



FORMAN CHRISTIAN COLLEGE (A Chartered University)
BIOT-202: Protoplast Cell & Tissue culture
Course Outline
Spring 2023

Instructor Information	
Name	Dr Asma Maqbool
Email	asmamaqbool@fccollege.edu.pk
Office Hours	Tuesday 11:00-12:30; Wednesday 9:30-11:00
Course Material/ Announcements	Will be shared via Institutional Learning Management System (Moodle)
Course Information	
Lecture	Section (A): Tuesday and Thursday: 8:00-09:15; S-417
Lab:	Section (A): Wednesday 11:00-12:50; S-329
Course Introduction	This course deals with the history of tissue culturing, Culture media, Plant growth regulators, In vitro propagation, plant regeneration, Organogenesis, somatic embryogenesis, Protoplast isolation and their culture, Somatic hybridization, and production of pathogen free plants.
Course Objectives	This course illustrates the use of controlled manipulation of organisms at cellular level. it helps: <ul style="list-style-type: none"> ○ To introduce the history and dimensions of <i>in vitro</i> technique ○ To evaluate the influence of different media formulations along with the effect of plant growth regulators and physical conditions on <i>in vitro</i> growth and differentiation pathways ○ To familiarize with micro-propagation, somaclonal variation, <i>in vitro</i> selection, pathogen elimination, protoplast isolation and somatic hybridization ○ To emphasize the practical applications of tissue culture in research projects
Learning Outcomes	At the end of this course student should be able to: <ul style="list-style-type: none"> ○ Design experiments for <i>in vitro</i> manipulation of plant material for different types of cultures ○ Understand and appreciate the role of physical conditions, nutrients and plant growth regulators in the molecule and cellular processes leading to the callus formation and morphogenetic pathways ○ Apply the technique and equipment for study of biotechnology and horticulture ○ Design and execute small lab projects and interpret results of their findings
Text Books & Reference Material	Books: <ol style="list-style-type: none"> 1. <u>Dodds, J. H, and L. W. Roberts. Experiments in plant Tissue Culture 3rd Ed.</u> 2. Bhojwani, S. S. and M. K. Razdan. Plant Tissue Culture: Theory and Practice 3. Plant Propagation by Tissue Culture by George et al published by springer 4. Methods in plant tissue culture by Kumar published by agrobios

5. Plant cell and tissue culture by Narayanaswamy published by McGraw-Hill.
6. Experiments in Plant Tissue Culture, John H. Dodds , Lorin W. Roberts , J. Heslop-Harrison
7. S-S--Bhojwani--M-K--Razdan---Plant-Tissue-Culture--Theory-and-Practice
8. (Any other book on plant tissue culture)

Course Policies & Important things to know

Attendance 80% attendance is required in lectures as well as in lab, if a student fail to fulfill the requirement, he/she will not be allowed to appear in final examination. Attendance will be marked at the start of class. Mid-term will be objective and subjective while final term will comprise objective, subjective and essay type questions. No tolerance for cheating / plagiarism (University policy will be followed).

Quizzes and Assignments. There will be two quizzes, 1 midterm exam and 1 final exam, 1 Group Presentation, Group assignment &/project. Rubrics of assignments, presentation and oral exam is given at the end of this document. To appear in quizzes and presentations at specified dates is necessary and no makeup will be arranged. In case of absence zero mark will be given in the missed activity. In the blended mode of education if a student missed an online quiz/exam/any other activity. **Make up of the missed activity will be arranged if a student provides enough evidence. This make up will be face to face on campus not online.**

Mobile Phone: Students are advised to silence their mobiles during lecture and labs.

Lab Notebook: only handwritten lab notebooks will be acceptable. Lab notebooks are required to be completed and signed in each lab classes. **Please submit your lab notebooks on final lab exam day**

Assessment Criteria	Activity to be Assessed	Weight age (%age)
	Final Exam	30
	Lab Exam	20
	Mid-Term Examination	25
	Assignments	10
	Attendance	5
	Class quizzes	10
	Total	100

Distribution of course contents:

Wks	Date	Contents	Lab
1	14 Feb	History and terminology of Plant tissue culture	Orientation to Laboratory and Safety measurement
2	21	Media preparation and Aseptic techniques	Calculations for preparation of culture media
3	17	Effect of growth regulators	Calculations for preparation of culture media
4	28	Effect of culture environment	Preparation of stock solutions
5	07 March	Types of cultures	Preparation of culture media (Quiz 1: 08 March)
6	14	Growth, differentiation, organogenesis	Inoculation of media
7	21	Somatic embryogenesis, synthetic seeds	Projects assigned to groups for lab.
8	28	Micro propagation	Project Work
9	04 April	Micro propagation	(Midterm; 5 April)
10	11	Production of Secondary Metabolites	Project Work
11	18	Production of Secondary Metabolites	Project Work
12	25	Pathogen elimination	Project Work (Quiz 2; 27 April)
13	2 May	Somaclonal variation	Group Presentation
14	9	Isolation, purification and culture of protoplasts	Group Presentation
15	16	Protoplast fusion and somatic hybridization	Group Presentation
16	23	Germplasm conservation	Group Presentation
17	30	Animal Cell culture	Discussion
18	06 June	Review and discussion,	(Lab Exam 07 June)
19.	12	Final Exam (Date and time to be announced)	

Disclaimer

Considering the situation of the country, the course instructor reserves the right to modify the above plan as needed during the course of the class; however, it won't be done impetuously. Any changes that would be incorporated will be informed well in advance.

RUBRIC (Presentation)

<p align="center">Excellent 90-100%</p>	<p align="center">Good 75-90%</p>	<p align="center">Average 65-75%</p>	<p align="center">Satisfactory 60-65%</p>
<ul style="list-style-type: none"> • Covered all the aspects of the topic in depth • Well designed with good flow and appropriate use of pictures and graphs • Confident delivery style with clear voice • Good spoken English • Excellent eye contact with the audience 	<ul style="list-style-type: none"> • Covered most of aspects of the topic nicely • Well designed with appropriate use of pictures and graphs, but uniformity in the slides absent • Normal confidence in delivery • Good spoken English • Good eye contact with the audience 	<ul style="list-style-type: none"> • Covered some aspects of the topic • Not so well designed. • Uniformity in the slides absent. Inappropriate use of pictures and graphs • Poor confidence and voice not clear. • Spoken English not so good • Normal eye contact with the audience 	<ul style="list-style-type: none"> • Covered the topic superficially • Poor design without use of any pictures and graphs. Only written slides • No confidence in delivery. • Voice not audible. • No eye contact with the audience • Poor spoken English

RUBRIC (Assignment)			
Excellent 90-100%	Good 75-90%	Average 65-75%	Satisfactory 60-65%
<ul style="list-style-type: none"> • Covered all the points of the assigned topics in depth • Sufficient number of latest and appropriate references cited • Key concepts clearly specified and explained technically • Formatting is according to the provided guidelines 	<ul style="list-style-type: none"> • Covered all the points of the assigned topics superficially • Latest and appropriate references cited but not sufficient in number • Key concepts specified and explained technically • Formatting is according to the provided guidelines 	<ul style="list-style-type: none"> • Few points of the assigned topics are missing • Latest and appropriate references cited but not sufficient in number • Key concepts specified but not explained technically • Formatting is partially according to the provided guidelines 	<ul style="list-style-type: none"> • Most points of the assigned topics are missing • Insufficient references • Key concepts not clearly specified and explained • Formatting is not according to the provided guidelines

RUBRIC (Oral Exam)			
Excellent 90-100%	Good 75-90%	Average 65-75%	Satisfactory 60-65%
<ul style="list-style-type: none"> • Good understanding of the question • Demonstrates deep knowledge, answer almost all the questions with explanations • Answer confidently and use perfect scientific vocabulary 	<ul style="list-style-type: none"> • Fair understanding of the question • Adequate knowledge of most topics; answer most of the questions but fails to elaborate. • Most of the answers are technically correct but confidence not very good • Use 75-80% correct scientific vocabulary 	<ul style="list-style-type: none"> • Normal understanding of the question • Superficial knowledge of topic; only able to answer basic questions. • Few of the answers are technically correct but confidence is not good • answers not to-the-point 	<ul style="list-style-type: none"> • Poor understanding of the question • Superficial knowledge of topic; only able to answer few basic questions • Poor technical knowledge of the subject and low on confidence • Vague answers