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2021/2022

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# Program Specifications of Master Degree Medical Microbiology and Immunology

21 September University for Medical & Applied Sciences  
Faculty of Laboratory Medicine

Republic of Yemen  
Ministry of Higher Education & Scientific Research  
21 September University for Medical & Applied Sciences  
Faculty of Laboratory medicine  
Department of Medical Microbiology and Immunology



الجامعة اليمنية  
وزارة التعليم العالي والبحث العلمي  
جامعة 21 سبتمبر للعلوم الطبية والتطبيقية  
كلية الطب المخبري

2024-5-21



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## Program Specification

### 1- Program Identification and General Information:

Program Identification and General Information:	
1	Program title: Master degree in Medical Microbiology & Immunology
2	Department responsible for the program: Medical Microbiology & Immunology
3	Degree offered Master of Medical Microbiology & Immunology
4	The Institute responsible for granting the degree: 21 September University of Medical & Applied Sciences
5	Study system: Single
6	Study language of the program: English
7	Entry requirements: Bachelor's degree Laboratory Medicine or other equal degrees
8	Departments participating in the program: Medical Microbiology & Immunology Faculty of Faculty of Laboratory Medicine
9	Starting year of the program: 2022-2023
10	Study methods in the program:
11	Location of delivery: 21 September University of Medical & Applied Sciences, Faculty of Faculty of Laboratory medicine , Medical Microbiology & Immunology
12	The program resources: 21 September University of Medical & Applied Sciences
13	Minimum grade requirements: As per regulations of the Ministry of Higher education and Scientific Research
16	Other admission requirements: According to the University rules and regulations
14	Date of current development of the program : February 2022

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15	Prepared by :	- Prof. Dr. Mojahed Ali Measar - Prof. Dr. Khaled A. Al-Moyed - Associate Prof. Dr. Ebtessam Al-Zabedi - Assistant Prof. Dr. Ghamdan Al-Tahish - Assistant Prof. Dr. Gamil Abdul-Mughni
16	Program coordinator:	Assistant Prof. Dr. Gamil Taher Abdul-Mughni!

**2) Program Overview:**  
 The Master program provides students a broad background in microbiology, immunology and the techniques used in microbiology research. The average amount of time to completion is two years. The Main Areas of Research are **Medical Microbiology, Immunology with Molecular Biology**

<b>3-University Vision, Mission, and Goals:</b>	<b>University vision 2025:</b> A contemporary university with national responsibility and a faith identity
<b>University mission:</b>	Leading the transformation in the management and delivery of health care with all partners by setting a standard of excellence in education and medical and applied research in a way that meets the needs of Yemeni society, its privacy and regional influence.
<b>University objective:</b>	1- Ensuring the application of quality standards and setting standards of excellence in medical and applied sciences, scientific research and community service. 2. The centrality of the student in the educational process, the partnership with them for life, the consolidation of the principles of national responsibility and faith identity, their care and the development of their capabilities after graduation and during work. 3. Attracting, employing and retaining scholars, cadres and highly specialized talents to gain minds and reverse the trend of "brain drain" in a way that enhances and ensures the creation of thinkers, businessmen and good citizens. 4. Continuous development of the distinguished academic infrastructure and the establishment of modern research and service centers with high efficiency and capable of making a real impact locally and regionally.

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5. Enhancing the university's position as a preferred partner for local, regional and international partnership through implementing innovative models of education, exchanging research and knowledge and providing real and effective outcomes for developing professional practices to benefit from them locally and regionally

<b>B. Mission, Objective, and Learning Outcomes of the master program</b>
<b>I. Mission :</b>
To prepare highly qualified graduate skilled in the medical microbiology and immunology through advanced leaning, practices and conducting scientific research.
<b>II. General objectives of the program:</b>
1- Produce health science professionals and in-depth medical microbiological and immunology knowledge of different emerging infectious disease and clinical immunology.
2- Promote our students to practice health care associated infection monitoring and prevention in academic and clinical settings.
3- Provide our candidate with the ability to apply different and recent molecular biological and immunological techniques in the field of microbiology
4- Give the candidate the ability to assess immunological status in different pathological condition with gaining knowledge about immunological role in development of different disease and how to target by immunotherapy
5- Provide opportunities to gain research capacity and publish scientific relevant studies.
6. Promote community partners and stakeholders for program development, evaluation and improvement and active participation in professional societies.

<b>III. Graduate Attributes of the program</b>
<i>Upon successful completion of the program in master of Medical Microbiology and Immunology, the graduates will be able to:</i>
1. Demonstrate advanced knowledge in the fields of Medical Microbiology and Immunology.
2. Demonstrate independent critical and analytical thinking, both within their field of study, and beyond for the use of their knowledge for service to others.

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3. Identify and suggest possible solutions to ethical dilemmas that occur in their work and field of study, and understand the importance of professional ethics in all aspects of scientific communication and laboratory work.
4. Demonstrate competence in the laboratory, including application of the scientific method and appropriate use of basic and state of the art laboratory tools and techniques.
5. Demonstrate written and oral skills necessary for communication of research, knowledge, and ideas to scientists and non-scientists alike.

**4. Intended Learning Outcomes from the program:**

**A. Knowledge and understanding:**

*At the end of the course the student should be able to*

1	Understand the basic Specific knowledge in medical microorganisms and immunology, including molecular biology, immunology and DNA technology coupled with hands on skills and leadership skills for a successful career.
2	Describe the important mechanisms of microbial pathogenesis, modes of transmission, eliminated, clarify treatment and outcomes of infections with emphasis on cellular and molecular immunology and immunity to infections
3	List the key considerations and principles in the planning and design of a study on the basis of statistical methods.
4	Discuss the different microbial and immunology diseases and the principle different laboratory techniques, including the isolation, characterization of specific microbes, seroimmunology and nucleic acid in clinical specimens

**B. Intellectual Skills:**

*At the end of the course the student should be able to*

1	Interpret and explain results simply and effectively to clinicians and patients
2	Illustrate important mechanisms of microbial pathogenesis, basic concepts of molecular immunology, immunity to infection, risk of infection, outcomes of infections and vaccines for individual infectious or immunological disease.
3	Design guidelines for prevention, control of infection/disease and antibiotic treatment regimens used for managing microbial and immunological diseases.
4	Categorize health risk factors associated with working in a research diagnostic laboratory

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C. Professional and Practical Skills:	
At the end of the course the student should be able to	
1	Demonstrate important mechanisms of microbial pathogenesis, basic concepts of molecular immunology, immunity to infection, risk of infection and outcomes of infections
2	Perform diagnostic laboratory tests in medical bacteriology, virology, mycology and immunology to offer basic advice on relevant investigations, interpretation of results and infection control procedures in association with quality assurance and control procedure.
3	Applied laboratory data relevant to the cases of medical microbiology, immunology and identified the pathogen by the isolation and its specific growth characteristics if any, distinguishing biochemical tests, its morphological and/or staining characteristics, immunological or nucleic acid-based tests..
D. General and Transferable outcomes:	
At the end of the course the student should be able to	
1	Communicate effectively through oral presentations, computer processing and presentations, and written reports.
2	Respect the role of staff and co-staff members regardless of degree or occupation.
3	Write scientific article according to the basics of scientific research

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Program Standards & Benchmarks	
<b>Academic Standards:</b>	
NARS (National Academic References Standard) for medical education in Yemen	
-Academic Standards Curriculum Criteria of Accreditation Board	
-Unified Regulations for Student Affairs, Ministry of Higher Education and Scientific Research	
<b>Benchmarks</b>	
1-Faculty of medicine and health Sciences, Sana'a university, Yemen	
2- Jordan University of Science and Technology (JUST) Jordan	<a href="https://www.just.edu.jo/FacultiesandDepartments/FacultyofAppliedMedScs/Depts/McdLabSciences/Documents/MSc%20in%20Medical%20Laboratory%20Sciences%20Program%20Information.pdf">https://www.just.edu.jo/FacultiesandDepartments/FacultyofAppliedMedScs/Depts/McdLabSciences/Documents/MSc%20in%20Medical%20Laboratory%20Sciences%20Program%20Information.pdf</a>
	<a href="https://www.just.edu.jo/FacultiesandDepartments/FacultyofAppliedMedScs/Pages/viewplan.aspx?planno=278">https://www.just.edu.jo/FacultiesandDepartments/FacultyofAppliedMedScs/Pages/viewplan.aspx?planno=278</a>
3- UNIVERSITY OF SHARJAH	
	<a href="https://www.sharjah.ac.ae/cn/academics/Colleges/healthsciences/dept/mls/Pages/Master-of-Science-in-Medical-Laboratory-Sciences.aspx">https://www.sharjah.ac.ae/cn/academics/Colleges/healthsciences/dept/mls/Pages/Master-of-Science-in-Medical-Laboratory-Sciences.aspx</a>
4- Majmaah University	
	<a href="https://www.mu.edu.sa/en">https://www.mu.edu.sa/en</a>
5- Tulane university	
	<a href="https://medicine.tulane.edu/departments/microbiology-immunology/masters">https://medicine.tulane.edu/departments/microbiology-immunology/masters</a>
6- Drexel University	
	<a href="https://drexel.edu/medicine/academics/graduate-school/microbiology-immunology/curriculum/">https://drexel.edu/medicine/academics/graduate-school/microbiology-immunology/curriculum/</a>

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<b>Teaching and Learning Strategies:</b>	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Seminars</li> <li>• Lab experiments</li> <li>• Training</li> <li>• Discussion</li> <li>• Presentations</li> <li>• Self-learning</li> <li>• Case study</li> </ul>
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<b>Teaching strategy:</b>	
Teaching Strategy	Description of how it will be used
Lectures	It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups or in sessions, which consist of more than one group gathered in one classroom.
Seminars	These are mainly used with small groups of students in which they find better chances for discussing and negotiating the different concerns of their studies.
Lab experiments	Students doing practices in medical labs individually or in small groups.
Training	This is a practical kind of course where the students are required to plan and execute some field visits to hospitals, corporations or institutions where the process of clinical pharmacy is essential.
Discussion	This is done by allowing the students to ask questions during the lecture and respond to them by the lecturer or other students for the purpose of establishing and clarify the subject of the lecture strongly and increase the concentration and absorption of the student and the attention and not to enter the boredom.
Presentations	Helps the students to be more confident with themselves and make them to show the others what knowledge they have acquired. It can be followed in many types of courses and tasks.
Self-learning	Self-learning is the process by which learners teach themselves using any materials or resources to achieve clear goals without the direct help of the teacher
Case study	Case studies are defined as the scientific documentation of a single clinical observation which is so important study design in advancing medical scientific knowledge especially of rare disease.
Office Hours	Office hours are hours determined by the faculty member (professor or of the

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course) to which the student studies. The hours allocated by the professor to meet with his students to help them and answer their queries in the event of any questions they may not be enough time for the lecture to answer it.

**Assessment Methods:**

- Written examinations
- Oral exams
- Technical or practical reports /Presentations
- Assignments including problem-solving exercises
- Individual and group project work
- Quizzes
- Home work

**Assessment Strategies:**

Assessment Strategy	Its description (in which course it will be used and in which rate)
Written examinations	Mid-term test is conducted between 6th to 8th Class and final exam is conducted at the end of each course.
Oral exams	For selected courses
Technical or practical reports /Presentations	As indicated in the course specification
Assignments including problem-solving exercises	The entire assignments including problem-solving exercises of coursework activities during the teaching period of each course. (which includes group and individual work, tests and presentations, etc.)
Individual and group project work	As indicated in the course specification
Quizzes	For all courses except for project
Home work	For all courses except for project

**1. Alignment of Program Intended Learning Outcomes (PILOs) to Teaching Strategies and Assessment Methods:**

<b>PILOs</b>	<b>Teaching Strategy</b>	<b>Assessment Methods</b>
Knowledge and Understanding A1, A2, A3, A4	Lectures, Interactive class discussions, Tutorials.	Written exams, assignment of work, quizzes, submission of

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reports.	Written exams, Project, Case studies and assignment work.	Lectures, Tutorial, Interactive class discussions, and group work, presentation.	Intellectual Skills B1, B2, B3, B4
Project presentation, Laboratory exam, Report/Project	Written exams, quizzes, Practical exam assignment and report submission.	Short lectures, case study, Laboratory experiments, Field Project, and group work, training, Drawing sessions.	Professional & practical skills C1, C2, C3,
	Project presentation, Laboratory project/presentation, Laboratory experiments, Tutorial, Seminar/ Interactive class discussions, Group work, Self-study, training, Drawing sessions.	Group work, Self-study, Interactive class discussions, Tutorial, Seminar/ Laboratory experiments, Project, and Art Gallery	General & Transferable Skills D1, D2, D3

**1. Project Assessment:**  
 Each project will be assessed by a committee of three members as follows:

Item	Marks Distribution
Project supervisor	60%
Internal examiner: a member of the department staff.	20%
External examiner: a qualified external examiner (either from other departments of the faculty or from another university)	20%
<b>Total</b>	<b>100%</b>

**Program Structure and Contents**

<b>Study System</b>	I-Duration of program 2 - 4 years maximum 4 years divided into courses and thesis
<b>II. Structure of the program:</b>	Total contact number of credit hours 46
<b>-First year</b>	Program-related essential courses and Students II Os
<b>Thesis</b>	MSc thesis subject should be officially registered within 6 months from application of the MSc degree, Discussion and acceptance of the thesis could be set after 12 months from MSc registering date.

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Course Compulsory	Code	Credits	hours
1	03.12.311	3	3
2	03.12.312	3	3
3	03.12.313	3	3
4	03.12.314	2	2
5	03.12.315	2	2
6	03.12.321	2	2
7	03.12.316	2	2
8	03.12.317	2	2
9	03.12.318	4	4
10	03.12.320	2	2
Special Course (Choose one)			
11		3	3
12		3	3
13		6	6
Total		34	34

**Program course:**





## Study Plan

Distribution of Courses according to Semesters (36 credit hours)

First semester		Code	Credit Hour	Number of weeks
1	Advanced Molecular Microbiology	03.12. 311	3	16
2	Biomedical Statistics & Epidemiology	03.12. 312	3	16
3	Advanced Medical Bacteriology	03.12. 313	3	16
4	Advanced Medical Immunology I	03.12. 314	2	16
6	Advanced Medical Mycology	03.12. 316	2	16
Total				13

Second semester		Code	Credit Hour	Number of weeks
1	Research Methodology	03.12. 317	2	16
2	Advanced Diagnostic and Molecular Microbiology	03.12. 318	4	16
3	Advanced Medical Parasitology	03.12. 320	2	16
4	Advanced Medical Virology	03.12. 315	2	16
5	Advanced Medical Immunology II	03.12. 321	2	16
Elective course MS Program (Choose one):				
1	Special Topics in parasitology		3	16
2	Selected topics according to thesis		3	16
3	Thesis		6	
Total				21
Total Of Program Credit Hours				34

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3	Annex- 3, Unified Regulations for Student Affairs, Ministry of Higher Education and Scientific Research
2	Annex- 2, Academic Standards Curriculum Criteria of Accreditation Board
1	1. NARS for medical education in Yemen
<b>Academic Standards:</b>	

Annex-2, Academic Standards Curriculum Criteria of Accreditation board.

No.	Requirements			Rational Weight %
	No. of Courses	Hours	Credit	
1	12	27	77	77
2	Compulsory	1	3	
	Elective	1	6	
Total:				15
				36

Annex-1: Program Structure:

الجامعة اليمنية  
 كلية الطب المخبري  
 قسم الأحياء الدقيقة والبيئة  
 ووزارة التعليم العالي والبحث العلمي  
 جامعة صنعاء ٢١  
 كلية الطب المخبري والبيئي  
 والبيئة والطبية



Yemen  
 of Higher Education & Scientific Research  
 member University for Medical & applied Sciences  
 Faculty of Laboratory medicine  
 Department of Medical Microbiology and Immunology



**Annex-3, Alignment Program vision, mission and Objectives with University and Faculty**

	University	Postgraduate studies and scientific research	Faculty of laboratory Medicine Vision, Mission and Goals:	Medical Microbiology and Immunology
Vission	A contemporary university with national responsibility and a faith identity	Scientific research and contemporary postgraduate studies according to quality standards that meet the needs of the labor market locally and regionally to prepare and implement scientific programs Qualitative application in order to prepare distinguished research leaders that contribute to the treatment of Community problems.	Contemporary and competitive faculty in Laboratory medicine.	To prepare highly qualified graduate skilled in the medical microbiology and immunology through advanced practical and conducting scientific research.
Mission	Leading the transformation in the management and delivery of health care with all partners by setting a standard of excellence in education and medical and applied research in a way that meets the needs of Yemeni society, its privacy and regional influence.		Contribute to improving health services in laboratory medicine by achieving standards of excellence in education and scientific research in a way that meets the needs and privacy of society and contributes to addressing global health problems.	

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<p>1- Ensuring the application of quality standards and setting standards of excellence in medical and applied sciences, scientific research and community service.                  2. The centrality of the student in the educational process, the partnership with them for life, the consolidation of the principles of national responsibility and faith identity, their care and the development of their capabilities after graduation and during work.                  3. Attracting, employing and retaining scholars, cadres and highly specialized talents to gain minds and reverse the trend of "brain drain" in a way that enhances and ensures the creation of thinkers, businessmen and good citizens.                  4. Continuous development of the distinguished academic infrastructure and the establishment of modern research and service centers with high efficiency and capable of making a real impact locally and regionally.</p>	<p>1- Establishing quality postgraduate programs that attract local and regional university graduates                  2- Continuous development and updating of postgraduate programs in accordance with comprehensive quality standards                  3- Preparing distinguished researchers through continuing education programs and developing research skills. 4- Partnership with similar scientific institutions in scientific research.                  5- Developing the infrastructure, human and financial for graduate studies programs and scientific research in accordance with the standards of academic accreditation. 6- Automating the system of postgraduate studies and scientific research and activating electronic links. 7- Attracting expertise from faculty members and researchers from the internal and external environment.</p>	<p>1. Preparing a highly qualified and skilled cadre in the field of laboratory medicine.                  2. Building an educational system that keeps pace with development and conforms to academic quality standards.                  3. Adopting, supporting and investing scientific research programs to meet the requirements of sustainable development and to contribute to solving global health problems.                  4. Developing a culture of community partnership in the field of laboratory medicine and research.                  5. Enhancing the facility position as a preferred partner for local, regional and international partnership through implementing innovative models of education, exchanging research and knowledge and providing real and effective outcomes for developing professional practices to benefit from them locally and regionally.</p>	<p>1 - Produce health science professionals and in-depth medical microbiological and immunology knowledge of different emerging infectious disease and clinical immunology.                  2- Promote our students to practice health care associated infection monitoring and prevention in academic and clinical settings.                  3- Provide our candidate with the ability to apply different and recent molecular biological and immunological techniques in the field of microbiology                  4- Give the candidate the ability to assess immunological status in different pathological condition with gaining knowledge about immunological role in development</p>
<p><b>Objectives</b></p>			

  
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<p>5. Enhancing the university's position as a preferred partner for local, regional and international partnership through implementing innovative models of education, exchanging research and knowledge and providing real and effective outcomes for developing professional practices to benefit from them locally and regionally</p>			<p>of different disease and how to target by immunotherapy          5- Provide opportunities to gain research capacity and publish scientific relevant studies.          6. Promote community partners and stakeholders for program development, evaluation and improvement and active participation in professional societies.</p>
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**Annex-4, Survey of Credit Hours of Similar Programs**

Benchmarking	21 UMAS		Sana'a university	Jordan University (JUST)	Majmaah University	UNIVERSITY OF SHARJAH	Tulane university school of medicine	Drexel University
	Credit Hours	Percentage	Credit Hours	Percentage	Credit Hours	Percentage	Credit Hours	Percentage
Program Requirements	26	74	24	16	22	24	27	36
Program Electives	3	9	6	9	11	6	0	0
Program Thesis	6	17	6	9	6	6	3	18
<b>Total Credit Hours</b>	<b>35</b>	<b>30</b>	<b>34</b>	<b>39</b>	<b>36</b>	<b>30</b>	<b>54</b>	

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*(Signature of Dr. Gamil Taher Abdul\_Mughni)*

