Course Specifications

Revised November 2019

Course Title:	**Microbial Toxicology**
Course Code:	**4014462-2**
Program:	**BSc Microbiology**
Department:	**Department of Biology**
College:	**Faculty of Applied Science – Department of Biology**
Institution:	**UM AL – QURA UNIVERSITY**
Revision Date	**November 2019**

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A. Course Identification

1. Credit hours: 2 hours
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ■ Elective ☐
3. Level/year at which this course is offered: **4th Year / Level 8**
4. Pre-requisites for this course (if any): Medical Microbiology (4013472-3)
5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	50 %
2	Blended		-
3	E-learning		-
4	Correspondence		-
5	Other	30	50 %

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	Lecture	30
2	Laboratory/Studio	42
3	Tutorial	-
4	Practical/Field work/Internship	6
5	Others (specify)	30
	Total	102
Other Learning Hours*		
1	Study	30
2	Assignments	8
3	Library	15
4	Projects/Research Essays/Theses	10
5	Others (specify)	-
	Total	63

* 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

This course is designed for students of applied microbiology to cover the basic aspects of microbial toxicology. The students will be familiar with the type toxins, specially microbial toxins. Also, the students will be study the structure and properties of microbial toxins. Also, mode of action of microbial toxins, antitoxins against Diphtheria, Cholera, and Tetanus will be covered. Fungal toxins (Aflatoxins), its production condition, Methods of detoxification, or removing the microbial toxins and the methods for assaying the microbial toxins will be studied.

2. Course Main Objective

❖ **After completing this course the student should be able to:**

- Define the microbial toxicology
- Familiar with microorganisms produced toxins
- Differentiate between chemical toxins and biological toxins
- Compare between Endotoxins and Exotoxins
- Diagnose the symptoms of bacterial toxins and mycotoxins
- list the types of bacterial and mycotoxins
- write briefly the structure of any microbial toxin
- Discuss the mechanism action of any toxin
- Describe the detoxification methods of the microbial toxins
- List the method used for assaying the bacterial and myco-toxins
- Diagram the chemical structure of microbial toxins
- Calculate the lethal dose of any toxin
- Predict with the type of toxin through the symptoms
- Summarize the conditions influencing the production of microbial toxins

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge:**	
	Upon successful completion of this course The student will be able to: • Define the microbial toxicology • Familiar with microorganisms produced toxins • Differentiate between chemical toxins and biological toxins • Compare between Endotoxins and Exotoxins • Diagnose the symptoms of bacterial toxins and mycotoxins • List the types of bacterial and mycotoxins • Write briefly the structure of any microbial toxin • Describe the detoxification methods of the microbial toxins • List the method used for assaying the bacterial and myco-toxins	
2	**Skills:**	
2.1	**Cognitive skills to be developed**	

	CLOs	Aligned PLOs
	❖ Upon successful completion of this course The student will be able to: • Defined the microbial toxicology • Differentiate between chemical toxins and biological toxins • Compare between Endotoxins and Exotoxins • Diagnose the symptoms of bacterial toxins and mycotoxins • write briefly the structure of any microbial toxin • Discuss the mechanism action of any toxin • Describe the detoxification methods of the microbial toxins • Diagram the chemical structure of microbial toxins • Calculate the lethal dose of any toxin • Predict with the type of toxin through the symptoms • Summarize the conditions influencing the production of microbial toxins	
2.4.	**Psychomotor Skills** ❖ Upon successful completion of this course, the student is expected to be able to: • Perform the tests for detection of microbial toxins. • Use tools and kits that are used Toxicological laboratories • Perform the laboratory experiments precisely • Operate all devices in lab • Prepare the different media used in microbial Toxicology lab	
3	**Competence:**	
3.1	❖ Upon successful completion of this course The student will be able to: • Developing oral presentations. • Communicating personal ideas and thoughts. • Work independently and as part of a team to finish some assignments. • Communicate results of work to others. • Use of needed precautions when dealing with pathogen microorganisms • Demonstrate professional attitudes and behaviors towards others. • Propose the smart questions • Understand and dissecting the problem so that it is fully solved understood. • Demonstrate the assertiveness for his decision. • Demonstrate his capability for the responsibility and Accountability • Show Effective verbal communication with clarity and must be characterize with the following interpersonal attributes; (verbal communication, non-verbal communication, good listening for the others, questioning, good manners, problem solving, social awareness, self-management, responsibility and accountability). • Enhancing the ability of students to use computers and internet. • Interpret the laboratory data. • Know how to write a report.	

C. Course Content

Topics to be Covered		
Topic	No of Weeks	Contact hours
❖ **Introduction: to microbial toxicology** -Definition of microbial toxins - Historical background about the microbial toxins - Types of toxins (chemical or biological toxins) - An overview about Microorganisms produced Toxins	**1**	**2**
❖ **General properties of microbial toxins** - Properties and Structures of microbial toxins -Mode of action of microbial toxins	**1**	**2**
❖ **Bacterial toxins** -General properties of bacterial toxins - Microorganisms produced toxins -Type of bacterial toxins (Endotoxins, Exotoxins): Botulinum, Tetanus toxin, Staphylococcal toxins, Anthrax toxin, Diphtheria toxins, Shiga toxin, Salmonella toxins, Erythrogenic Toxins, ……etc. -Structure of bacterial toxins -Level of toxicity -Symptom of each bacteria toxins - Mechanism of action of bacterial toxins - Diseases caused by or associated with bacterial toxins: - Methods for detoxification of bacterial toxins	**3**	**6**
❖ **Mycotoxins:** -General properties of fungal toxins - Microorganisms produced toxins -Type of fungal toxins: (Aflatoxins, Ochratoxin, Citrinin, Ergot Alkaloids, Patulin, Fusarium toxins) -Structure of bacterial toxins -level of toxicity -Symptom of each bacteria toxins - Mechanism of action of bacterial toxins -Diseases associated with fungal toxins - Methods for detoxification of fungal toxins	**3**	**6**
❖ **Production of microbial toxins** Factors influence production of bacteria and fungal toxins	**1**	**2**

❖ **Methods for assaying the microbial toxins**: - Biological assays - Immunological assays - Gel diffusion assays - Haemagglutination - Coagglutination - Enzyme-linked immunosorbent assay - Enzyme-linked immunofiltration assay. - Radioimmunoassay. - Nucleic acid probes and polymerase chain Reaction (PCR technique)	**2**	**4**
❖ Methods for determination of mycotoxins: - *sample pretreatment methods* such as liquid–liquid extraction (LLE), supercritical fluid extraction (SFE), solid phase extraction (SPE), (b) *separation methods* such as (TLC), high performance liquid chromatography (HPLC), gas chromatography (GC), and capillary electrophoresis (CE) and (c) *others* such as ELISA.	**1**	**2**
❖ **Relationship between microbial toxins and cancer**	**1**	**2**
❖ **Methods for detoxification and removing the microbial toxins**	**1**	**2**
	14 weeks	**28hrs**

D. Teaching and Assessment

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

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge**		
1.1	• Define the microbial toxicology • Familiar with microorganisms produced toxins • Differentiate between chemical toxins and biological toxins • Compare between Endotoxins and Exotoxins • Diagnose the symptoms of bacterial toxins and mycotoxins • List the types of bacterial and mycotoxins • Write briefly the structure of any microbial toxin • Describe the detoxification methods of the microbial toxins • List the method used for assaying the bacterial and myco-toxins	- The methodology includes a combination of lectures by the lecturer, seminar presentation by the students and web-interactions. - At the end of the programme, students will be divided into groups for seminar presentation on important areas of the course to assess their understanding and comprehension of the course. - All students will be involved in on-line learning process and each student is required to create an E-mail address to facilitate student web interactions. - Using images and	• Periodical exam and reports 10% • Mid- term theoretical exam 20% • Mid-term practical exam 5% • Final practical exam 15% • Final exam 50%

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		movies - Encouraging students to collect the new information about microbial toxicology and the new microbial toxins. - Availability of the reference books and scientific sites concerning the microbial toxicology in internet.	
2.0	**Skills**		
2.1	**Cognitive skills** • Defined the microbial toxicology • Differentiate between chemical toxins and biological toxins • Compare between Endotoxins and Exotoxins • Diagnose the symptoms of bacterial toxins and mycotoxins • write briefly the structure of any microbial toxin • Discuss the mechanism action of any toxin • Describe the detoxification methods of the microbial toxins • Diagram the chemical structure of microbial toxins • Calculate the lethal dose of any toxin • Predict with the type of toxin through the symptoms • Summarize the conditions influencing the production of microbial toxins	• Lectures • Brain storming • Discussion	• Exam must contain questions that can measure these skills. • Quiz and exams • Discussions after the lecture.
2.2	**Psychomotor Skills** • Perform the tests for detection of microbial toxins. • Use tools and kits that are used Toxicological laboratories • Perform the laboratory experiments precisely • Operate all devices in lab • Prepare the different media used in microbial Toxicology lab	- Case Study - Active learning - Small group discussion	• Evaluate the efforts of each student in preparing the report. • Evaluate the scientific values of reports. • Evaluate the work in team • Evaluation of students presentations

