



Tentative Course Plan
DEPARTMENT OF _____

Class: B.S.Botany Semester- 8th (Botany) Session: 2016-20

Instructor	Dr.Musarrat		Email:musarrat.ramzan@iub.edu.pk	
Course Title	AdvancePlant Culture Techniques		Program	BS.Botany
Course Number	BOTA-01803		Credit Hours	3 (2+1)
Lectureday: period (00:00a.m to 00: 00a.m), Room# 00			
Course Objective: This course is intended to introduce the student to the principles and practical considerations of animal and plant cell and tissue culture. The focus of Tissue Culture I will be on routine maintenance of cultures. This course examines and discusses the principles, protocols and utilization of plant cell tissue culture systems. In vitro propagation and regeneration, mutagenesis and selection, secondary metabolite elicitation and cell transformation techniques including protoplast fusion, direct DNA uptake and plant bacterial co-cultivation will be emphasized.				
Course Outcomes: 1. understand the theory and principles of cellular toti-potency 2. 1. Know the mechanisms by which plant cells revert back from a seemingly terminal situation, to regenerate further. 3. 2. Understand the principles and methods behind single cell regeneration which is known as 'plant cell and tissue culture'. 4. 3. Know and apprecitae the various methods or pathways by which single cells develop into a tissue, organ or whole plant. 5. Know how to regenerate plants in sterile environment. 6. Understand if the GMOs are boon or bane and the possible social issues associated with it. 7. Know how to use plant cell and tissue culture techniques for both research and commercial purposes.				
Methods of Teaching ✓ Assigned readings ✓ Group activities & Discussion ✓ Audiovisual aids lectures ✓ Web-assisted instruction ✓ Student-Directed Teaching				
Resource Material	1.Books Prescribed: 1.Harrison, M.A., & Rae, I.F., (1997), <i>General Techniques of Cell Culture</i> , Cambridge University Press. 2.Dixon, R.A., (1985), <i>Plant Cell Culture: Practical Approach</i> , IRLPress. 3.Doyle, A., & Griffiths, J.B., (2000), <i>Cell and Tissue Culture for Medical Research</i> , John Wiley and Sons. 4.Chawla, H.S., (2002), <i>Introduction to Plant Biotechnology</i> , 2 nd Ed., Science Publisher.			
	2.Reference Book		3.Research Papers	
	i		i	
	ii		ii	
	4.Hot Research Papers		5.Web Resources	
	i		i	
	ii		ii	
Office Help Hoursday,day: 00:00am			
Grading	Exam (Date to be announced) Mid- Exam (30%) Final Exam (50%) Problem Session/Assignments (20%)			
Problem Sessionday: 00 and 00 periods (0:00-00:00am), Room# 00			
SEQUENCE OF TOPICS TO BE COVERED				
Session #	Topics (outline of main topics and sub topics)		Chapter #	Tutorial /Laboratory

1	General introduction and background of Tissue culture techniques	Introduction and History	Laboratory organization
2 & 3	An overview of background, advantages, limitations, terms and definitions, cell lines	Plant culture	Media preparation
4 & 5	Culture environment, cell adhesions, cell proliferation, differentiation and evolution of cell line.	Biology of cultured cell	
5 & 6	Design and layout for wash area, media preparation, observation and storage room transfer area for aseptic manipulation, culturerooms, data collection areas, lab wares	Laboratory organization	Sterilization methods
7 & 8	Objectives, element of aseptic environment, sterile handling, general safety, risk assessment, radiation and biohazards.	Good Safety practices	
9 & 10	Sterilization, importance, methods of sterilization of equipments, culture media and explants	Instrumentation and sterilization techniques	
11 & 12	Introduction, types of media and important, preparation of stocks, pH, buffers and their significance in media.	Tissue culture Media	
13 & 14	Media constituents vitamins, unidentified supplements, carbohydrates for energy source, nitrogen source and organic supplements, complex substances, hormones, Activate charcoal, An appraisal of different media, selection of media, preparation and designing	Tissue culture Media	Explant preparation
15	Mid Term Exam	Course/Discussion from session 1 to 14	
16 & 17	Cell suspension culture, callus culture, Embryo culture, Haploid culture, microspore and macrospore culture, triploid culture, endosperm culture	Types of culture	Inoculation,
18 & 19	Current status of in vitro propagation in agriculture, crops and forestry Techniques: Meristem and shoot tip culture, bud organogenesis, virus indexing, transfer of plants to greenhouse Advantages and limitations of Micropropagation, importance of micropropagation in crop improvement.	Regeneration	Maintenance of cultures
20 & 21	In vitro rooting, use of PGRS, effects of media use of alternative substrates (Perlite and vermicillite), use of activated charcoal, culture environment	Rooting	
22 & 23	Ex vitro rooting, advantages of microcutting rooting, use, composition of sowing mixtures and additives culture environment	Rooting	
24 & 25	Need for hardening micropropagated plantlets, reasons and techniques in acclimatization	Hardening	Transfer of plantlets to greenhouse
26 & 27	Designing laboratory for small, and large scale production of plants, cost of micropropagation, methods to reduce cost of micropropagation, b. Alternative cultural techniques: Hydroponics, Aeroponics	Commercial micropropagation	
28 & 29	Contamination, vitrification, malformation, browning, phenolic and latex compounds, decline in vigour, habituation, shoot tip necrosis, rooting and hardening Acclimatization of tissue cultured plants	Challenges in plant tissue culture	Micro propagation techniques

30	Final Term Exam	Course/Discussion from session 1- 29	

Student Evaluation criteria:

Attendance	5%
Workshop / Assignments/Case study	5%
Surprise Test/Sudden Test , Quizzes	5%
Class Participation	5%
Mid Term Paper	30%
Final Term paper	50%
Total	100%

Student Responsibilities:

Students must attend class. Failure to attend class may result in failure in the course. Students must also arrive on time and remain in class for the entire period. Cellular Phones and Beeper must be Turned off (Proper classroom decorum [behavior] adopts, Course outlines and calendars explain requirements and assignments, students are responsible for knowing what they say. Students are also responsible for doing all assigned work on time. Excessive absences (more than 03) will result in “F Grade”. Students may prepare Sketchbook for taking notes and for references.

Instructor/Tutor

Approved by:

Dean/ Chairman/ HOD/ Subject Specialist/ Program Coordinator

