-Shattering to Permeabilise Cells, Freeze-Fracture technique, Antibody labeling: Primary Ab Vs Secondary Ab labeling. Immunostaining for studying plant metabolic pathways, Simultaneous	4	6	0

	doubleimmunostaining, Negative Stain Immunogold Labelling, Immunofluorescence			
	Total	21	21	0
Evaluation criteria:				
1. 2 minor tests : 30% each				
2. 1 major test (end semester) : 40%				
Learning outcomes:				
1. A basic understanding of the various immunological tools and techniques frequently used for studying molecular events in a plant system.				
2. An exposure to advances in immunochemistry and available alternatives for examining molecular mechanisms in plants.				
3. An ability to utilize the tools and techniques for deciphering the biochemical interactions leading to physiological phenomena at the cellular level.				
Materials:				
Suggested readings				
1. Kuby's Immunology, 5th ed. Goldsby, R A., Kindt, T.J, Osborne, B.A.(2003) W. H. Freeman and company, New York.				
2. Immunochemistry 1 & 2; A Practical Approach Alan P. Johnstone; Malcolm W. Turner				
Additional information (if any):				
Student responsibilities:				

Course reviewers: