2023
TPG-153

Course Specification
(Postgraduate)

Course Title:	Food Processing Microbiology
Course Code:	FS6007
Program:	M.Sc. Food Hygiene and Safety
Department:	Department of Biology
College:	Faculty of Science
Institution:	Umm Al-Qura University
Version:	2
Last Revision Date:	December 2024

Table of Contents

A. General information about the course:

1. Course Identificationn:

1. Credit hours: (3 credit hours)				
3 credit hours				
2. Course type				
A.	☐University	☐College	☒ Department	☐Track
B.	☒ Required		☐Elective	
3. Level/year at which this course is offered: (Level 2 / Year 1)				
4. Course general Description:				
Processing of fermented foods, nutritional values of fermented foods, roles of microorganisms in food processing, microorganisms or its byproducts used industrially to produce fermented foods, ingredients, feed and for optimal utilization of rest raw material will be covered. Important criteria in the choice of organism in food industry, general principles that govern the behavior of microbes in food systems, with an emphasis being made on the industrial large scale food production processes will be discussed.				
5. Pre-requirements for this course (if any)**:**				
Advanced Microbiology FS6000/ Public Health Microbiology During Hajj and Umrah Seasons FS6001				
6. Pre-requirements for this course (if any)**:**				
N/A				
7. Course Main Objective(s):				
Describe the processing of fermented foods. Understand the roles of microorganisms in food industry. Be familiar with methodology for mak9ng fermented foods. Apply biotechnology and food microbiology principles to produce various food products. Apply food microbiology principles and process in relation to food systems and food manufacturing				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	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**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)……**	
	Total	45

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe mechanisms involved in microbial food processing.	K2	- lectures, - Seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
1.2	Summarize the steps and methods for the production of Meat and fermented Fish, Vegetables, tea, breads, and Mushroom	K3	- lectures, - Seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
2.0	**Skills**			
2.1	Evaluate the roles of starter bacterial culture in food processing	S3	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
2.2	Design the processing of fermented milk products (cheese, yoghurt)	S2	- Case studies and group work	-Quizzes -Assignments -Mid-term exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
				-Final exam
2.3	Criticize the roles of enzymes in food processing	S3	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
3.0	**Values, autonomy, and responsibility**			
3.1	To demonstrate independently and with multi-disciplinary teams.	V1	- Case studies - Group work	Final exam
3.2	To cooperate in providing scientific and technical services in microbiology	V2	- Case studies - Group work	Final exam
3.3	To demonstrate responsibility and accountability	V3	- Case studies - Group work	Final exam

C. Course Content:

No	List of Topics	Contact Hours
1.	Introduction and history to microbial food processing: - Aware with principles of thermal processing; Pasteurization and Sterilization; Calculation of process time temperature-schedules; Freezing and refrigeration in food processing; Freezing time calculation; Principles of alternative and Nonthermal processing of food; high pressure processing. - Isolation, screening and maintenance of industrially important microbes; microbial growth and death kinetics (an example from each group, particularly with reference to industrially useful microorganisms); strain improvement for increased yield and other desirable characteristics. - Nutritional, healthy and economics roles for microbial fermented foods - Definitions and Terms of Food Processing Microbiology - Microorganisms and metabolism - Roles of microorganisms in food processing (Uses of Microorganisms in the Food Industry). - Important criteria in the choice of organism	**3**

2	Bioreactor Design and Analysis Batch and continuous fermenters; modifying batch and continuous reactors: chemostat with recycle, multistage chemostat systems, fed-batch operations; conventional fermentation v/s biotransformations; immobilized cell systems; large scale animal and plant cell cultivation; upstream processing: media formulation and optimization; sterilization; aeration, agitation and heat transfer in bioprocess; scale up and scale down; measurement and control of bioprocess parameters	**3**
3.	❖ Downstream Processing and Process Economics Separation of insoluble products - filtration, centrifugation, sedimentation, flocculation; Cell disruption; separation of soluble products: liquid-liquid extraction, precipitation, chromatographic techniques, reverse osmosis, ultra and micro filtration, electrophoresis; final purification: drying; crystallization; storage and packaging. Isolation of micro-organisms of potential industrial interest; strain improvement; market analysis; equipment and plant costs; media: sterilization, heating and cooling; aeration and agitation; batch-process cycle times and continuous cultures; recovery costs; water usage and recycling; effluent treatment and disposal	**6**
4.	❖ Starter cultures used in food processing: -Role of the starter cultures in food processing -Starter culture microorganisms (Bacterial starter cultures, Yeast starter cultures, - Mold starter cultures, Strain identification, Strains preservation methods) -Starter culture math -Manufacture of starter cultures -Evaluating culture performance -How starter culture used -Encapsulated and immobilized cells	**3**
5.	❖ Industrial microbial products from microorganisms: Production of:Agar, Alginate, Alcohol (Ethanol), Organic acids (Citric, acetic, Lactic and Gluconic acid) Solvent (Glycerol Acetone, Butanol), Antibiotics (Penicillin, streptomycin, tetracycline) Amino acids (lysine, glutamic acid) Single cell proteins (SCP) Vitamins (Riboflavin) Enzymes (Amylase, lactase, protease), Hydrocarbons – Biodegradable plastic – Polyhydroxyalkanoates (butyrate, propionate etc), recombinant protein (hepatitis – B vaccine)	**3**
6.	❖ Enzymes of interest in food industry - Enzymes in food science: friend and/or enemy. Properties of enzymes of special interest for food technologists. Role of specific enzymes in processing of meat, seafood and poultry products, waste management, animal feed industry. Use of enzymes in food processing: filtration aids, meat tenderization, protein texturization, production of sweeteners, fat interesterification, milk curdling. Biotechnological modification of enzymes involved in food processing: general strategies and examples	**3**
7.	❖ Food processing of Fermented milk: -Introduction	**6**

	-Fermentation principles - Manufacuring steps -Example of fermented dairy products: (**Yogurt**, Cultured buttermilk) ❖ Food processing of Cheese products: -Introduction -Type of cheese -Manufacturing principles -General steps in cheese making -Examples of cheese: -Special steps for making the Mold-ripened cheese a- (Blue-mold ripened cheese), b- white-mold ripened cheese), whit cheese	
8.	❖ Food processing of fermented Meat and fermented Fish: -Introduction -Meat starter cultures -Principle of fermented sausage manufacture -General steps for making fermented meat - General steps for making salted fish -Manufacture of fermented sausage -Dried and smoked Meat -German salami -Pickled fish -Salt fermented fish	**3**
9.	❖ Food processing of Fermented Vegetables: - Introduction - Production principles -General steps for making of fermented vegetables -Example of fermented vegetables: - Manufacturing of Sauerkraut - pickle production - Olive production -Kimchi ❖ Food processing of Fermented Beverages - Introduction - General Principles for making fermented Beverages and tea	**6**

	-General steps for making of fermented beverages - Nutritional values of fermented Beverages - Bouza -Sobia - Magon - Sake - Tibi	
10.	❖ Microbial food processing of Bread - Introduction -Yeast and bacterial starters cultures used -Bread manufacturing principles -Sourdough fermentation -Nan bread - *kishk* -Papadam ❖ Food processing of Fermented tea and Café - Introduction - General Principles for making fermented tea -General methods for making of fermented tea - Nutritional values of fermented tea -Tea production	**3**
11.	❖ Microbiology of therapeutic fermented foods: Probiotic Microorganisms Associated with Therapeutic Properties Criteria Associated with Probiotic Microorganisms Beneficial Health Effects of Probiotic Cultures Effective Daily Intake of Probiotics Probiotic Dairy Products ❖ Factors Affecting Probiotic Survival in Food Systems ❖ Prebiotics	**6**
Total		**45**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Formative assessment: problem solving exercises, discussions	Every week	10 %
2.	Mid Term Exam	6	20 %

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
3.	Seminar	11	20 %
4	Summative assessment: Final Exam	16	50 %
	Total Mark		100%

