



Course Specification

— (Postgraduate Programs) عبدالمطش

Course Title: Cell Signalling and Communication

Course Code: BIO-6314

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

Department: Biology عبدالمطش

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: (2Lecture 2+ Lab 2)

2. Course type

A. ☐ University ☐ College ☐ Department ☒ Track

B. ☒ Required ☐ Elective

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

4. Course general Description:

This graduate course provides the students with concepts of the major cellular signalling events, starting at the cell surface and ending up in the nucleus. The course contents illustrate the mechanisms through which the cells communicate with each other and their microenvironment. The signalling events that result from these interactions and their translation into cellular responses are also emphasized.

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

None

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

None

7. Course Main Objective(s):

The objective of this graduate course is to provide an in-depth understanding of specialized areas of cell biology relevant to cellular signalling pathways. The course also aims to clarify how cells interact/communicate specifically with their microenvironment. Developing an appreciation for the signalling pathways that mediate cellular responses and the related molecular mechanisms underlying these processes.

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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		

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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

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B. Course Learning Outcomes, Teaching Strategies, Assessments Methods

Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	List the different types of cellular receptors and their characteristics	K1	Two credits weekly lectures	-Quizzes -Presentations -Assignments -Written exams
1.2	Describe the major signaling pathways by which cells communicate with each other and with the extracellular matrix, and the molecular components of these communication pathways	K2	Two credits weekly lectures	-Quizzes -Presentations -Assignments -Written exams

Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
1.3	Explain how the various signaling pathways lead to specific cellular responses	K3	Two credits weekly lectures	-Quizzes -Presentations -Assignments -Written exams
2.0	Skills			
2.1	Compare the various types of cell signalling encountered in multicellular organisms	S1	-Two credits weekly lectures -Lecture discussions and tutorials	-Quizzes -Presentations -Assignments -Written exams
2.2	Relate critically between the internal receptors and the cell-surface receptors	S2	-Two credits weekly lectures -Lecture discussions and tutorials	-Quizzes -Presentations -Assignments -Written exams
2.3	Demonstrate the connection between cellular signal pathways and medical phenomena	S3	-Two credits weekly lectures -Lecture discussions and tutorials	-Quizzes -Presentations -Assignments -Written exams
3.0	Values, autonomy, and responsibility			
3.1	Participate in discussions to show how mutations in signalling proteins lead to dysregulated biological outcomes	V1	-Group discussions	-Participation -Presentations
3.2	Demonstrate the ability to independently identify questionable research issues in the area of cell signalling and suggest possible approaches	V2	Group discussions	Performance Evaluation- Participation -Presentations

C. Course Content:

No	List of Topics	Contact Hours
1.	Introduction to cell signaling: - Overview of cell signalling: Signaling, Signal transduction, ligand, receptors - Forms of signalling in general: Paracrine, Synaptic, Autocrine, Endocrine, cell-cell contact, Types of Receptors	4
2.	Intercellular signalling pathways: Basics: - Tools for Intercellular Signaling - Steps of Intercellular Signaling - Regulation of Intercellular Signaling - Hormones in Intercellular Signaling	4
3.	Intracellular signalling: Basics: - Reception of External Signals - Activation and Deactivation of Signaling Proteins - Processing of Multiple Signals	4
4.	Intracellular Signaling and Molecular Tools: - Variability of Signaling Proteins - Molecular Tools for Intracellular Signaling - Basic Mechanisms of Intracellular Signaling - Modular Structure of Signaling Proteins and Signaling Complexes	4
3.	Organization of intracellular Signaling and Cell-type Specificity: - Linear Signaling Pathways, Branching and Crosstalk - Signaling Networks - Redundancy and Specificity of Signaling Redundancy - Regulation of Signaling Pathways - Spatial Organization of Signaling Pathways - Compartmentalization and Transport - Evolution of Signaling Pathways - Cell-type Specificity: expression, splicing, stability, posttranslational modification, subcellular localization	4
4.	Extracellular signalling: - Types of signal molecules and specific receptors - Steps of extracellular signals - G-protein-coupled receptors - Gs cAMP Dependent Pathway - Gi cAMP Dependent Pathway	4
5.	Extracellular matrix (ECM) signalling in morphogenesis and tissue repair: - ECM signalling via cellular receptors	4



	- ECM signaling via proteolytic cleavage - ECM signalling via exposure of cryptic sites	
6.	Extracellular Matrix and Cell Signaling Transduction: - Integrin Cell Signaling Pathway Transduction - Growth Factor Signaling Transduction - Cell Signaling Transduction Related Cell Adhesion	4
Total		30

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm exam-1	5 th week	20%
2.	Midterm exam-2	10 th week	20%
3.	Assignments, presentations, attendance, data search, participation	Throughout the course duration	20%
...	Final exam	16 th exam	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	Hancock, J. (2010). Cell Signaling. 3 rd Edn. Oxford University Press, ISBN- 13:9780199232109.
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (Projector, smart board, software)	Projector, smart board
Other equipment (Depending on the nature of the speciality)	

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