

Course Specification

— (Postgraduate Programs) عبد المحسن بن أبي طالب عز يريه عبداللہ رحمتي ناصر

Course Title: Cell Culturing Technology

Course Code: BIO-6201 (Lab Course)

Program: Master of Science in Applied Biology (Cell and Molecular Biology)

Department: Biology عبد المحسن بن أبي طالب عز يريه عبداللہ رحمتي ناصر

College: Science

Institution: Imam Mohammad Ibn Saud Islamic University

Version: 1

Last Revision Date: Pick Revision Date.

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A. General information about the course:

1. Course Identification:

1. Credit hours: (Lecture 2 + Lab 2)

2. Course type

A. ☐ University ☐ College ☐ Department ☒ Track

B. ☒ Required ☐ Elective

3. Level/year at which this course is offered: (Level 2 / First year)

4. Course General Description:

This graduate course serves as an introductory guide, providing insights into the enhancement of biological research, specifically in the transition from basic research to modern approaches in cell biology, through the application of cell culture technologies. This course covers foundational aspects such as biosafety levels, laboratory equipment, subculture various methods and a short introduction to the three-dimensional cell culture technique. In addition, cell counting methods and viability assessment are among the topics that the course will cover. The course offers an accessible opportunity to unravel the intricate pathways of biomedical research, where cell culture stands out as a powerful tool.

5. Pre-requirements for this course (if any):

None

6. Co-requisites for this course: (if any):

None.

7. Course Main Objective(s):

The primary objective of this graduate course is to provide the students with both theoretical and practical experience necessary to carry out experimental work using cell and tissue cultures as inevitable *in vitro* tools of research. The course content aims to foster an understanding of the noteworthy progress made in the techniques of cell culturing. The knowledge acquired from this course empowers the students to perform their research work independently in cell culture laboratories. By the end of the course, students will be equipped with the professional skills to maintain animal cells and tissues under *in vitro* conditions.



2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	√	100%
2	E-learning		-
3	Hybrid - Traditional classroom - E-learning		
4	Distance learning		

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	30
3.	Field	
4.	Tutorial	-
5.	Others (specify)	
	Total	60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Outline the principles of cell culture techniques, encompassing biosafety levels, culture conditions, and key characteristics of cell lines.	K1	-Lab Presentations and group discussions to introduce the cell culture techniques	-Active participation -Lab reports -Lab exam

Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
1.2	List the differences between finite and continuous cell lines, and the distinctions between adherent and suspension cell cultures.	K2	-Lab Presentations and group discussions to introduce the various types of cell lines.	-Active participation -Lab reports -Lab exam
1.3	Describe cryopreservation including freezing mediums, and the protocols for both preserving and thawing cultured cells.	K3	-Lab Presentations and group discussions to introduce cryopreservation	-Active participation -Lab reports -Lab exam
2.0	Skills			
2.1	Apply the cell culture techniques in a professional manner to support the various research purposes.	S1	-Guided Lab work -Lab tutorials	-Active participation -Lab reports -Lab exam
2.2	Design and conduct experimental assay by employing critical practical skills and the proper cell culturing methods	S2	-Guided lab experiments -Group discussions	-Lab reports -Presentations
2.3	Interpret and analyze the experimental data by applying the appropriate statistical methods, and derive meaningful conclusions through evaluation.	S3	-Guided analysis of research data -Group discussions	-Lab reports -Presentations
3.0	Values, autonomy, and responsibility			
3.1	Demonstrate responsibility for research reliability by upholding the highest standards of accuracy in all cell culture-related experiments and data reporting.	V1	-Guided lab research work -Group discussions	-Lab reports -Presentations by research groups
3.2	Participate in discussion of scientific issues and recognize the importance of effective	V2	-Tutorials on presenting research data	-Presentations -Lab reports



Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
	communication orally or in a written format to achieve successful outcomes in cell culture experiments.		-Seminars -Group discussions	
3.3	Follow the principles of ethical conduct of research in handling cell cultures.	V3	-Tutorials on research ethics	-Lab reports

C. Course Content:

No	List of Topics	Contact Hours
1.	Cell culture laboratory: Biosafety levels, Basic equipment, and laboratory safety practices.	3
2.	Introduction to cell culture: Cell culture, Finite vs. continuous cell line, and culture conditions.	2
3.	Cell culture basics: Acquiring cell lines, Adherent vs. suspension culture, media and Cell culture plastics.	3
4.	Subculturing of Adherent Cells: Media recommendations and Protocol for passaging adherent cells.	3
5.	Subculturing Suspension Cells: Passaging suspension cultures, suspension culture vessels, and Protocol for passaging suspension cells.	3
6.	Freezing Cells: Guidelines for cryopreservation, freezing medium, and Protocol for cryopreserving cultured cells.	2
7.	Thawing Frozen Cells: Guidelines for thawing, materials needed, and Protocol for thawing frozen cells.	2
8.	Cell Counting Methods: Hemocytometer, automated cell counters.	2
9.	Cytotoxic studies: MTT Assay, LDH assay	2
10.	The Third Dimension in Cell Culture Fundamentals, types and applications of 3D-Cell Cultures.	2
Total		60



D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm exam	5 th & 10 th weeks	30 %
2.	Quizzes, presentations, lab reports, participation, attendance, data search, assignments	Throughout the semester duration	30 %
4	Final lab exam	16 th week	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

Essential References	-Kasper, C.; Charwat, V.; Lavrentieva, A.(2018). Cell Culture Technology, 1st ed.; Springer International Publishing: Berlin/Heidelberg, Germany, 2018; ISBN 978-3-319-74854-2. -Davis JM. (2011). Animal Cell Culture: Essential Methods. Wiley-Blackwell, John Wiley & Sons: Chichester, UK. Doi:10.1002/9780470669815.
Supportive References	https://www.kbcc.cuny.edu/academicdepartments/bio/documents/Bio_57_syllabus.pdf https://education.ki.se/course-syllabus/1BA017/6305 https://www.btec.ncsu.edu/academic/courses/bit466-566.php
Electronic Materials	
Other Learning Materials	

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Well-equipped lab
Technology equipment (Projector, smart board, software)	Projector and smart board
Other equipment (Depending on the nature of the specialty)	



F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of students' assessment	Faculty	Direct
Quality of learning resources	Faculty	Direct
The extent to which CLOs have been achieved	Faculty	Direct
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	BIOLOGY DEPARTMENT COUNCIL
REFERENCE NO.	23
DATE	23/8/1445