*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	(1)- Khairatun N, et al. (2021) Food Safety Practices in Restaurant Industry. Business Science References, (ISBN: 179987415X) (2)- Fellows P. (2022) Food Processing Technology: Principle and Practice 5th edition. Woodhead Publishing, (ISBN: 032385737X) (3)- Malik A. et al. (2019) Health and Safety Aspects in Food Processing Technology. Springer (ISBN: 3030249050) (4)- Haddad, N. (2022) Hazards in the Food Processing and Distribution Chain. Wiley, (ISBN: 1789450934). (5)- Sant'Ana, A. (2017) Quantitative Microbiology in Food Processing: Modelling the Microbial Ecology. Wiley, (ISBN: 9781118756423). (6)- Hutikins, R. (2018) Microbiology and Technology of Fermented Foods 2nd edition. Wiley, (ISBN: 1119027446) (7)- Varzakas, T. (2021) Microbiology of Fermented Foods and Beverags. MDPI AG, (ISBN: 3036518487) (8)- Paramithiotis S. et al. (2022) Lactic Acid Bacteria in Food Biotechnology: Innovations and Functional Aspects. Elsevier, (ISBN: 0323898750)
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (Projector, smart board, software)	projector
Other equipment (Depending on the nature of the specialty)	

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Indirect: Regular surveys to evaluate teaching effectiveness and course relevance. Direct: CLO' assessment
Effectiveness of students assessment	Peer Review	Direct: Annual review of course content by faculty members and external experts
Quality of learning resources	Students	Indirect: Regular surveys to evaluate Quality of learning resources
The extent to which CLOs have been achieved	Peer Review	Direct: Annual review of course content by faculty members and external experts
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

2023
TPG-153

Course Specification
(Postgraduate)

Course Title:	Food Microbiology
Course Code:	FS6002
Program:	M.Sc. Food Hygiene and Safety
Department:	Department of Biology
College:	Faculty of Science
Institution:	Umm Al-Qura University
Version:	2
Last Revision Date:	December 2024

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1. Course Identificationn:

1. Credit hours: (3 credit hours)					
3 credit hours					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 2 / Year 1)					
4. Course general Description:					
This course covers principle of food microbiology ,microbial ecology of food, the role of microorganisms in food spoilage the characteristic of microbial growth, intrinsic and extrinsic factors and their relationship to microbial growth; beneficial microorganisms in food systems, the principles of food fermentation and the role of beneficial microbes; the role of microorganisms and food spoilage; pathogenic microorganisms, characteristics of foodborne infection.					
5. Pre-requirements for this course (if any)**:**					
Advanced Microbiology FS6000					
6. Pre-requirements for this course (if any)**:**					
N/A					
7. Course Main Objective(s):					
• Obtain advanced understanding of the microbial phenomena occurring in food products. • To define microbial food spoilage, food quality, food safety and the factors affecting the growth and control of microorganisms in food. • To articulate the use of hurdle technology and food preservation in the control of foodborne pathogens in food systems. • To discuss the principles of food preservations and to describe the different food preservation methods. • To describe the role of beneficial microorganisms in food processing, preservation and safety, and their potential health benefits. • To explain the causes of foodborne microbial diseases and predict the pathogens that can grow in any given food during different stages of the food production system.					

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	E-learning		
3	Hybrid • Traditional classroom		

No	Mode of Instruction	Contact Hours	Percentage
	• E-learning		
4	Distance learning		

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)……**	
	Total	45

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	list microorganisms associated with food infections	K2	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
1.2	describe the method for food preservations, and control of foodborne pathogens in food systems	K3	- lectures, - Seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
2.0	**Skills**			
2.1	Analyze principles of microbial spoilage of different food	S2	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	Criticize the common methods for food preservation	S3	- Case studies and group work	-Quizzes -Assignments -Mid-term exam -Final exam
2.3	Evaluate the risks associated with food preservation methods	S3	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
3.0	**Values, autonomy, and responsibility**			
3.1	To demonstrate independently and with multi-disciplinary teams.	V1	- Case studies - Group work	Final exam
3.2	To cooperate in providing scientific and technical services in microbiology	V3	- Case studies - Group work	Final exam
3.3	To demonstrate responsibility and accountability	V3	- Case studies - Group work	Final exam

C. Course Content:

No	List of Topics	Contact Hours
1.	Introduction of food microbiology, Food Microbiology Definition - History of food microbiology - Positive and negative roles of the microorganisms in food products - Food Microbiology in KSA and global perspectives - Important definition in food microbiology: - Food-Borne Diseases, Food Spoilage, Food Bioprocessing, food contaminants, Food Additives, Food preservations, - Microbial growth and factors effect microorganisms - intrinsic and extrinsic factors affecting the growth of microbes in foods Water activity and their roles in food spoilage	6

2	❖ Occurrence of Microorganisms cause food contamination and spoilage (Bacteria, Fungi, Molds and yeast, Viruses, Protozoa) - Psychrophilic microorganisms - Mesophilic microorganisms - Thermophilic microorganisms - Thermotolerant microorganisms - Enterobacteriaceae and non Enterobacteriaceae - Acidophilic microorganisms Alkalophilic microorganisms	3
3.	- Microbial contamination of raw material - Contamination of various foods. - Sources of contamination. - Type of contamination - Factors cause food contamination - Microbiology: Sample Reception and preparation for microbiological analysis, enumeration. - Indicator microorganism. Standards, guideline and specifications Microbial examination of foods , Methods to Detect Coliforms, faecal coliforms and E. coli	6
4.	- Microbiology of raw milk and dairy products: -The Initial Microflora of Raw Milk -Biosecurity, Udder Disease, and Bacterial Content of Raw Milk - Sources of raw milk contamination with microorganisms - The Microflora of Milking Equipment and Its Effects on Raw Milk - Natural antimicrobial substances presence in raw milk and some fermented dairy products (Lysozyme, Lactoferrin, lactic acids, bacteriocins). - Factors affecting microorganisms in raw milk - The Influence of Storage and Transport on the Microflora of Raw Milk	6
5.	❖ Food spoilage: - Factors responsible for food spoilage - Microbial spoilage of cereals and coconut and their products - Microbial spoilage of meat, eggs, seafood and their products - Microbial spoilage of vegetables, fruits and their products - Microbial spoilage of canned foods - Microbial spoilage of milk and dairy products - Factors affecting growth of Microorganism (the factors that affect the growth of microorganisms and how they can be controlled. - Food spoilage mechanisms Changes of food properties (Chemical and physical) as affected by microbial spoilage	9
6.	❖ Principles of Food Preservation by Controlling Microbial Growth: ❖ Methods of Food Processing, Preservation and Storage - Microbial control by applying sanitation methods - Microbial control by temperature control (High temperature proccing, pasteurization, low temperature processing, freezing methods) - Microbial control by drying, lyophilization - Microbial control irradiation and modified atmosphere - Microbial control by using antimicrobial preservatives - Microbial control by preservatives food additives	6

	- Microbial control by salting methods in some foods, sugar in some foods Microbial control by non-thermal processing and combination of methods (hurdle concept)	
7.	❖ Foodborne infections, Food poisoning: - Types of food poising, - Bacterial food poising. - Indicator microorganisms for food quality and safety - Foods with Greatest Risk (foods with greatest risk to food poisoning and reasons for their susceptibility) - Diseases caused from contaminated foods Mycotoxins	**3**
8.	❖ Principles of Food Microbiological Analysis: - Sampling and preparation of microbiological analysis - Qualitative and quantitative microbiological analysis Molecular methods for foodborne pathogens detection: Introduction to PCR	**3**
9.	❖ Principles of Food Fermentation and fermented foods - Microorganisms in food proccing: - Basic of food fermentation process - Food fermentation products and beneficial microbe Types of fermented foods	**3**
Total		**45**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Formative assessment: problem solving exercises, discussions	Every week	10 %
2.	Mid Term Exam	6	20 %
3.	Seminar	11	20 %
4	Summative assessment: Final Exam	16	50 %
	Total Mark		100%

*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	(1)- Doyle M, et al. (2019) Food Microbiology: Fundamentals and Frontiers 5th edition. ASM Press, (ISBN: 1555819966) (2)- Kniel, K. et al. (2017) Food Microbiology: An Introduction. ASM Press, (ISBN: 1555819389)

