



# Course Specification

## (Bachelor)

**Course Title:** Epidemiology

**Course Code:** BIOL 446

**Program:** Biology

**Department:** Biology

**College:** College of Science

**Institution:** Majmaah University

**Version:** 4<sup>th</sup>

**Last Revision Date:** (07/10/2023)



## Table of Contents

<b>A. General information about the course:</b> .....	3
<b>B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods</b> .....	4
<b>C. Course Content</b> .....	6
<b>D. Students Assessment Activities</b> .....	9
<b>E. Learning Resources and Facilities</b> .....	9
<b>F. Assessment of Course Quality</b> .....	11
<b>G. Specification Approval</b> .....	11





## A. General information about the course:

### 1. Course Identification

#### 1. Credit hours: 3 (2+2)

Equivalent to ECTS Credit Point : 4.5

#### 2. Course type

- A.  University  College  Department  Track  Others
- B.  Required  Elective

#### 3. Level/year at which this course is offered: (Level 7/ year 4)

#### 4. Course General Description:

Survey of major topics of environmental health. Sources, routes, media, and health outcomes associated with biological, chemical, and physical agents in environment. Effects of agents on disease, water quality, air quality, food safety, and land resources. Current legal framework, policies, and practices associated with environmental health and intended to improve public health

#### 5. Pre-requirements for this course (if any): N/A

**Instrumentation Microscopic Preparation BIOL 361**

#### 6. Co-requisites for this course (if any): N/A

#### 7. Course Main Objective(s):

- To identify the cause, of a disease and its relevant risk factors (i.e., factors that increase a person's risk for a disease) to reduce morbidity and mortality from the disease
- To develop a rational basis for prevention programs based on identified causal factors and work on to reduce or eliminate exposure to those factors
- To determine the extent of disease found in the community and help plan health services and facilities for effective health care facilities and develop appropriate treatments, which can prevent the transmission of the disease to others
- To study the natural history and prognosis of the disease and help compare the results of using new modalities with the baseline data to determine whether new approaches have truly been effective.

### 2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	80%
2	E-learning	15	20%
3	Hybrid <ul style="list-style-type: none"> <li>• Traditional classroom</li> <li>• E-learning</li> </ul>		



No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

### 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 Contact hours		60

### Workload (based on the academic semester)

No	Activity	Work Load (in hours)
1.	Contact hrs	60
2.	Self-study hours or Academic learning hours (Assignments, quizzes, reports, Discussions, Library, research....)	60
Total Workload		120 hours
Equivalent to <b>ECTS Credit points</b>		4.5

## B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.2	Acquire knowledge in epidemiological terms and glossaries	K2	-Lectures - online Lectures -Conduct scientific research (project) - Seminars. -Discussions	- Midterm 1 - Midterm 2 - Final exam -Quizzes. - Class exercises - E exam





Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
			-Brainstorming	- Assignments
1.2	Continue to acquire and outline the main source and mode of spread diseases	K2	-Lectures - online Lectures -Conduct scientific research (project) - Seminars. -Discussions -Brainstorming	- Midterm 1 - Midterm 2 - Final exam -Quizzes. - Class exercises - E exam - Assignments
<b>2.0</b>	<b>Skills</b>			
2.3	Construct and categorize the epidemic diseases and the pathogens and the main way to investigate the outbreak (S3: KPI:14)	S3	- Discussion - Brain storm - Case study - Projects - online lecture (blackboard)	- Midterm 1 - Midterm 2 - Final exam
2.3	Distinguish the epidemic diseases sources (animals or humans) and the characteristic of each one (S3: KPI:16)	S3	- Discussion - Brain storm - Case study - Projects - online lecture (blackboard)	- Midterm 1 - Midterm 2 - Final exam
2.4	Statistically calculate the Risk ratio of communicable diseases and the sensitivity and specificity of disease diagnostic tests (S4: KPI:18)	S4	- Practical training - Laboratory work - Lab Report	Rubrics of behaviour and performance in the lab Lab assignment Practical exam
<b>3.0</b>	<b>Values, autonomy, and responsibility</b>			
3.1	Committee toward group task contributing ideas (V1: KPI 20)	V1	-Training courses - Workshop -Project - Volunteer hours	-Reports, Assignment -Homework - Presentation - Oral questions, Viva voce, Community services
	Effective communication of their scientific concepts	V1	-Training courses - Workshop	-Reports, Assignment





Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	(e.g. oral presentation, viva voce, assignment, research project etc)		-Project - Volunteer hours	-Homework - Presentation - Oral questions, Viva voce, Community services

### C. Course Content

No	List of Topics (Theory)	Contact Hours
1.	<p><b><u>Unit:1 Introduction to Epidemiology</u></b></p> <ul style="list-style-type: none"> <li>· Define: Epidemiology</li> <li>· Role and purposes of Epidemiology</li> <li>· Role of Epidemiologist</li> <li>· History of Epidemiology</li> <li>· Important Terms in Epidemiology</li> <li>· Uses of Epidemiology</li> <li>· Components of Measuring Disease Frequency</li> <li>· Difference and definition of: Endemic; Epidemic and Pandemic Diseases</li> <li>· Descriptive Epidemiology and Analytic Epidemiology</li> <li>· Epidemiological agents, hosts and Environmental factors</li> <li>· Disease transmission and Disease level</li> <li>· Role of Laboratory Sciences and Field Sciences in epidemiology</li> </ul>	2
2.	<p><b><u>Unit:2 Disease and disease transmission</u></b></p> <ul style="list-style-type: none"> <li>· Disease definition</li> <li>· Infectious diseases as a cause of Death</li> <li>· Infectious diseases Throughout History</li> <li>· Koch's Postulate</li> <li>· Different groups of Infectious agent</li> <li>· Categories of pathogenic organisms and their characteristics</li> <li>· Transmission of Infectious Diseases:</li> <li>· Airborne infectious agents</li> <li>· Factors that influence airborne transmission</li> <li>· Water-borne infections</li> <li>· Water-borne infectious agents (Typhoid; Cholera; Giardiasis, bacillary, amoebic and viral dysentery: Symptoms and control measures)</li> <li>· Faecal-oral infections and infectious doses</li> <li>· Phases of Infectious Disease</li> </ul>	4



	<ul style="list-style-type: none"> <li>· Classification of Infectious Disease</li> <li>· Asymptomatic Infections / Pathogen carriers</li> <li>· Reducing the Spread of Infectious Diseases</li> <li>· Emerging Infectious Diseases</li> </ul>	
3.		
4.	<p><b><u>Unit:3 Source and Mode of Epidemiological Disease Transmission</u></b></p> <ul style="list-style-type: none"> <li>· Global examples of Emerging and Re-emerging infectious Diseases</li> <li>· Frequent viral epidemics</li> <li>· Frequent Bacterial epidemics</li> <li>· Fungal epidemics</li> <li>· Frequent parasitic epidemics with examples and their life cycles</li> <li>· Mode of infection Transmission</li> <li>· Chain of Infection transmission</li> <li>· Fomite: Passive vector</li> <li>· Portal of Entry</li> <li>· Portal of Exit</li> <li>· Reservoir (Symptomatic carrier; Asymptomatic carrier; Incubatory carrier; Convalescent carriers)</li> <li>· Zoonotic diseases</li> <li>· Susceptible Host (Genetic makeup; specific immunity; Socioeconomic factors)</li> <li>· Infectious factors and types</li> <li>· Healthcare-Associated (Nosocomial) Infections</li> <li>· Prevention of disease transmission</li> </ul>	2
5.	<p><b><u>Unit:4 Preparedness to control Epidemic or Pandemic</u></b></p> <ul style="list-style-type: none"> <li>• Outbreak</li> <li>• Define: Outbreak (Sudden onset, Short incubation period)</li> <li>• Recent International Viral Outbreaks</li> <li>• Reasons for Outbreak</li> <li>• Outbreak Management</li> <li>• Need of outbreak preparedness</li> <li>• Epidemiological Approaches on outbreaks</li> <li>• Tools for quantifying the epidemics</li> <li>• Understanding the Sources of infectious agents</li> <li>• Investigating Criteria for Outbreak</li> <li>• Steps in Outbreak Investigation</li> <li>• Field work Preparation</li> <li>• Outbreak investigation Team</li> <li>• Outbreak Case Definition</li> <li>• Identify and count Cases</li> <li>• Point of Source Outbreak</li> <li>• Intermittent Common-source Outbreak</li> <li>• Propagated source Outbreak</li> <li>• Difference between a common source and propagated outbreak</li> <li>• Cohort studies</li> <li>• Calculation of disease attack rate (Risk ratio; Odds ratio)</li> </ul>	4



