



# Course Specifications

<b>Course Title:</b>	<b>Tissue Culture</b>
<b>Course Code:</b>	<b>23074462-3</b>
<b>Program:</b>	<b>BSc Biology.</b>
<b>Department:</b>	<b>Biology</b>
<b>College:</b>	<b>Aljumum University College</b>
<b>Institution:</b>	<b>Umm Al-Qura university</b>

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## A. Course Identification

<b>1. Credit hours:</b> <b>3 hours</b>
<b>2. Course type</b> a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
<b>3. Level/year at which this course is offered:</b> <b>4<sup>th</sup> year / level 8.</b>
<b>4. Pre-requisites for this course (if any):</b> <b>Genetics (23073331-3).</b>
<b>5. Co-requisites for this course (if any):</b>

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom		70 %
2	Blended		
3	E-learning		10 %
4	Correspondence		10 %
5	Other		10 %

### 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	28
2	Laboratory/Studio	42
3	Tutorial	6
4	Practical/Field work/Internship	6
5	Others (specify)	10
	<b>Total</b>	<b>92</b>
<b>Other Learning Hours*</b>		
1	Study	
2	Assignments	
3	Library	
4	Projects/Research Essays/Theses	
5	Others (specify)	
	<b>Total</b>	

\* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

## B. Course Objectives and Learning Outcomes

### 1. Course Description

The course will cover many topics based on the concept of potency (the genetic potential of plants to reproduce into an entire organism). It deals with the mass production of plants, under aseptic environment in in-vitro conditions. The success of modern Plant Biotechnology is attributed to this technique, which plays an important role in micro-propagation of microbial-free plants and regeneration of endangered species as well as species difficult to regenerate with the traditional ways.

### 2. Course Main Objective

#### Intended Learning Outcome:

After completing this course student should be able to:

- Define the basic concepts of Plant Tissue Culture "PTC" as a Biotechnology tool.
- Recognize the importance of Plant Tissue Culture technique.
- Practice the different techniques used in Plant Tissue Culture.
- Acquire all skills used in Plant Tissue Culture techniques.
- List of chemicals, media and equipment required for Plant Tissue Culture Lab.
- Explain and analyse the role of plant growth regulators in PTC technique.
- Describe how to regenerate plants using the different techniques of PTC
- Recognize the possible reasons for failure of a specific plant tissue or organ culture.
- Analyse and interpret the in vitro data and draw sensible conclusions from such data

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.1	Upon successful completion of this course the student will be able to: <ul style="list-style-type: none"> <li>• List the various components of plant tissue culture media, e.g. minerals, growth factors, hormones, and what governs the choice of components.</li> <li>• Recognize the various steps taken to establish and optimize media for particular purposes in particular species.</li> <li>• Define the various stages of micro-propagation, including morphogenesis.</li> <li>• Describe the types of in vitro culture. □ State and write a protocol to establish an unknown species and test its response.</li> </ul>	
1.2		
1.3		
1...		
2	<b>Skills :</b>	
2.1	<b>Cognitive Skills:</b>	
	<ul style="list-style-type: none"> <li>- Acquire the skills needed for sub-culturing in a pathogen free environment.</li> <li>- Carry out careful examination of the cultured cells under sterile conditions.</li> <li>- Analyse the data obtained and draw careful observations and conclusions.</li> </ul>	
2.2		
	<b>Interpersonal Skills and Responsibility</b>	
	At the end of the course, the student will be able to:	

CLOs		Aligned PLOs
2.3	<ul style="list-style-type: none"> <li>- Work independently and as part of a team..</li> <li>- Report writing.</li> <li>- Use of web internet.</li> <li>- Use of power point and laptop.</li> <li>- Use of projector systems.</li> <li>- Use of the advanced features in scientific calculators.</li> <li>-</li> </ul> <p><b>Communication, Information Technology and Numerical Skill</b></p> <p>The student is able to propose solutions to some problems:</p> <ul style="list-style-type: none"> <li>- Skills, oral and written communication</li> <li>- Using computer and search the Web for information sources</li> <li>- Use a power point for Proposals Group</li> <li>- The use of statistical methods in the analysis of information</li> <li>- To use computer and internet.</li> </ul>	
2.4	<p><b>Psychomotor Skills (if applicable)</b></p> <ul style="list-style-type: none"> <li>- Description of the psychomotor skills to be developed and the level of performance required</li> <li>- Collecting samples from environment</li> <li>- Examining samples in lab</li> </ul>	
<b>3</b>	<b>Competence:</b>	
3.1	- Developing oral presentations.	
3.2	- Communicating personal ideas and thoughts.	
3.3	- Work independently and as part of a team to finish some assignments.	
3...	- Communicate results of work to others	

### C. Course Content

List of Topics	No. of Weeks	Contact Hours
<b>Introduction to the course:</b>		
<ul style="list-style-type: none"> <li>- History of tissue culture.</li> <li>- Characteristics and importance of tissue culture</li> </ul>	1	2
<b>Identify appropriate plant tissue sources.</b>	2	2
<b>Isolated and sterilized then grown in appropriate circumstances.</b>	3-4	4
<b>Methods of plant organ transplants culture.</b>	5-6	4
<b>Methods for preparation of cell suspensions.</b>	7-8	4
<b>Isolation and cultivation methods of plant protoplast cells.</b>	9-10	2
<b>The Methods for integrate and cultivated protoplast in somatic cells.</b>	11	2
<b>The economic importance of the applications of plant tissue culture science.</b>	12	2
<b>Applications has been studied by seminars</b>	13-14	4

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge</b>		
1.1	Upon successful completion of this course the student will be able to:		
1.2			
...			
	<ul style="list-style-type: none"> <li>- List the various components of plant tissue culture media, e.g. minerals, growth factors, hormones, and what governs the choice of components.</li> <li>- Recognize the various steps taken to establish and optimize media for particular purposes in particular species.</li> <li>- Define the various stages of micro-propagation, including morphogenesis.</li> <li>- Describe the types of in vitro culture. State and write a protocol to establish an unknown species and test its response.</li> </ul>	Discussion. -Tutorials that review the content of each lecture. - Independent study assignment which requires the use of library reference materials. -Virtual labs.	Homework, exams and research papers
<b>2.0</b>	<b>Skills</b>		
2.1	<b>Cognitive Skills</b> <ul style="list-style-type: none"> <li>- Acquire the skills needed for sub-culturing in a pathogen free environment.</li> <li>- Carry out careful examination of the cultured cells under sterile conditions.</li> <li>- Analyse the data obtained and draw careful observations and conclusions</li> </ul>	<ul style="list-style-type: none"> <li>- Lectures.</li> <li>- Brain storming.</li> <li>- Discussion.</li> </ul>	<ul style="list-style-type: none"> <li>.- Problem solving questions.</li> <li>-Group and individual assignments that require the application of analytical tools..</li> </ul>
2.2	<b>Interpersonal Skills &amp; Responsibility</b> <ul style="list-style-type: none"> <li>- be involved in self-directed learning.</li> <li>- succeed in team work.</li> <li>- share and discuss results with others.</li> <li>- be involved in a simple research project.</li> <li>- Evaluate answers and positively criticize them.</li> </ul>	<ul style="list-style-type: none"> <li>-Lab work.</li> <li>-Case Study.</li> <li>-Active learning.</li> <li>-Small group discussion</li> <li>-Cooperative learning and application of scientific method in thinking the scientific problem solving.</li> <li>-Work as part of a team.</li> </ul>	<ul style="list-style-type: none"> <li>- Assessment of group assignment.</li> <li>- Evaluate the independent assignments</li> </ul>
2.3	<b>Communication, Information Technology, Numerical</b> <ul style="list-style-type: none"> <li>-Use information and communication</li> </ul>	<ul style="list-style-type: none"> <li>-Oral presentations.</li> <li>- Internet search</li> </ul>	-Evaluation of student essays and