	(3)- Forsyth, S (2020) The Microbiology of Safe Food 3rd edition. Wiley, (ISBN: 1119405017) (4)- Hutkins, R. (2018) Microbiology and Technology of Fermented Foods 2nd edition. Wiley, (ISBN: 1119027446) (5) Institute of Food Science and Technology (2020) Handbook of Microbiological Criteria for Foods. Institute of Food Science and Technology, (ISBN: 1916343805)
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (Projector, smart board, software)	Projector
Other equipment (Depending on the nature of the specialty)	

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Indirect: Regular surveys to evaluate teaching effectiveness and course relevance. Direct: CLO' assessment
Effectiveness of students assessment	Peer Review	Direct: Annual review of course content by faculty members and external experts
Quality of learning resources	Students	Indirect: Regular surveys to evaluate Quality of learning resources
The extent to which CLOs have been achieved	Peer Review	Direct: Annual review of course content by faculty

Assessment Areas/Issues	Assessor	Assessment Methods
		members and external experts
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

Course Specification

(Postgraduate Programs)

Course Title:	Food Chemical Composition
Course Code:	FS6021
Program:	Food Hygiene and Safety
Department:	Department of Biology
College:	Faculty of Science
Institution:	Umm Al-Qura University
Version:	Version 2
Last Revision Date:	December 2024

Table of Contents

A. General information about the course:

1. Course Identification:

1. Credit hours: (3 credit hours)				
3 credit hours				
2. Course type				
A.	☐University	☐College	☒ Department	☐Track
B.	☒ Required		☐Elective	
3. Level/year at which this course is offered: (First year)				
4. Course General Description:				
This cours descript chemical and biochemical properties and function of components in food: Carbohydrates, proteins, lipids, water, aroma compounds, vitamins and minerals. The chemistry of the principal components of foods, their properties and interactions, and the changes that occur during processing, storage, and utilization. Emphasis will be on evidence derived from research literature, interpretation of research findings, and problem solving based on the scientific principles. food hygiene, food borne illness. Toxins, heavy metals. Chemical preservatives, food preservation. The importance of this knowledge for sustainable utilization and processing of food.				
5. Pre-requirements for this course (if any):				
N/A				
6. Pre-requirements for this course (if any):				
N/A				
7. Course Main Objective(s):				
Understand the chemical function and properties of major food components (Carbohydrates, Proteins, Lipids, Vitamins, Minerals). Understand the chemical interactions of food components and their effects on sensory and nutritional quality, functional properties, and safety of foods. Understand the chemical basis of food preservation and the effects of processing and storage on food quality.				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	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**	**45**
2.	**Laboratory/Studio**	**-**
3.	**Field**	**-**
4.	**Tutorial**	**-**
5.	**Others (specify)……**	**-**
	Total	**45**

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**			
1.1	Outline the relation between food chemistry and biochemistry and biology	K2	- lectures, - seminars Discussion	Quizes Mid term exam Final exam
1.2	Differentiate between healthy and unhealthy biomolecules in food, and determine the effect of food additives, genetic modification in food.	K3	- lectures, - Seminars Discussion	Quizes Mid term exam Final exam
2.0	**Skills**			
2.1	To Summarize most of the biochemical data (Carb, protein, lipids, enzymes, nucleic acids, vitamins) and their importance.	S2	- lectures, - seminars - Discussion	Quizes Mid term exam Final exam
2.2	To evaluate the interrelationships between biomolecules	S3	Case studies and group work	Quizes Mid term exam Final exam
2.3	To interpret the relation between the biomolecule's	S3	- lectures, - seminars - Discussion	Quizes Mid term exam Final exam

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	abnormalities and health during the processing, storage, and cooking of food and affect the functional, nutritional, and sensory properties of food			
3.0	**Values, autonomy, and responsibility**			
3.1	To demonstrate independently and with multi-disciplinary teams.	V1	- Case studies - Group work	Final exam
3.2	To cooperate in providing scientific and technical services in microbiology	V3	- Case studies - Group work	Final exam
3.3	To demonstrate responsibility and accountability	V3	- Case studies - Group work	Final exam

C. Course Content:

No	List of Topics	Contact Hours
1.	Carbohydrates - Introduction - Monosaccharides - Related Compounds - Oligosaccharides - Polysaccharides - Dietary Fiber	3
2.	Carbohydrates - Chemical Reactions and Derivatives - Dietary Fiber - Oxidation of carbohydraties	3
3.	Proteins - Amino Acid Composition - Protein Classification - Protein Structure - Denaturation	3
4.	Proteins - Nonenzymic Browning	3

	- Chemical Changes - Functional Properties - Animal Proteins - Plant Proteins	
5.	Lipids - Description of Fatty Acids and Glycerides - Component Fatty Acids - Component Glycerides - Autoxidation - Efficacy of different antioxidants - Action mechanisms of antioxidants - How safe are food antioxidants? - Photooxidation	3
6.	Lipids - Heated Fats – Frying - Hydrogenation - Interesterification - Physical Properties - Fat Replacers	3
7.	Minerals - Introduction - Major Minerals - Inorganic mineral salts - Organic mineral salts - Trace Elements - Metal Uptake in Canned Foods	3
8.	Flavor - Introduction - Chemistry of food flavourings - Classification of food flavourings - Taste & Odor - Description of Food Flavors - Flavor and Off-Flavor - Flavor of Some Foods - Flavor Reversion - Analytical methods for the analysis of food flavourings	3
9.	Texture - Introduction - Texture Profile - Objective Measurement of Texture - Application to Foods - Textural Properties of Some Foods - Microstructure - Water Activity and Texture	3
10.	Vitamins	3

	- Introduction - Fat-Soluble Vitamins - Water-Soluble Vitamins - Vitamins as Food Ingredients	
11.	Enzymes - Introduction - Nature and Function - Hydrolases - Oxidoreductases - Immobilized Enzymes	3
12.	Additives and Contaminants - Introduction - Intentional Additives - Incidental Additives or Contaminants - Technological contaminants - Persistent organohalogen contaminants - Pesticides - Contaminants from packaging materials	3
13.	Preservatives - Natural food preservatives - Traditional food preservation methods - Artificial preservative agents - Modern food preservation techniques - Safety concerns of food preservatives - Analytical methods for the determination of preservative residues	3
14.	Regulatory Control of Food Composition, Quality, and Safety - Historical Overview - Safety - International Food Law - Harmonization	3
Total		

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Formative assessment: problem solving exercises, discussions	Every week	10 %
2.	Mid Term Exam	6	20 %
3.	Seminar	11	20 %
4.	Summative assessment: Final Exam	16	50 %
	Total Mark		100%

*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	Food Biochemistry and Food Processing (2th edition). Edited by: Benjamin K. Simpson, Associate Editors, Leo M.L. Nollet, Fidel Toldr´a, Soottawat Benjakul, Gopinadhan Paliyath, Y.H. Hui (2012), Wiley.
Supportive References	Handbook of Food Chemistry (2015) Edited: Peter C.K. Cheung and Bhavbhuti M. Mehta. Springer Nature
Electronic Materials	Web search, Blackborad website
Other Learning Materials	Multi-Media associated with textbooks

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	classrooms
Technology equipment (Projector, smart board, software)	projector
Other equipment (Depending on the nature of the specialty)	

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Indirect: Regular surveys to evaluate teaching effectiveness and course relevance. Direct: CLO' assessment
Effectiveness of students' assessment	Peer Review	Direct: Annual review of course content by faculty members and external experts
Quality of learning resources	Students	Indirect: Regular surveys to evaluate Quality of learning resources
The extent to which CLOs have been achieved	Peer Review	Direct: Annual review of course content by faculty members and external experts
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TPG-153

Course Specification
(Postgraduate)

Course Title:	Food Biotechnology and Genetically Modified Foods
Course Code:	FS6008
Program:	M.Sc. Food Hygiene and Safety
Department:	Department of Biology
College:	Faculty of Science
Institution:	Umm Al-Qura University
Version:	2
Last Revision Date:	December 2024

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A. General information about the course:

1. Course Identificationn:

1. Credit hours: (3 credit hours)				
3 credit hours				
2. Course type				
A.	☐University	☐College	☒ Department	☐Track
B.	☒ Required		☐Elective	
3. Level/year at which this course is offered: (Level 1/Year 1)				
4. Course general Description:				
Introduction and history to Food biotechnology and their roles for improvement of food production (Importance of food biotechnology, Prospects for the development of food biotechnology, Regulation and policy approaches to biotechnology, Ethics and world views in relation to biotechnology, Tailoring biotechnology: towards societal responsibility and country specific approaches, Societal responses to the rise of biotechnology). History of the genetically modified foods, Benefit of the genetically modified foods, GMO food safety and Risks of the genetically modified foods will be covered.				
5. Pre-requirements for this course (if any)**:**				
N/A				
6. Pre-requirements for this course (if any)**:**				
N/A				
7. Course Main Objective(s):				
Understand the background and history of the GMOs in food debate. Explore the range of crops and foods that currently contain GMOs. Understand the fundamentals of food biotechnology and genetics. Aware with the advantages and limitations of novel food products obtained through biotechnological approaches. Comprehend the principles behind important analytical techniques employed in biotechnology as well as in genetic modification of foods. Gain an understanding of how biotechnology intersects with globalization, trade, poverty, food security, and environmental sustainability				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)……**	
	Total	45

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe the applications and current situation of Biotechnology in relation to foods	K2	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
1.2	Explain the advantages and limitations of novel food products obtained through biotechnological approaches	K1	- lectures, - Seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
2.0	**Skills**			
2.1	Evaluate the current trends in GMO food and their future implications	S2	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	Criticize the KSA advances and regulatory controls for GMO foods	S3	- Case studies and group work	-Quizzes -Assignments -Mid-term exam -Final exam
2.3	Criticize early genetic engineering of GRAS ingredients in foods	S3	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
3.0	**Values, autonomy, and responsibility**			
3.1	To demonstrate independently and with multi-disciplinary teams.	V1	- Case studies - Group work	Final exam
3.2	To cooperate in providing scientific and technical services in microbiology	V2	- Case studies - Group work	Final exam
3.3	To demonstrate responsibility and accountability	V3	- Case studies - Group work	Final exam

C. Course Content:

No	List of Topics	Contact Hours
1.	Introduction and history to Food biotechnology and their roles for improvement of food production, state of the art, future. -The importance of food biotechnology. - Prospects for the development of food biotechnology. -Regulation and policy approaches to biotechnology -Ethics and world views in relation to biotechnology -Tailoring biotechnology: towards societal responsibility and country specific approaches -Societal responses to the rise of biotechnology	**3**

	-Types of biotechnology	
2	Food Biotechnology: Fermentative production of enzymes used in food industry; solid state fermentation; recovery of enzymes from natural sources; cheese making and whey processing, impact of enzyme technology (bioethanol, protein hydrolysates, bioactive peptides); enzymatic processing of fruit juices. Role of enzymes in baking, meat and meat processing; comparative methods of toxicity test in (novel) foods; biosensors; enzymatic approach to tailor made fats; catabolic processes and oxygen-dependent reactions in food; use of lipases and reactions in organic solvents and two phases	6
3.	❖ Frontiers in Food Biotechnology: - Lactic acid bacteria (LAB) in food and fermented products. -Probiotics, prebiotics and synbiotics: current status and future prospects -Indigenous fermented foods and beverages -Biocolours: an insight into production, application, stability and regulation. -Food allergens: chemistry, detection and future implications on human health. -Rapid methods for the detection of food borne pathogens -Role of nanotechnology in food processing. -Baker's and brewer's yeast: production, applications, and genetic manipulations	6
4.	Overview of Genetics Chemical structure of nucleic acids, proteins; introduction to Genetics, DNA replication, transcription and translation. Genetic Engineering -Molecular methods in the production of GMO food. PCR, RT-PCR, electrophoresis, electro blotting and capillary blotting; population & evolutionary genetics, gene mapping; microbial gene transfer mechanisms, mutation, types of mutations, molecular mechanism of mutations, practical applications; applications to produce genetically modified foods	6
5.	❖ Genetically modified Food (GMO): -Introduction, - Basics of GM foods, - Controversy about the genetically modified foods - History of the genetically modified foods	6

	-Benefit of the genetically modified foods -GMO food safety. - Risks of the genetically modified foods - Examples of GMOs in food and GMO products approved for the food market. - Consumer acceptance - Contribution of GM foods to human nutrition - Safety assessment of GM foods - Detection of GMOs and GM foods -Legal acts related to GMOs. - Future consideration -GM foods or Not? The controversy	
6.	Genetically modified microorganisms to produce some biotechnological products - Genetically modified organisms to produce some important food additive products single cell proteins, Xanthan, Polysaccharides, Amino acids, Production of microbial food colorants, Production of microbial food emulsifiers, Production of microbial food flavors)	6
7.	Genetically modified plants and vegetables: -Techniques used for production of transgenic plants - Genetically modified plants (examples) - Modification of starches for their use in food industry. - Modification of proteins for the food scientist. - Genetically modified animals and their potential use by the food industry.	3
8.	Biotechnology and Cell culture technology Introduction to plant and animal tissue cultures and cell cultures in general. Cell culture lab design and equipment, Media and reagents. Animal, mammalian, and other cell lines for in-vitro testing of drugs, toxicity of environmental pollutants, production of vaccines and therapeutic proteins & production of stem cells. Principles of cryobiology and molecular diagnostics, Technological aspects for commercial utilization of cell cultures: Reactor studies, scale up and biosafety	3

9.	Applications of biotechnology in quality assurance in the food industry. Use and exploitation of residues and byproducts	6
Total		45

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Formative assessment: problem solving exercises, discussions	Every week	10 %
2.	Mid Term Exam	6	20 %
3.	Seminar	11	20 %
4	Summative assessment: Final Exam	16	50 %
	Total Mark		100%

*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	(1)- McClements D. (2022) Food Nanotechnology. Dr Gruyter, (ISBN: 311078842X) (2)- Paramithiotis S. et al. (2022) Lactic Acid Bacteria in Food Biotechnology: Innovations and Functional Aspects. Elsevier, (ISBN: 0323898750) (3)- Osman A. (2018) Progress in Food Biotechnology. Bentham Science Publisher, (ISBN: 1681087421) (4)- Newton D (2021) GMO Food: A Reference Handbook 2nd edition. ABC-CLIO, (ISBN: 1440877769) (5)- Hutikins, R. (2018) Microbiology and Technology of Fermented Foods 2nd edition. Wiley, (ISBN: 1119027446) (6)- Joshi V., Singh R. (2013) Food Biotechnology. I K International Publishing. (ISBN: 9381141495) (7)- SHARMA, C.; SHARMA, A. K.; ANEJA, K. R. Frontiers in Food Biotechnology. Hauppauge, New York: Nova Science Publishers, Inc, 2016. Disponível em: https://research.ebsco.com/linkprocessor/plink?id=a12a1a95-3e2e-3547-91b2-a87ef71428bb. Acesso em: 20 dez. 2024.