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
3.0	**Competence**		
3.1	• Developing oral presentations. • Communicating personal ideas and thoughts. • Work independently and as part of a team to finish some assignments. • Communicate results of work to others. • Use of needed precautions when dealing with pathogen microorganisms • Demonstrate professional attitudes and behaviors towards others. • Propose the smart questions • Understand and dissecting the problem so that it is fully solved understood. • Demonstrate the assertiveness for his decision. • Demonstrate his capability for the responsibility and Accountability • Show Effective verbal communication with clarity and must be characterize with the following interpersonal attributes; (verbal communication, non-verbal communication, good listening for the others, questioning, good manners, problem solving, social awareness, self-management, responsibility and accountability). • Enhancing the ability of students to use computers and internet. • Interpret the laboratory data. • Know how to write a report.	• Lab work • Case Study • Active learning • Small group discussion • Homework (preparing a report on some topics related to the course depending on web sites). • Seminars presentation • Practical during carryout the experiments in the lab.	• Oral exams. • Evaluate the efforts of each student in preparing the report. • Evaluate the scientific values of reports. • Evaluate the work in team. • Evaluation of the role of each student in lab group assignment • Evaluation of students presentations.

2. Assessment Tasks for Students

5. Schedule of Assessment Tasks for Students During the Semester

Assessment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Exam duration	Proportion of Final Assessment
1	**Periodical Exam (s)**	**4**	**15 min**	**10 %**
2	**Mid Term Exam (Theoretic)**	**8**	**60 min**	**20 %**
3	**Mid Term Exam (practical)**	**9**	**30 min**	**10 %**
4	**Reports and essay**	**11**	**--**	**5 %**
5	**Final Practical Exam**	**15**	**60 min**	**15 %**
6	**Final Exam**	**16**	**120 min**	**40 %**
Total Marks				**100%**

***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 : • **Office hours: 10hrs.**

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	1- Microbial Toxins: Structure and Their Type Paperback – April 17, 2011 by Rajeeva Gaur (Author), Soni Tiwari (Author), Ranjan Singh (Author)
Essential References Materials	1- Microbial Toxins: Current Research and Future Trends by Thomas Proft (Editor), Publisher: Caister Academic Press (April 14, 2009)
Electronic Materials	https://en.wikipedia.org/wiki/Microbial_toxins
Other Learning Materials	**PPT prepared by Dr.** Dr. Hussein Abulreesh

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Class room is already provided with data show • The area of class room is suitable concerning the number of enrolled students (68) and air conditioned
Technology Resources (AV, data show, Smart Board, software, etc.)	• Digital lab containing 15 computers.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	• Incubators, autoclaves, measuring equipment, water bath, digital balances, pH meters, centrifuge, safety facilities. • Availability of some reference bacterial strains • Different media • All chemicals and reagents that needed • Availability the immunological kits for pathogens detection

G. Course Quality Evaluation

1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- Questionaries
- Open discussion in the class room at the end of the lectures.

2. Other Strategies for Evaluation of Teaching by the Instructor or by the Department • Revision of student answer paper by another staff member. • Analysis the grades of students.
3. Processes for Improvement of Teaching • Preparing the course as PPT. • Using scientific movies. • Coupling the theoretical part with laboratory part • Periodical revision of course content.
4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution) • After the agreement of Department and Faculty administrations
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. • Periodical revision by Quality Assurance Units in the Department and institution

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

Prepared by faculty staff: 1. **Dr.** Hussein Abulreesh	**Signature:**
Date Report Completed: November **2019**	
Revised by: 1. Dr. Khaled Elbanna 2. Dr. Hussein H. Abulreesh 3. Dr. Shady Elshahawy	**Signature:**
Date: November **2019**	
Program Chair Dr. Hussein H. Abulreesh	**Signature:**
Dean	**Signature:**
Date:	