	<ul style="list-style-type: none"> <li>• Possible control measures for communicable diseases (Viral, bacterial and parasitic infection with example)</li> </ul> <p>Individual Preparedness for outbreak management</p>	
6.	<p><b>Unit:5 Epidemiology of Non-communicable diseases</b></p> <ul style="list-style-type: none"> <li>• Non-communicable Disease (NCDs):Definition</li> <li>• Four major types of non-communicable Diseases</li> <li>• Other Types of NCDs</li> <li>• Risk factors of NCDs and Mortality Rate</li> <li>• Classification of Risk factors (Modifiable or changeable risk factors and Non-modifiable or non-changeable risk factors)</li> <li>• The Non-modifiable risk factors classes (Biological factors; Behavioral factors and Societal factors)</li> <li>• Age related NCDs risk factors</li> <li>• Cardiovascular Diseases (CVDs)</li> <li>• Cancer and classification of carcinogens</li> <li>• Chronic Respiratory Diseases (CRDs)</li> <li>• Diabetes Mellitus and types</li> <li>• Management of Risk Factors by national programme</li> <li>• Food Management</li> <li>• Cancer prevention</li> <li>• Contemporary Prevention Strategy of NCDs</li> </ul> <p>□ Conclusion: Prevention Strategy of NCDs</p>	4
7.	<ul style="list-style-type: none"> <li>• <b>Unit: 6 Diagnosis and Reporting of Epidemiological diseases</b></li> <li>• Laboratory screening and confirmatory tests</li> <li>• Epidemiological Values of Diagnostic Tests</li> <li>• Screening test Result</li> <li>• Errors: Screening test</li> <li>• False positive and False negative</li> <li>• Sensitivity and specificity and its calculations</li> <li>• Positive predictive value and its calculation</li> <li>• Negative predictive value and its calculation</li> <li>• Likelihood Ratios (Positive and Negative) and its calculations</li> <li>• Pre-test and Post-test Probabilities and clinical uses</li> <li>• Diagnostic facilities to manage epidemiological outbreaks</li> <li>• Role of the laboratory in public health surveillance</li> <li>• Clinical Laboratories versus Public Health Laboratories</li> <li>• Public Health Laboratories infrastructure</li> <li>• Laboratory Safety</li> <li>• Electronic Laboratory Reporting</li> <li>• Screening and confirmatory tests for common epidemiological diseases (Viral; bacterial, fungal and parasitic)</li> </ul> <p>Reporting system for Infectious Disease Positive findings</p>	4
8.		





9.		
<b>Total</b>		<b>30</b>
<b>List of Topics (The practical part)</b>		<b>Contact Hours</b>
<p><b>Practical:</b></p> <ul style="list-style-type: none"> <li>• Environmental surveillance of Epidemiological disease as follows</li> <li>• Viral</li> <li>• Bacterial</li> <li>• Fungal</li> <li>• Parasites</li> <li>• Non-communicable diseases</li> <li>• Strategies to break Infection chain</li> <li><input type="checkbox"/> Statistical data for descriptive epidemiological analysis</li> </ul>		30
<b>Total</b>		<b>30</b>

#### D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quiz's, Assignments, Homework	Once every 2 weeks	10%
2.	Mid-term Exam-1	5 <sup>th</sup> week	10%
3.	Mid-term Exam-2	9 <sup>th</sup> week	10%
4.	Black Board, E-Exam	12 <sup>th</sup> week	10%
5.	Practical	15 <sup>th</sup> week	20%
6.	Finall exam	17 <sup>th</sup> week 17 <sup>th</sup> 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