	(8)- Mahgoub, S.E.O. (2015). Genetically Modified Foods: Basics, Applications, and Controversy (1st ed.). CRC Press. https://doi.org/10.1201/b18642
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (Projector, smart board, software)	Projector
Other equipment (Depending on the nature of the specialty)	

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Indirect: Regular surveys to evaluate teaching effectiveness and course relevance. Direct: CLO' assessment
Effectiveness of students assessment	Peer Review	Direct: Annual review of course content by faculty members and external experts
Quality of learning resources	Students	Indirect: Regular surveys to evaluate Quality of learning resources
The extent to which CLOs have been achieved	Peer Review	Direct: Annual review of course content by faculty members and external experts
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

2023
TPG-153

Course Specification
(Postgraduate)

Course Title:	Microbiological Analysis of Food
Course Code:	FS6017
Program:	M.Sc. Food Hygiene and Safety
Department:	Department of Biology
College:	Faculty of Science
Institution:	Umm Al-Qura University
Version:	2
Last Revision Date:	December 2024

Table of Contents

A. General information about the course:

1. Course Identificationn:

1. Credit hours: (3 credit hours)				
3 credit hours				
2. Course type				
A.	☐University	☐College	☒ Department	☐Track
B.	☒ Required		☐Elective	
3. Level/year at which this course is offered: (Level 3 / Year 2)				
4. Course general Description:				
Microbiological analysis of food products is the use of microbiological, biochemical, molecular or chemical methods for the detection, identification or enumeration of microorganisms in a material (e.g. food, drinking water). This course intended to teach the fundamental and principles techniques required for microbiological food analysis. The course will rely on standard methods set by the United States Food and Drug Administration (US FDA), particularly Bacteriological Analytical Manual (BAM)				
5. Pre-requirements for this course (if any)**:**				
Food Microbiology FS6002/ Water Health and Sanitation FS6005				
6. Pre-requirements for this course (if any)**:**				
N/A				
7. Course Main Objective(s):				
become proficient at laboratory skills and techniques. Analyze the samples using standardized methods of analysis of food and water. Demonstrate proficiency the most common techniques in microbiological methods for handling and analyzing food and water. to understand how to validate a method to monitor microbiological and/or chemical hazards in food (according to international guidelines. to implement standard analytical methods to monitor microbiological, chemical and physical hazards in food.				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	E-learning		
3	Hybrid • Traditional classroom		

No	Mode of Instruction	Contact Hours	Percentage
	• E-learning		
4	Distance learning		

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)……**	
	Total	45

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe standard methods to monitor microbiological hazards in food (according to US-FDA guidelines)	K2	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
1.2	describe the procedures of advanced microbiological analysis methods for food hazards, adulteration and traceability	K4	- lectures, - Seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
2.0	**Skills**			
2.1	Design methods for isolation and identification of unknown pathogens	S4	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	Criticize mentoring and enumeration methods of microorganisms	S3	- Case studies and group work	-Quizzes -Assignments -Mid-term exam -Final exam
2.3	Design the techniques used for food analysis	S4	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
3.0	**Values, autonomy, and responsibility**			
3.1	To demonstrate independently and with multi-disciplinary teams.	**V1**	- Case studies - Group work	Final exam
3.2	To cooperate in providing scientific and technical services in microbiology	**V2**	- Case studies - Group work	Final exam
3.3	To demonstrate responsibility and accountability	**V3**	- Case studies - Group work	Final exam

C. Course Content:

No	List of Topics	Contact Hours
1.	Safety considerations in laboratories Personal safety issues in laboratories Microbiological hazards Chemical hazards Decontamination and disposal of biohazards materials	**3**

2	Introduction to microbiological techniques Laboratory equipment and apparatus, Culture Media, types, and preparation Sample preparation to analysis Sterilization procedures, preparation of culture media, isolation of microorganisms, smearing and staining, microscopy Principles of isolation of microorganisms from different food samples Indicator organism testing using selective media Culturing and Handling of Microorganisms from different food samples	**3**
3.	US FDA Bacteriological Analytical Manual (FDA-BAM) General Guideline Procedure Food sampling and preparation of sample homogenate, Microscopic examination of food Aerobic plate count Investigations of food implicated in illness	**3**
4.	Methods for specific pathogens: -Enumeration of *Escherichia coli* and coliform bacteria - Diarrheagenic *Escherichia coli* *- Salmonella* *-Shigella* *-Campylobacter* *- Yersinia enterocolitica* *-Vibrio* *-Listeria monocytogens* *-Staphylococcus aureus* *-Bacillus cereus* *-Clostridium perfringens* *-Clostridium botulinum* -Yeast and molds	**30**
5.	Methods for microbial toxins *Staphylococcus aureus* entérotoxines détection Methods	**3**
6.	Additional methods Examination of canned foods Most probable number determination from serial dilutions	**3**
Total		**45**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Formative assessment: problem solving exercises, discussions	Every week	10 %
2.	Mid Term Exam	6	20 %
3.	Seminar	11	20 %
4	Summative assessment: Final Exam	16	50 %
	Total Mark		100%

*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	(1)- FDA (2021) Bacteriological Analytical Manual (BAM). US Food and Drug Administration, Maryland, USA. (https://www.fda.gov/food/laboratory-methods-food/bacteriological-analytical-manual-bam) (2)- Doyle M, et al. (2019) Food Microbiology: Fundamentals and Frontiers 5th edition. ASM Press, (ISBN: 1555819966) (3)- Johnson, T., Case, C. (2018) Laboratory Experiments in Microbiology 12th edition. Pearson, (ISBN: 0134605209) (4)- Yousef, A., Perry, J. (2022) Analytical Food Microbiology, Laboratory Manual 2nd edition. Wiley, (ISBN: 0470425113) (5)- Schnieder, A. (2022) Bacteriological Methods in Food and Drug Laboratories: with and Introduction to Micro-Analytical Methods. Legare Street Press, (ISBN: 1019105127) (6) Smith, H, Brown, A. (2021) Benson's Microbiology Application Laboratory Manual. McGraw-Hill, (ISBN: 126025898X) (7) LeBoeff, M. (2021) A Photographic Atlas for the Microbiology Laboratory. Morton Publishing Company, (ISBN: 1617319031) (8)- da Silva N. (2017) Microbiological Examination Methods for Food and Water: a Laboratory Manual. CRC Press, (ISBN: 978-1138451971)

Supportive References	
Electronic Materials	
Other Learning Materials	

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (Projector, smart board, software)	Projector
Other equipment (Depending on the nature of the specialty)	

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Indirect: Regular surveys to evaluate teaching effectiveness and course relevance. Direct: CLO' assessment
Effectiveness of students assessment	Peer Review	Direct: Annual review of course content by faculty members and external experts
Quality of learning resources	Students	Indirect: Regular surveys to evaluate Quality of learning resources
The extent to which CLOs have been achieved	Peer Review	Direct: Annual review of course content by faculty members and external experts
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	
REFERENCE NO.	

DATE	

2023
TPG-153

Course Specification
(Postgraduate)

Course Title:	Epidemiology of Food and Waterborne Infections
Course Code:	FS6030
Program:	M.Sc. Food Hygiene and Safety
Department:	Department of Biology
College:	Faculty of Science
Institution:	Umm Al-Qura University
Version:	2
Last Revision Date:	December 2024

Table of Contents

A. General information about the course:

1. Course Identificationn:

1. Credit hours: (3 credit hours)					
3 credit hours					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (Level 4 / Year 2)					
4. Course general Description:					
This course deals with basic epidemiologic concepts, transmission, and epidemiology of major environmental, food-, and water-borne diseases. Outbreak, outbreak investigation, and sporadic detection, source tracking and control of pathogens. Overview of the impact of foodborne outbreaks on regulatory activities at the local, state, national and global level					
5. Pre-requirements for this course (if any)**:**					
Food Microbiology FS6002/ Water Health and Sanitation FS6005/ Public Health Microbiology During Hajj and Umrah Seasons FS6001					
6. Pre-requirements for this course (if any)**:**					
N/A					
7. Course Main Objective(s):					
Describe the role and impact of potential environmental contaminants on the safety of food from the origin of the food in the field to retail purchase across diverse agriculture scales (local, state, national, and global). Relate environmental pathogen transmission patterns to prevention of food-borne disease. Develop strategies for monitoring and control of food- and water-borne diseases in the food industry.					