*(Signature of Dr. Ghandan Al-Taheri)*

*(Signature of Dr. Gamil Taher Abdul\_Mughni)*

*(Signature of Prof. Dr. Eriksson M.)*

**Annex-5, Survey on Mission and objectives of the program and Similar accredited program**

University	21 September	Sana'a university	Jordan University	Majmaah University	UNIVERSITY OF SHARJAH	Drexel University	Tulane university
Faculty	Laboratory Medicine	Faculty of medicine	Applied Medical Sciences	College of Applied Medical Sciences	College of Health Sciences	School of Medicine	school of medicine
Department	Medical Microbiology & Immunology	Medical microbiology	Medical Laboratory Sciences	Clinical Laboratory Sciences	Medical Lab Sciences	Microbiology and Immunology	Department of Microbiology and Immunology
Program	Medical Microbiology & Immunology	degree program in medical microbiology	Clinical Microbiology, Immunology and Serology	Clinical Laboratory Sciences	Master of Science (MS)	Master Science Microbiology and Immunology	Masters Program in Microbiology and Immunology
Country	Yemen	Yemen	Jordan	Saudi Arabia	UAE	USA	USA
Program Mission:				To prepare competencies in Clinical laboratory field to enhance learners scientific research skills and deeply prepared courses to expand the	To develop and maintain superior educational program in the field of medical laboratory sciences.	To preparation of individuals for a variety of career objectives in microbiology and immunology.	

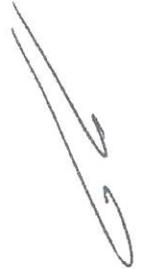




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2		<p>knowledge provided by recognized faculty member in their specialty in order to cope with the evolution in the field of laboratory diagnostic techniques</p>		<p>1-Learning the fundamental principles and recent advances in Clinical Laboratory.</p> <p>2-Updating students about the modern technologies in Clinical and Research field.</p> <p>3-Enable students to understand the principles of laboratory</p>	<p>1-The program is designed to provide students with the skills required to advance to positions as bioscience researchers and trainers in a broad spectrum of positions.</p> <p>2-The structure of the program provides a framework for the mastery of the current state of the subject matter of bioscience, an ability to synthesize this information and apply this foundation to the identification of key areas of investigation/experimentation in bioscience.</p> <p>3-The program relates the above framework to the development of the ability to</p>	<p>1. Demonstrate advanced knowledge in the fields of Medical Microbiology and Immunology.</p> <p>2. Demonstrate independent critical and analytical thinking, both within their field of study, and beyond for the use of their knowledge for service to others.</p> <p>3. Identify and suggest possible solutions to ethical dilemmas that occur in their work and</p>
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3 Program Outcomes:				<p>management, safety, quality control, research and statistical approach.</p> <p>4-Motivate students to commit to life-long learning and scientific research to solve health problems of the community.</p> <p>5-Allow students to develop their management, leadership, communication, teamwork, writing and presentation skills.</p>		<p>design, implement and interpret experimental approaches which address the questions identified.</p> <p>4-In addition, the program will develop skills in the various means of communicating both the core of bioscience knowledge and the expression of experimental design, results and interpretation to a variety of potential audiences.O10</p>	<p>field of study, and understand the importance of professional ethics in all aspects of scientific communication and laboratory work.</p> <p>4. Demonstrate competence in the laboratory, including application of the scientific method and appropriate use of basic and state of the art laboratory tools and techniques.</p> <p>5. Demonstrate written and oral skills necessary for communication of research, knowledge, and ideas to scientists and non-scientists alike.</p>
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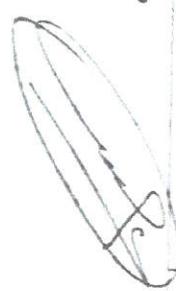




**Annex-6, Alignment Program Intended Learning Outcomes (PILOs) to Faculty Educational Objectives (FObj)**

**1. Program PILOs**

	FObj1	FObj2	FObj3	FObj4	FObj5
A1	✓	✓	✓	✓	✓
A2	✓	✓	✓	✓	✓
A3	✓	✓	✓	✓	✓
A4	✓	✓	✓	✓	✓
B1	✓	✓	...	✓	✓
B2	✓	✓	...	✓	✓
B3	✓	✓	...	✓	✓
B4	✓	✓	✓	✓	✓
B5	✓	✓	✓	✓	✓
C1	✓	✓	✓	...	✓
C2	✓	✓	✓	...	✓
C3	✓	✓	✓	...	✓
C4	✓	✓	✓	✓	✓
D1	✓	✓	✓	✓	✓
D2	✓	✓	✓	✓	✓
D3	✓	✓	✓	✓	✓