<b>Essential References</b>	<ol style="list-style-type: none"> <li>1- Basic Epidemiology, 2006, Bonita, R., Beaglehole, R., Kjellström, T, World Health Organization. ISBN: 9240681833, 9789240681835</li> <li>2- Principles of Epidemiology in Public Health Practice (3rd Edition). 2012. CDC</li> <li>3- Essentials of Epidemiology in Public Health 3rd Edition. 2014. Ann Aschengrau and George R. Seage. Burlington, MA</li> </ol>
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	<p>: Jones &amp; Bartlett Learning. ISBN: 9781449657352, 1449657354</p> <p>4- Epidemiology 101 2nd Edition, Robert H. Friis, Jones &amp; Bartlett Learning, 2009, ISBN 0763754439 9780763754433.</p> <p>5- Leon Gordis: Epidemiology. 3rd edition, 2004 Articles: In Department of Epidemiology library, labeled as EPI 810 Articles</p> <p>6- Last J M, A Dictionary of Epidemiology, 4th edition 2001 Chin J: Control of Communicable Disease Manual, 17th edition (required for EPI 817)</p> <p>7- Centers for Disease Control and Prevention. Core functions and capabilities of state public health laboratories. MMWR Recommend Rep 2002;51(No. RR 14). <a href="http://www.cdc.gov/mmwr/PDF/rr/rr5114.pdf">http://www.cdc.gov/mmwr/PDF/rr/rr5114.pdf</a></p>
<p><b>Electronic Materials</b></p>	<p>Electronic materials of Lecture notes and PowerPoints available in 'Black board' database</p> <p>E-learning course – Introduction to Public Health Informatics</p> <ul style="list-style-type: none"> <li>· Introduction to Public Health Informatics Course on CDC TRAIN</li> </ul>
<p><b>Other Learning Materials</b></p>	<p><a href="https://www.cdc.gov/eis/field-epimanual/chapters/datacollection-management.html">https://www.cdc.gov/eis/field-epimanual/chapters/datacollection-management.html</a></p> <ul style="list-style-type: none"> <li>· <a href="https://www.maine.gov/dhhs/mecdc/infectiousdisease/epi/disease/index.shtm">https://www.maine.gov/dhhs/mecdc/infectiousdisease/epi/disease/index.shtm</a> ·</li> </ul> <p>WHO. Modes of transmission of virus causing COVID-19: implications for IPC precaution recommendations. <a href="https://www.who.int/news-room/commentaries/detail/modes-of-transmission-of-virus-causing-covid-19-implications-for-ipc-precaution-recommendations">https://www.who.int/news-room/commentaries/detail/modes-of-transmission-of-virus-causing-covid-19-implications-for-ipc-precaution-recommendations</a></p> <ul style="list-style-type: none"> <li>· Visit the Virginia Department of Health website at <a href="https://www.vdh.virginia.gov/haiar/diseasesorganisms/candida-auris/">https://www.vdh.virginia.gov/haiar/diseasesorganisms/candida-auris/</a> or the Centers for Disease Control and Prevention website at <a href="https://www.cdc.gov/fungal/candida-auris/index.html">https://www.cdc.gov/fungal/candida-auris/index.html</a>.</li> </ul>

## 2. Required Facilities and equipment





Items	Resources
<b>facilities</b> (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
<b>Technology equipment</b> (projector, smart board, software)	Smart board and e podium available
<b>Other equipment</b> (depending on the nature of the specialty)	Library and seminar room

## F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	<b>Students</b>	<b>Direct assessment</b>
Effectiveness of Students assessment	<b>Program Leader</b>	<b>Direct assessment</b>
Quality of learning resources	<b>Students</b>	<b>Indirect assessment</b>
The extent to which CLOs have been achieved	<b>Faculty</b>	<b>Direct supervision</b>
Other		

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

**Assessment Methods** (Direct, Indirect)

## G. Specification Approval

<b>COUNCIL /COMMITTEE</b>	BIOLOGY DEPARTMENT COUNCIL
<b>REFERENCE NO.</b>	7
<b>DATE</b>	4/4/1446 (07/10/2024)