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	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**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)……**	
	Total	45

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Define what Disease outbreak is	K3	- lectures, - Seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
1.2	List Epidemiological Factors associated with hosts	K4	- lectures, - Seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
2.0	**Skills**			
2.1	Develop strategies for monitoring and control of food- and water-borne diseases in the food industry	S3	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
2.2	Summarize the internal and external structure of the	S2	- Case studies and group work	-Quizzes -Assignments -Mid-term exam -Final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	pathogen bacterial cells			
2.3	Explain, analyze and interpret the laboratory findings	S3	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
3.0	**Values, autonomy, and responsibility**			
3.1	To demonstrate independently and with multi-disciplinary teams.	V1	- Case studies - Group work	Final exam
3.2	To cooperate in providing scientific and technical services in microbiology	V3	- Case studies - Group work	Final exam
3.3	To demonstrate responsibility and accountability	V3	- Case studies - Group work	Final exam

C. Course Content:

No	List of Topics	Contact Hours
1.	- Introduction: An Historical and Principles Overview of epidemiology - What is food safety? Digestion - Microbes of the GI tract, Dysbiosis, Antimicrobial resistance - Environmental Epidemiology. - Economics of foodborne disease	3
2	- The science and art of epidemiology - Information sources and search strategies - Risk and epidemiological proof in relation to environmental causation of diseases	6

	- Types of epidemiological study used in the investigation of food and waterborne diseases - An approach to the investigation and control of food and waterborne diseases	
3.	- Disease outbreak - Measuring Disease Frequency - Surveillance or mentoring	6
4.	Burden of Food-borne disease	3
5.	- Infectious disease epidemiology: - Infectious agents- Bacteria - Infectious agents- Viruses - Infectious agents- parasites	
6.	- Food borne illness investigation basics - Identification and typing-I - Identification and typing-II - Identification and typing- III	6
7.	- Vehicles and sources - Food as exposure	3
8.	- Epidemiological Factors associated with hosts - Epidemiology factors of disease transmission	3
9.	Disease control and prevention	6
10.	Understanding the causes of food and waterborne diseases Evidence from case studies	3
	Total	**45**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Formative assessment: problem solving exercises, discussions	Every week	10 %
2.	Mid Term Exam	6	20 %
3.	Seminar	11	20 %
4	Summative assessment: Final Exam	16	50 %
	Total Mark		100%

*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	(1)- Aschengrau, A., Seage G. (2018) Essential of Epidemiology in Public Health 4th edition. Jones & Bartlett (ISBN: 1284128350)

	(2)- Celentano, D., Szklo, M. (2018) Gordi's Epidemiology 6th edition. Elsevier, (ISBN: 0323552293) (3)- Friis, R., Sellers, T. (2020) Epidemiology for Public Health Practice 6th edition. Jones and Bartlett, (ISBN: 128417543X)
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (Projector, smart board, software)	Projector
Other equipment (Depending on the nature of the specialty)	

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Indirect: Regular surveys to evaluate teaching effectiveness and course relevance. Direct: CLO' assessment
Effectiveness of students assessment	Peer Review	Direct: Annual review of course content by faculty members and external experts
Quality of learning resources	Students	Indirect: Regular surveys to evaluate Quality of learning resources
The extent to which CLOs have been achieved	Peer Review	Direct: Annual review of course content by faculty members and external experts
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TPG-153

Course Specification
(Postgraduate)

Course Title:	Emerging Topics in Food Microbiology
Course Code:	FS6029
Program:	M.Sc. Food Hygiene and Safety
Department:	Department of Biology
College:	Faculty of Science
Institution:	Umm Al-Qura University
Version:	2
Last Revision Date:	December 2024

Table of Contents

A. General information about the course:

1. Course Identificationn:

1. Credit hours: (3 credit hours)				
3 credit hours				
2. Course type				
A.	☐University	☐College	☒ Department	☐Track
B.	☐ Required		☒ Elective	
3. Level/year at which this course is offered: (Level 4 / Year 2)				
4. Course general Description:				
The course aimed to provide in depth understanding and exposure to the current trends and emerging problems in food microbiology and food hygiene and safety, to make student familiar with the critical gap and emerging issues relevant to human health.				
5. Pre-requirements for this course (if any)**:**				
Food Microbiology FS6002/ Food Processing Microbiology FS6007/ Food Quality Assurance FS6010				
6. Pre-requirements for this course (if any)**:**				
N/A				
7. Course Main Objective(s):				
To provide an opportunity to learn international and national food law and quality standards. Obtain an advanced understanding of the microbial phenomena occurring in food products. Obtain a basic understanding about food safety and hazards associate with production of food.				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	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**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)……**	
	Total	45

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	list the local food agencies involved in establishing local laws and regulations in Saudi Arabia	K3	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
1.2	Describe food safety and hazards and their sources associate with production of food, and methods of control	K4	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
2.0	**Skills**			
2.1	Criticize the emerging factors that take place during food processing and how food can be contaminated in the food continuum (pre and postharvest level)	S2	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	Criticize the principles and limitations of food preservation.	S3	- Case studies and group work	-Quizzes -Assignments -Mid-term exam -Final exam
2.3	Evaluate food contamination and the sources of contamination	S3	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
3.0	**Values, autonomy, and responsibility**			
3.1	To demonstrate independently and with multi-disciplinary teams.	V1	- Case studies - Group work	Final exam
3.2	To cooperate in providing scientific and technical services in microbiology	V2	- Case studies - Group work	Final exam
3.3	To demonstrate responsibility and accountability	V3	- Case studies - Group work	Final exam

C. Course Content:

No	List of Topics	Contact Hours
1.	**General principle for food safety regulation at National/ regional level :** - The Structure of Food Law. - Food Regulation What Should be Regulated. - Laws and Regulations to Prevent Adulteration and Cross Contamination. - Microbial Contamination. - Hygienic Practice. - Chemical and Environmental Contamination. - Food Additives. - Labeling. - Food Laws and Regulations at the International Level for Harmonization.	**3**

2	**National Standards** - Food Safety and Standard Authority of KSA regulations - Agricultural and Processed food Export Development Authority - Marine Product Export Development Authority - Export Inspection council and Export Inspection Agency. - International food standards., Trends in Food Standardization, - An Overview :Clause wise Interpretation of ISO 9001:2000, - An overview : Clause wise Interpretation of ISO 22000:2005.	**3**
3.	**Overview of food regulations and food agencies in Saudi Arabia.** - Saudi Food and Drug Administration SFDA - Sanitary and Phytosanitary agreement SPS - General agreement on Tariffs and Trade TBT	**3**
4.	**Traceability in Food Supply Chain Systems:** - Developing traceability systems across the food supply chain: an overview - Traceability for food safety and quality control - Technology for traceability (bar code, RFID, DNA profiling, remote sensing etc.)	**3**
5.	**Environmental toxicology** -Toxic environmental inorganic and organometallic food contaminants. Sources and their impact on human health. Toxic man-made organic food contaminants. Pesticides and other persistent organic compounds, which are important in food toxicology	**3**
6.	Mycotoxins - Major classes of food mold and the related toxins - The toxicity of poisonous mushrooms in humans. - Relationship between mold growth, their potential mycotoxins, and disease - Environmental conditions for mold growth. - Major species of toxic molds and their disease endpoints. - the route of exposure of mycotoxins, general pharmacologic effects and clinical disease. - Type of mycotoxins: (Patulin, Ochratoxin, Zearalenone, Aflatoxins, Trichothecenes and Fumonisins) - Guidance and regulations on mycotoxins in food and feed- Mycotoxin - Control Strategies- Good agricultural practices (GAPs)/good manufacturing practices (GMPs), HACCP, Biological control measures, - Risk Assessment, Food Safety Implications	**6**

7.	❖ Bacterial Toxins - Define bacterial toxigenesis, General properties of bacterial toxins - Explore bacterial toxins, their background and nomenclature. - Microorganisms produced toxins - Differentiate exotoxins and endotoxins. - Type of bacterial toxins - Structure of bacterial toxins, - Mechanism of action of bacterial toxins - Symptom of each bacteria toxins - Understand the origins of sepsis. - Diseases caused by or associated with bacterial toxins - Methods for detoxification of bacterial toxins	9
8.	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)	3
9.	Emerging Topics	6
10.	Emerging Topics	6
Total		**45**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Formative assessment: problem solving exercises, discussions	Every week	10 %
2.	Mid Term Exam	6	20 %
3.	Seminar	11	20 %
4	Summative assessment: Final Exam	16	50 %