  
 23/11/2023



Annex-7. Alignment of Program Intended Learning Outcomes (PILOs) to Program Objectives (POs)

1. Program PILOs	Program Objectives					
	PObj1	PObj2	PObj3	PObj4	PObj5	PObj6
A1	✓	✓	...	...	✓	
A2	✓	✓	...	✓	✓	
A3	✓	✓	✓	✓	✓	✓
A4	✓	✓	✓	✓	✓	✓
B1	✓	✓	...	✓	✓	✓
B2	✓	✓	...	✓		✓
B3	✓	✓	...	✓		✓
B4	...	✓	✓	✓	✓	✓
C1	✓	✓	...	...	✓	✓
C2	...	...	...	...	✓	✓
C3	...	...	...	✓	✓	✓
C4	✓	✓	...	✓		
D1	✓	✓	✓	✓	✓	✓
D2	✓	✓	...	✓	✓	✓
D3	✓	✓	✓	✓	✓	✓






Annex-8. Survey of Course Names per Academic Semesters of Similar Programs

C.N	21-Sep	Same university	Jordan University of Science and Technology (JUST)	Majmaah University	UNIVERSITY OF SHARJAH	Drexel University	Tulane university school of medicine	Course Hours	
								L	P T C h
	12	13	14	8	15	13	8		
T.Cr	35	30	34	39	36	54	30		
1	Advanced Molecular Microbiology	Molecular biology I and II	Advanced Molecular Biology	Cellular & Molecular Biology				L	P T C h
2	Advanced Biostatistics and Epidemiology	Biostatistics and Epidemiology	Advanced Biostatistics and Computer Application	Biostatistics		Biostatistics I		L	P T C h
3	Advanced Bacteriology	Medical Bacteriology I and II	Bacteriology	Microbialogy I Microbiology II	Microbial Pathogenesis	Molecular Pathogenesis II		L	P T C h
4	Advanced Immunology	Advanced Immunology I and II	Immunology	Immunology	Advanced Clinical Immunology	Immunology I		L	P T C h
5	Advanced Medical Virology	Advanced medical	Virology and Parasitology	Viral Pathogens and		Molecular Pathogenesis I (Viral)		L	P T C h

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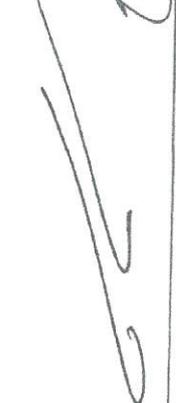
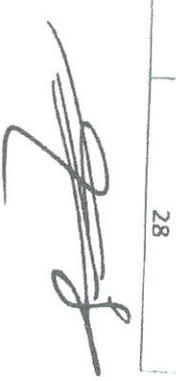






Annex-9, Survey of Number of courses and Credit Hours of Similar Programs Compared to Current Program

University	No of Courses	Total Cr. Hrs.
University of 21 September for Medical & Applied Sciences	13	36
Faculty of medicine Sana'a university	13	30
Beirut Arab University	11	36
Jordan University of Science and Technology (JUST)	25	34
Mahidol University		
University of Michigan	25	36
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Annex-10 . Matrix of Mapping Program PILO's with Courses

Course No.	Code/ No.	ILOs														
		Knowledge & understanding skills				Intellectual skills				Practical & professional skills				General & Transferable skills		
		A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3
1	Advanced Molecular Biology	x		x	x					x	x	x	x	x	x	x
2	Advanced Biostatistics and Epidemiology	x		x	x	x	x	x	x	x	x	x	x	x	x	x
3	Advanced Bacteriology (Molecular and Cellular Pathogenesis)	x		x	x	x	x	x	x	x	x	x	x	x	x	x
4	Advanced immunology	x		x	x	x	x	x	x	x	x	x	x	x	x	x



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