



Course Specification

— (Postgraduate Programs) عبد المحسن بن عبد العزيز آل سعود

Course Title: Molecular Pathology

Course Code: BIO-6012

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

Department: Biology

College: Science عبد المحسن بن عبد العزيز آل سعود

Institution: Imam Mohammed Ibn Saud Islamic University

Version: 1

Last Revision Date: Pick Revision Date.

عبد المحسن بن عبد العزيز آل سعود



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عبد المحسن بن أحمد العنزي ربيعاً بالمرحمة رحمتي الناصر

عبد المحسن بن أحمد العنزي ربيعاً بالمرحمة رحمتي الناصر





A. General information about the course:

1. Course Identification

1. Credit hours: (Lecture 2 + Lab 0)

2. Course type

A. ☐ University ☐ College ☐ Department ☒ Track ☐ Others
B. ☐ Required ☒ Elective

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

4. Course General Description:

Molecular pathology is a discipline of molecular biology that is concerned with the investigation of the molecular basis of disease. It represents a discipline involving molecular biology and pathology in a unique combination. The course encompasses the knowledge gained from studying biochemistry, physiology, genetics, and cell biology. Thus, this graduate course is intended to provide students with the knowledge and skills to understand the molecular alterations contributing to the development of disease. The molecular basis of inflammation, cytotoxicity, autoimmune diseases, and blood cell pathologies are emphasized in this graduate course. Among the course topics are the molecular basis of diabetes, muscle diseases, enzymatic defects, and neurologic diseases. This multidisciplinary approach of this course implies the application of molecular techniques contributing to the investigation of disease.

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

-Molecular biology course
-Molecular genetics course

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

None

7. Course Main Objective(s):

This course aims to provide the students with a critical understanding and in-depth knowledge of the molecular mechanisms integrated into a range of disease conditions. This graduate course significantly develops the student's proficiency and skills in the detection of the molecular alterations that accompany and contribute to cancer and non-cancer disease conditions. Through the knowledge acquired by studying this course, the students can identify apoptosis and its molecular markers, and the molecular alterations associated with inflammation, diabetes, and muscle disease. The course's main objective is to allow the students to be acquainted with the multidisciplinary approach of the various molecular techniques.



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	0
3.	Field	0
4.	Tutorial	8
5.	Others (specify)	0
Total		30

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	Describe the various molecular mechanisms of disease	K1	-Two-credit weekly lectures using the available projection tools and visual learning resources -Lecture discussions Student participation	-Quizzes -Written exams -Assignments -Presentations -Data Search

Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
1.2	Illustrate the importance of molecular markers and pathways in the investigation of cancer cells	K2	-Two-credit weekly lectures using the available projection tools and visual learning resources -Lecture discussions Student participation	-Quizzes -Written exams -Assignments -Presentations -Data Search
1.3	Explain how specific molecular alterations contribute to the causation of cellular dysfunctions	K3	-Two-credit weekly lectures using the available projection tools and visual learning resources -Lecture discussions Student participation	-Quizzes -Written exams -Assignments -Presentations -Data Search
1.4	List the appropriate molecular assays relevant to the investigation of specific disease conditions	K4	-Two-credit weekly lectures using the available projection tools and visual learning resources -Lecture discussions Student participation	-Quizzes -Written exams -Assignments -Presentations -Data Search
2.0	Skills			
2.1	Relate between the pathological findings and the results of molecular testing	S1	-Two-credit weekly lectures using the available projection tools and visual learning resources -Lecture discussions	-Quizzes -Written exams -Assignments -Presentations -Data Search

Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
			Student participation	
2.2	Write a proposal and conduct a research work by employing critical thinking and the convenient lab methods	S2	-Lab demonstrations	-Lab report -Presentation
2.3	Interpret and analyze the results of molecular tests using the appropriate analytical methods	S3	-Two-credit weekly lectures using the available projection tools and visual learning resources -Lecture discussions Student participation	-Presentations
3.0	Values, autonomy, and responsibility			
3.1	Perform the assigned research work independently and cooperate effectively in a team	V1	-Two-credit weekly lectures using the available projection tools and visual learning resources -Lecture discussions Student participation	-Lab reports -Direct observation
3.2	Communicate the scientific issues and present the research results orally or via written formats.	V2	-Class discussions	-Presentations
3.3	Adhere to the relevant ethics while conducting a research work	V3	-Lecture discussions	-Lab report -Direct observation



C. Course Content

No	List of Topics	Contact Hours
1.	Molecular Mechanisms of Cell Death: -Modes of Cell Death -Structural Features of Necrosis and Apoptosis -Cellular and Molecular Mechanisms Underlying Necrotic Cell Death -Apoptosis and Apoptosis: -Pathways to Apoptosis -Molecular mechanisms of apoptosis	2
2.	Molecular toxicology: Molecules involved in cytotoxicity	2
3.	Molecular pathology of inflammation: -Leukocyte Adhesion, Migration, and Activation -Acute Inflammation and Disease Pathogenesis -Inflammatory cytokines -Pattern Recognition Receptors and Inflammatory Responses -Chronic Inflammation and Acquired Immune Responses	2
4.	Autoimmune diseases: Molecular basis of autoimmune diseases	2
5.	Immune cells: Molecular defects of immune cells	2
6.	Molecular pathology of blood cells: -Myeloid Disorders -Lymphocyte Disorders	2
7.	Molecular basis of diabetes Molecular pathology of endocrine pancreas	2
8.	Molecular aspects of enzymatic defects Molecular pathology of enzymatic disorders	2
9.	Molecular mechanisms of carcinogenesis Cancer Biomarkers	2
10.	Molecular markers of solid tumours and cancer cells Understanding cancer at the molecular level	2
11.	Muscle diseases: Molecular basis of muscle diseases	2
12.	Neurologic disease: Molecular alterations in Neurologic disease	2
Total		30



D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm-exam 1 (written exam)	5 th week	20%
2.	Midterm-exam 2 (written exam)	10 th week	20%
3.	Assignments, presentations, data search, participation, attendance	Throughout the course duration	20%
4.	Final exam (written 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	Coleman WB, Tsongalis GJ. (2009). Molecular Pathology. The Molecular Basis of Human Diseases. Coleman WB and Tsongalis GJ (Eds). Academic Press. ISBN: 978-0-374419-7
Supportive References	https://www.prospects.ac.uk/universities/the-university-of-manchester-3888/school-of-medical-sciences-3893/courses/molecular-pathology-122416#section-course-content http://www.drps.ed.ac.uk/19-20/dpt/cxmclm11056.htm https://www.gla.ac.uk/coursecatalogue/course/?code=MED5459
Electronic Materials	
Other Learning Materials	Tutorial videos

2. Required Facilities and equipment

Items	Resources
facilities	Classroom



Items	Resources
(Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	
Technology equipment (projector, smart board, software)	-Projector -Smartboard
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 (questionnaire)
Effectiveness of Students assessment	Faculty	Direct
Quality of learning resources	Peer Reviewer	Direct
The extent to which CLOs have been achieved	Faculty	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify))

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

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