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
	Total Mark		100%

*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	(1)- Doyle M, et al. (2019) Food Microbiology: Fundamentals and Frontiers 5th edition. ASM Press, (ISBN: 1555819966) (2)- Shen C., Zhang Y. (2017) Food Microbiology Laboratory Manual for the Food Science Students: A Practical Approach. Springer, (ISBN: 9783319583709) (3)- Kanovsky S, Pines W. (2020) A Practical Guide to FDA's Food and Drug Law and Regulation 7th edition. Food and Drug Law Institute, (ISBN: 1935065874). (4)- Sanchez M. (2019) Food Law and Regulation for non-Lawyers: A US Perspective. Springer, (ISBN: 3030100979) (5)- The Art of Service (2020) Food Traceability a Complete Guide. The Art Service Food Traceability Publishing, (ISBN: 1867444941) (6)- Ijabadeniyi et al. (2023) Food Safety and Toxicology: Present and Future Perspective. De Gruyter (ISBN: 3110748339) (7)- Bagashi D., Swaroop, A. (2016) Food Toxicology. CRC Press, (ISBN: 1498708749. (8)- Sashan A., Hedrich S. (2017) Food Toxicology. Apple Academic, (ISBN: 1774630559) (9)- Morris G, Vugia D (2021) Foodborne Infections and Intoxication. Academic Press (ISBN: 0128195193)
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (Projector, smart board, software)	Projector
Other equipment (Depending on the nature of the specialty)	

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Indirect: Regular surveys to evaluate teaching effectiveness and course relevance. Direct: CLO' assessment
Effectiveness of students assessment	Peer Review	Direct: Annual review of course content by faculty members and external experts
Quality of learning resources	Students	Indirect: Regular surveys to evaluate Quality of learning resources
The extent to which CLOs have been achieved	Peer Review	Direct: Annual review of course content by faculty members and external experts
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

2023
TPG-153

Course Specification
(Postgraduate)

Course Title:	Advanced Microbiology
Course Code:	F6000
Program:	M.Sc. Food Hygiene and Safety
Department:	Department of Biology
College:	Faculty of Science
Institution:	Umm Al-Qura University
Version:	2
Last Revision Date:	December 2024

Table of Contents

A. General information about the course:

1. Course Identificationn:

1. Credit hours: (3 credit hours)					
3 credit hours					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 1/Year 1)					
4. Course general Description:					
This course introduces history and Scope of Microbiology, beneficial and harmful roles of microorganisms, Roles of microorganisms in food and agricultural microbiology, disease and pathogenesis, evolution of Prokaryotic cells, Structural organization of Prokaryotic cells will be covered.					
5. Pre-requirements for this course (if any)**:**					
N/A					
6. Pre-requirements for this course (if any)**:**					
N/A					
7. Course Main Objective(s):					
Describe diversity of microorganisms and provide deep and theoretical knowledge about the structure, physiology, function and possibilities to exploit living microbial cells. understand the roles of the human microbiota in health and disease. Understand the role of microorganisms in relation to food, agriculture and environment.					

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	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**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)……**	
	Total	45

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	List the benefit and negative roles of microorganisms for human health and environmental system	K1	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
1.2	describe bacterial cell structure and functions	K2	- lectures, - Seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
2.0	**Skills**			
2.1	Criticize the factors effect on microbial growth	S3	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
2.2	Design methods using metagenomics to diagnose environmental and human health	S3	- Case studies and group work	-Quizzes -Assignments -Mid-term exam -Final exam
2.3	Calculate energy yields the microbial metabolism (aerobic and anaerobic respiration, fermentation	S3	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.0	**Values, autonomy, and responsibility**			
3.1	To demonstrate independently and with multi-disciplinary teams.	V1	- Case studies - Group work	Final exam
3.2	To cooperate in providing scientific and technical services in microbiology	V3	- Case studies - Group work	Final exam
3.3	To demonstrate responsibility and accountability	V3	- Case studies - Group work	Final exam

C. Course Content:

No	List of Topics	Contact Hours
1.	**History and Scope of advanced Microbiology:** Beneficial and harmful microorganisms, - Roles of microorganisms in food and agricultural microbiology, disease and pathogenesis -Introduction and evolution of Prokaryotic and Eukaryotic cells, Structural organization of Prokaryotic and Eukaryotic cells, -Major groups of Microorganisms : Viruses, Bacteria, Algae, Fungi and Protozoa. -General features of microorganisms (Bacteria, Algae, Fungi and Protozoa, Viruses) - Microbial identification ,Binomial Nomenclature; Haeckel‟s three kingdom classification; Woese‟s three kingdom classification systems and their utility – Archaea, Eubacteria, Eukarya.	**3**
2.	**Prokaryote cell structure and growth :** Structure and function of Cell Wall; Cell Membrane; Cytoplasm; Flagella; Fimbriae; Glycocalyx; Capsule; Ribosomes, Genetic materials, Endospores.	**3**
3.	**Microbial growth, Nutrition and Growth Factors:** - Definition, growth phases, kinetics of growth, modes of nutritional uptake: (Entry of nutrition in the cell, passive diffusion, facilitated diffusion and active transport, Utilization of nutrients. - Direct and indirect measurement of growth, - Factors affecting growth (pH, temperature, oxygen, salts, pressure). - Growth Curves, Phages of growth - Classification of bacteria on the basis of growth supporting environmental factors (such as oxygen, temperature, pH, osmotic pressure, salt and hydrostatic pressure.)	**6**

	-Methods for determination of bacterial growth. - Cultivation of aerobic; anaerobic bacteria - Maintenance and preservation of bacterial cultures, Transport of nutrients mechanisms	
4.	**Control of microbes:** -Sterilization, disinfection, antiseptic, tyndallisation, pasteurization: Physical-dry heat, moist heat, UV light, ionizing radiation, filtration, HEPA filter, Chemical-phenol and phenolic compounds, (halogen aliphatic alcohol, formaldehyde, ethylene oxide, heavy metals) anionic and cationic detergents.	**3**
5.	**Microbial Enzymes:** Definition, Structure, enzymes as biocatalysts properties and classification, specificity, active sites, coenzymes: Activators and inhibitors, activity unit, isozymes, enzyme kinetics (negative and positive comparatively), Kinetic analysis of allosteric enzymes principles of allosteric regulation, Ribozyme and abzyme	**3**
6.	**Microbial metabolism:** Bacterial metabolism- Aerobic and anaerobic respiration (definition, examples), fermentation (alcoholic, mixed acid, acetic acid, lactic acid), glycolysis, TCA cycle, Entner Duodruffs pathway, pentose phosphate pathway, electron transport chain, (components, sites of synthesis), bacterial photosynthesis (green and purple bacteria), biochemical nitrogen fixation– non-symbiotic, symbiotic (definition and examples), basic concept of nif – genes. Nod genes, nitrogenase complex, legheamoglobin., Pasteur effect.	**6**
7.	**Short Description of important pathogenic microorganisms:** -Important Eubacteria: Non Proteobacteria and Proteobacteria: - Gram Positive -Low G+C or Firmicutes - Important archaeal groups -Important fungi and yeasts caused human diseases	**3**
8.	**Microbe-microbe relationships** Microbial interactions- mutualism, symbiosis, commensalisms, predation, parasitism, amensalism, competition.	**3**
9.	**Microorganisms and Human Disease:** introduces microorganisms and the human diseases they cause, with particular emphasis on the impact of these relationships on the development of human societies - past, present, and future. **a) Virus diseases:** Measles, Mumps, Influenza, Yellow fever, HIV, Herpes, Rabies, Hepatitis, Polio myelitis, Dengue fever, Rhinovirus, COVID19. **b)Bacterial diseases :** Diphtheria, Typhoid, Gonorrhea, Syphilis, Plague, Leprosy, Tuberculosis, Gas gangrene, Tetanus, Septicemia, Cholera and Brucellosis. **c) Fungi diseases :**	**9**

	pathogenesis, epidemiology and control of fungi, which are agents of human and animal diseases (Candidiasis, Mycetoma, Chromomycosis, Sporotrichosis, Cryptococcosis, Blastomycosis, Coccidiomycosis and Histoplasmosis.) **d) Protozoa diseases:** Amoebiasis, Giardiasis, Malaria, Leishmaniasis and Trypanosomiasis.	
10.	**Advanced topics in microbiology: Microbial metagenomes** - Metagenomics for enzyme discovery in biotechnology - The human microbiome: roles in health and disease - Current and emerging methods for microbial diagnostics in the clinical setting - The environmental microbiome: function and metagenomic monitoring approaches	**3**
11.	**Applied and environmental microbiology** Application of microorganisms in soil, water, sewage, food, dairy, industrial and medical microbiology. Alternative energy resources (Biogas), bioremediation (biodegradation of hydrocarbon, industrial and domestic wastes and pesticides). Microbes and biological control. Genetic engineering and solving food deficiency problems (Single cell protein)	**3**
Total		**45**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Formative assessment: problem solving exercises, discussions	Every week	10 %
2.	Mid Term Exam	6	20 %
3.	Seminar	11	20 %
4	Summative assessment: Final Exam	16	50 %
	Total Mark		100%

