Course Specifications

Revised November 2019

Course Title:	**Bacteriology**
Course Code:	**4012422 -3**
Program:	**BSc Microbiology**
Department:	**Department of Biology**
College:	**Faculty of Applied Science – Department of Biology**
Institution:	**UM AL – QURA UNIVERSITY**
Revision Date	**November 2019**

Table of Contents

A. Course Identification

1. Credit hours: 3 hours
2. Course type **a.** University ☐ College ☐ Department ☑ Others ☐ **b.** Required ■ Elective ☐
3. Level/year at which this course is offered: **Level** Year 4 (scond semester) 4th Year /(8)
4. Pre-requisites for this course (if any): Introductory Microbiology (4012401-4)
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 deals with the occurrence of bacteria in the environment, Bacterial cell structure, classification bacterial groups based on morphological, physiological and genetic characterization. Study key characteristics, sources, and biology of many commonly encountered and/or taxonomically interesting bacterial groups. It will be considered, how molecular approaches, particularly 16S ribosomal RNA sequence analysis, allow diverse organisms to be grouped based on phylogenetic relationships. Methods and approaches for the isolation and identification of bacteria are considered in the laboratory. Also, study of the factors effect of bacterial growth and nutrition of bacteria will be coverd.

2. Course Main Objective

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

- List the roles of bacteria in the life and in different applications
- Describe the general characteristics of bacteria
- Understand the principles and keys of bacterial taxonomy
- Understand the positive and negative roles of bacterial in the life
- Define basic structures and shapes of different bacterial genera.
- Describe the fine structure of bacterial cell.
- Differentiate between the different genera of bacteria.
- Illustrate the bacterial growth curve.
- Write the different methods for bacterial staining
- Summarize the factors effect on bacterial growth
- Summarize the nutritional requirements of bacteria
- Describe the reproduction in bacteria
- List the different animal and human diseases caused by some bacterial groups.
- Discuss the different between gram positive and negative bacteria.
- Describe the role of bacteria in genetic engineering and its applications in different fields.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge:**	
	❖ **Upon successful completion of this course The student will be able to:** • List the roles of bacteria in the life and in different applications • Describe the general characteristics of bacteria • Understand the principles and keys of bacterial taxonomy • Understand the positive and negative roles of bacterial in the life • Define basic structures and shapes of different bacterial genera. • Describe the fine structure of bacterial cell. • Differentiate between the different genera of bacteria. • Illustrate the bacterial growth curve. • Write the different methods for bacterial staining • Summarize the factors effect on bacterial growth • summarize the nutritional requirements of bacteria • Describe the reproduction in bacteria • List the different animal and human diseases caused by some bacterial groups. • Discuss the different between gram positive and negative bacteria.	

	CLOs	Aligned PLOs
	• Describe the role of bacteria in genetic engineering and its applications in different fields.	
2	**Skills:**	
2.1	**Cognitive skills to be developed** ❖ Having successfully completed the course students should be able to: • Describe the general characteristics of bacteria • Understand the principles and keys of bacterial taxonomy • Understand the positive and negative roles of bacterial in the life • Describe the fine structure of bacterial cell. • Differentiate between the different genera of bacteria. • summarize the factors effect on bacterial growth • summarize the nutritional requirements of bacteria • Describe the reproduction in bacteria • Discuss the different between gram positive and negative bacteria. • Describe the role of bacteria in genetic engineering and its applications in different fields.	
2.4.	**Psychomotor Skills** ❖ Upon successful completion of this course, the student is expected to be able to: • Perform the laboratory experiments precisely • Operate all devices in lab • Diagram growth curve of bacteria. • Assemble and collect important bacterial isolates • Prepare different media • Cultivate the bacterial isolates • Carry out bacterial identification techniques.	
3	**Competence:**	
3.1	❖ Upon successful completion of this course, the student is expected to 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	

CLOs		Aligned PLOs
	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

1 Topics to be Covered		
Topic	No of Weeks	Contact hours
❖ **Introduction:** -An overview about the role of bacteria in the environment and their applications in different fields - Distribution of bacteria in the environment - Different between the prokaryotes and Eukaryotes	**1**	**2**
❖ **Growth of bacteria** - Culture and Pure Culture - Media and growth conditions for diverse bacteria	**1**	**2**
❖ **Bacterial taxonomy** - Bergey's Manual of determinative Bacteriology -Bergey's Manual of Systematic Bacteriology - Nomenclature of bacteria - Identification - Classification - Morphological characteristics - Phenotypic of bacteria - Genotypic of bacteria (16s rRNA, DNA-DNA hybridization, Fatty acids frofile, Protein profile)	**1**	**2**
❖ **Bacterial motility** - Swimming by flagella - Gliding movement - Rotary movement	**3**	**6**
❖ **Bacterial staining** - Simple Stains:(positive stain and negative stain) - Compound or differential stains: Gram stain Spore stain Acid fast stain	**2**	**4**

❖ **Bacterial cell structure and the their functions** - Cell wall - Protoplast - Cytoplasmic membrane - Cytoplasmic contents: -Bacterial genome and plasmids - Stored materials - Gas Vacuoles -Spores (in some cases), Sporulation in bacteria	**1**	**2**
❖ **Bacterial reproduction** -Reproduction methods in bacteria - Bacterial growth curve - Factors effect the growth curve of bacteria - Generation time	**2**	**4**
❖ **Bacterial Nutrition** -Energy resources for bacteria -Heterotrophic bacteria, Autotrophic bacteria - Oxygen, light, elements, vitamins requirements	**1**	**2**
❖ **Short Description for:** - Microorganisms in Soil - Microorganisms in Food and dairy -Microorganisms in water	**2**	**4**
	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	Upon successful completion of this course The student will be able to: • List the roles of bacteria in the life and in different applications • Describe the general characteristics of bacteria • Understand the principles and keys of bacterial taxonomy • Understand the positive and negative roles of bacterial in the life • Define basic structures and shapes of different bacterial genera. • Describe the fine structure of bacterial cell. • Differentiate between the different genera of bacteria. • Illustrate the bacterial growth curve. • Write the different methods for bacterial staining	- The methodology includes a combination of lectures by the lecturer, seminar presentation by the students and web-interactions. - Students will be given opportunity to understand the role of important microorganisms in different applications and human service. - 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	• 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
	• Summarize the factors effect on bacterial growth • summarize the nutritional requirements of bacteria • Describe the reproduction in bacteria • List the different animal and human diseases caused by some bacterial groups. • Discuss the different between gram positive and negative bacteria. • Describe the role of bacteria in genetic engineering and its applications in different fields.	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 movies -Encouraging students to collect the new information about what the new bacteriology - Enable the reference books and scientific sites concerning bacteriology in internet.	
2.0	**Skills**		
2.1	**Cognitive skills** • Describe the general characteristics of bacteria • Understand the principles and keys of bacterial taxonomy • Understand the positive and negative roles of bacterial in the life • Describe the fine structure of bacterial cell. • Differentiate between the different genera of bacteria. • summarize the factors effect on bacterial growth • summarize the nutritional requirements of bacteria • Describe the reproduction in bacteria • Discuss the different between gram positive and negative bacteria. • Describe the role of bacteria in genetic engineering and its applications in different fields.	• Lectures • Brain storming • Discussion	• Exam must contain questions that can measure these skills. • Quiz and exams • Discussions after the lecture.
2.2	**Psychomotor Skills** Upon successful completion of this	- Follow up students the students in lab	

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	course, the student is expected to be able to: • Perform the laboratory experiments precisely • Operate all devices in lab • Diagram growth curve of bacteria. • Assemble and collect important bacterial isolates • Prepare different media • Cultivate the bacterial isolates • Carry out bacterial identification techniques.	and during carryout all the laboratory experiments	-Giving additional marks for the students they have accurate laboratory results and good seminar presentation -Practical exam.
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

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods

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	-Book note prepared by associate prof. Dr. Khaled El Banna -Brock Biology of Microorganisms, Twelfth edition by Madigan, Martinko, Dunlap and Clark; Publisher: Pearson Prentice-Hall, ISBN: 0132324601 (2008). -Benson, H.J. (2002). Microbiological Applications. Laboratory Manual in General Microbiology, eighth edition.
Essential References Materials	1-Prescott, L., Harley, J. and Klien, D. (2005). Microbiology, MacGraw 2-Larry McKane & Judy Kandel (1996) Microbiology–Essential and Applications, International Edition.
Electronic Materials	www.bacteriamuseum.org/niches/wabacteria/bacteriology.shtmlhttp://www.bacterio.net
Other Learning Materials	• **PPT prepared by prof. Dr. Khaled Elbanna**

2. Facilities Required

Item	Resources

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, safety facilities. • Availability of some reference bacterial strains • Availability all kits for identification of the microorganisms isolated from different habitates • Availability of VITEK device for rapid identification of microorganisms • All chemicals and reagents that needed • Availability all kits for identification of the microorganisms isolated from different habitates

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.)

H. Specification Approval Data

Prepared by faculty staff: **1. Prof. Dr. Khaled Elbanna**	**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	**Signature:**

Dr. Hussein H. Abulreesh	
Dean	**Signature:**
Date:	