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	<p>technology.</p> <ul style="list-style-type: none"> <li>- Use IT and communication technology in gathering and interpreting information and ideas.</li> <li>- Use the internet as a means of communication and a source of information.</li> <li>- Encourage students to use internet for searching certain electronic journals regarding topics of the course.</li> <li>- Scientific writing.</li> <li>- Use his/her observations to solve problems.</li> <li>- Doing research and conduct searches for restoring information.</li> <li>- Able to calculate and discuss the facts and logical propose methods to solve the difficulties.</li> </ul>	<p>assignments and essays.</p> <ul style="list-style-type: none"> <li>-Incorporating the use and utilization of computer in the course requirements.</li> <li>-Students will be asked for delivering a summary regarding certain topics related to the course.</li> </ul>	<p>assignments.</p> <ul style="list-style-type: none"> <li>-Evaluating the laboratory written reports.</li> <li>-Marks given to for good reports and presentations</li> <li>-Evaluating during the discussion in lecture and reports. Part of the grad is put for student's written participation</li> </ul>
2.4	<p><b>Psychomotor:</b></p> <ul style="list-style-type: none"> <li>-Enhancing the ability of students to use computers and internet to prepare a research article.</li> <li>- Interpret the laboratory data.</li> </ul>	<p>Follow up students the students in lab and during carryout all the laboratory experiments</p>	<ul style="list-style-type: none"> <li>-Giving additional marks for the students they have accurate laboratory results and good seminar presentation</li> <li>-Practical exam.</li> </ul>
<b>3.0</b>	<b>Competence</b>		
3.1	Use information and communication technology	<p>Oral presentations.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Internet search</li> <li><input type="checkbox"/> Incorporating the use and utilization of computer in the course requirements.</li> <li><input type="checkbox"/> Students will be asked for delivering a summary regarding certain topics related to the course.</li> </ul>	<p>Evaluation of student essays and assignments.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Evaluating the laboratory written reports.</li> <li><input type="checkbox"/> Marks given to for good reports and presentations</li> <li><input type="checkbox"/> Evaluating during the discussion in lecture and reports. Part of the grad is put for student's written participation</li> </ul>
3.2	Use IT and communication technology in gathering and interpreting information and ideas		
...	Use the internet as a means of communication and a source of information.		

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Home works, search or presentation	4th and 8th weeks	10 %
2	Midterm "Written Test (1)"	8th week	30%
3	Final Exam "Practical Test"	15th week	20%
4	Final Exam Written Test		40%
5			

#	Assessment task*	Week Due	Percentage of Total Assessment Score
6			
7			
8			

\*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	<ul style="list-style-type: none"> <li>- Handbook of Plant Cell Culture Techniques and breeding. Ed. Evans, Sharp, Ammirato and Yamada. Macmillan, New York, 1983.</li> <li>- Plant Tissue Culture : Methods and Application in Agriculture. Ed. Travor A. Thorpe. Academic Press, 1981.</li> <li>- Growth and Organization in Plant , Stewart, F.C. Adison - Wesley Co. Reading Wareing (1987).</li> <li>- Plant Propagation by tissue culture: Handbook and directory of commercial laboratories. Ed. George, E. F. and Sherrington, P. D. Exegetics Limited, 1984.</li> </ul>
<b>Essential References Materials</b>	<ul style="list-style-type: none"> <li>- Handbook of Plant Cell Culture Techniques and breeding. Ed. Evans, Sharp, Ammirato and Yamada. Macmillan, New York, 1983.</li> <li>- Plant Tissue Culture : Methods and Application in Agriculture. Ed. Travor A. Thorpe. Academic Press, 1981.</li> <li>- Growth and Organization in Plant , Stewart, F.C. Adison - Wesley Co. Reading Wareing (1987).</li> <li>- Plant Propagation by tissue culture: Handbook and directory of commercial laboratories. Ed. George, E. F. and Sherrington, P. D. Exegetics Limited, 1984.</li> </ul>
<b>Recommended Books and Reference Material (Journals, Reports, etc) (Attach List)</b>	<ul style="list-style-type: none"> <li>- Handbook of Plant Cell Culture Techniques and breeding. Ed. Evans, Sharp, Ammirato and Yamada. Macmillan, New York, 1983.</li> <li>- Plant Tissue Culture : Methods and Application in Agriculture. Ed. Travor A. Thorpe. Academic Press, 1981.</li> <li>- Growth and Organization in Plant , Stewart, F.C. Adison - Wesley Co. Reading Wareing (1987).</li> <li>- Plant Propagation by tissue culture: Handbook and directory of commercial laboratories. Ed. George, E. F. and Sherrington, P. D. Exegetics Limited, 1984.</li> </ul>



<b>Electronic Materials</b>	There are too many websites and are searched using the more than one method to enter on Google for sites that have to do with rule the required of scientific study.
<b>Other Learning Materials</b>	Using the Microsoft software in writing tables and graphs and PowerPoint presentation using the Power Point.

## 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) <ul style="list-style-type: none"> <li>• Class rooms are already provided with data show</li> <li>• Laboratory necessity</li> <li>• Reduce the number of students in class rooms</li> <li>• Find a solution for the air conditioning problem</li> <li>• Necessity of a library</li> </ul>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	data show, Smart Board
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Laboratory instruments & equipment: Spectrophotometer

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)

## H. Specification Approval Data

<b>Council / Committee</b>	
<b>Reference No.</b>	
<b>Date</b>	

**Head of Department**

  
**Dr. Wessam M. Filfilan**

**Stamp**