*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	(1)- Willey J., Sandman K., Wood D. (2019) Prescotts' Microbiology 11th edition. McGraw-Hill (ISBN: 1260409023). (2)- Madigan MT, Martinko JM. Parker J. (2020) Brock Biology of Microorganisms 16th edition. Pearson (ISBN: 0135845688)

	(3)- Chess, B. (2020) Talaro's Foundation in Microbiology: Basic Principles 11th edition. McGraw-Hill (ISBN: 1260575381)
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (Projector, smart board, software)	Projector
Other equipment (Depending on the nature of the specialty)	

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Indirect: Regular surveys to evaluate teaching effectiveness and course relevance. Direct: CLO' assessment
Effectiveness of students assessment	Peer Review	Direct: Annual review of course content by faculty members and external experts
Quality of learning resources	Students	Indirect: Regular surveys to evaluate Quality of learning resources
The extent to which CLOs have been achieved	Peer Review	Direct: Annual review of course content by faculty members and external experts
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TPG-153

Course Specification
(Postgraduate)

Course Title:	Water, Health and Sanitation
Course Code:	FS6005
Program:	M.Sc. Food Hygiene and Safety
Department:	Department of Biology
College:	Faculty of Science
Institution:	Umm Al-Qura University
Version:	2
Last Revision Date:	December 2024

Table of Contents

A. General information about the course:

1. Course Identificationn:

1. Credit hours: (3 credit hours)				
3 credit hours				
2. Course type				
A.	☐University	☐College	☒ Department	☐Track
B.	☒ Required		☐Elective	
3. Level/year at which this course is offered: (Level 2 / Year 1)				
4. Course general Description:				
Water Microbiology is designed for the students to understand water microbiology concepts, Water ecosystem and water pollution-sources. The origin and types of water contaminants including live organisms, infectious agents and chemicals of agricultural and industrial origins, Water Quality Standards; WHO Guidelines for Drinking Water Quality, public health issues related to distribution networks and biofilms				
5. Pre-requirements for this course (if any)**:**				
Advanced Microbiology FS6000/ Public Health Microbiology During Hajj and Umrah Seasons FS6001				
6. Pre-requirements for this course (if any)**:**				
N/A				
7. Course Main Objective(s):				
Understand water microbiology, Water health and sanitation concepts, Water ecosystem (Fresh water and marine) and water pollution-sources, characteristics of water pollution. Aware with Principles of Microbiological assessments and detection methods for waterborne pathogens and of drinking water. Memorize the Standard criteria of drinking water according to WHO guidelines.				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	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**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)……**	
	Total	45

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	describe Water health and sanitation concepts,	K3	- lectures, - Seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
1.2	Describe the different biological and chemical treatments carried out for drinking water as well as for wastewater	K4	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
2.0	**Skills**			
2.1	Evaluate WHO guidelines for drinking water quality	S3	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
2.2	Criticize the criteria for drinking and recreational water quality	S3	- Case studies and group work	-Quizzes -Assignments -Mid-term exam -Final exam
2.3	Design the microbiological treatment for	S2	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	wastewater and sewage			-Final exam
3.0	**Values, autonomy, and responsibility**			
3.1	To demonstrate independently and with multi-disciplinary teams.	V1	- Case studies - Group work	Final exam
3.2	To cooperate in providing scientific and technical services in microbiology	V3	- Case studies - Group work	Final exam
3.3	To demonstrate responsibility and accountability	V3	- Case studies - Group work	Final exasm

C. Course Content:

No	List of Topics	Contact Hours
1.	❖ General Introduction to Water, health and sanitation - Water Microbiology concepts, - Water ecosystem (Fresh water and marine) and water pollution-sources, characteristics of water pollution. - The origin and types of water contaminants including live organisms, infectious agents and chemicals of agricultural and industrial origins. - Health hazards water pollution. Quantitative Microbial Risk Assessment of Waterborne Disease	**3**
2	❖ Drinking Water Quality Standards ❖ Criteria for drinking and recreational water quality -Standard criteria for drinking water according WHO -Microbiological criteria -Chemical criteria (anions and cations, pH, oder) -Physical criteria (such color, turbidity .....) - Estimation of Water Demand	**3**
3.	❖ Normal flora in aquatic environments - Cyanobacteria - Green algae	**3**

	- Diatoms - Red algae - Other types of algae - Bacteria - Viruses - Zooplankton (microscopic invertebrates) -Aquatic Macrophytes (Floating weeds, Submergent weeds, Emergent weeds)	
4.	❖ Water quality and pollution of natural water sources: - Types and effects on natural flora: - Quality of surface waters - Water quality in flowing waters - Groundwater quality - Microbiological quality of drinking water - Chemical quality of drinking water	**3**
5.	❖ Public health issues and water-borne diseases - Microbiological drinking-water quality and human health -Water-related disease incidence worldwide. - Morbidity and mortality rates of some important water-related diseases such: **Amebiasis, Campylobacteriosis**, Cholera, **Cryptosporidiosis**, **Giardiasis**, Hepatitis, **Shigellosis**, **Typhoid fever**, **Viral gastroenteritis**, Cyanobacterial Toxins.) -Bacterial Pathogens Capable of Causing Waterborne Disease: *Salmonella, Shigella, Vibrio cholera,* Enterovirulent *E. coli, Yersinia enterocolitica, Campylobacter jejuni, Legionella pneumophila, Helicobacter pylori.*) - Opportunistic and other water-associated pathogens (Examples of opportunistic pathogens of this type include *Pseudomonas aeruginosa*, certain species of *Flavobacterium, Acinetobacter, Klebsiella, Serratia, Aeromonas* and some 'slow growing' mycobacteria)	**6**
6.	Principles of Microbiological assessments and detection methods for waterborne pathogens and of drinking water: -Water sampling, Total count, presumptive test ,Confirmatory Test, Completed Test, IMVIC tests: (Indol Production test, Methyl Red test, Voges – Proskauer test, Citrate utilization test), *Eckman test.* -Detection Methods for Waterborne Pathogens: - Polymerase Chain Reaction (PCR) -MULTIPLEX PCR (mPCR)	**3**

	- Oligonucleotide DNA Microarrays - Fluorescence *in Situ* Hybridization *(FISH)* - Immunology-Based Methods - Biosensor Based Methods	
7.	❖ Detailed study of Bacterial Faecal Indicators: - Biological indicators of water pollution Chemical, Microbiological (detailed study of bacterial faecal indicators). - Features and condition of organisms selected as indicators. - Biotechnological indicators Why Coliforms are Chosen as Indicators ((*Escherichia coli*, Faecal streptococci, Sulfite reducing Clostridium)	**3**
8.	❖ Drinking water purifications Treatment - Conventional and new technological developments to eliminate water pollutants: -Surface-water intakes - Mixing and flocculation Sedimentation - Flocculator-clarifiers - Filtration - Turbidity removal - Taste and odor control - Synthetic organic chemical removal - Iron and manganese removal Precipitation Softening - Fluoridation - Chlorination - Chlorination by-products - Ozone - Disinfection - Ion exchange softening and nitrate removal - Removal of dissolved salts - Sources of wastes in water treatment - Dewatering and disposal of wastes from water treatment plants	**3**
9.	❖ Drinking water microbiology - Surface water - Stored water - Microbial response to disinfectant	**3**

	Taste and odor problems in potable water	
10.	❖ Public health issues related to distribution networks and biofilms - **Biofilms in Drinking Water Distribution** - Microorganisms forming biofilms (Microbes in or associated with biofilms that may present a public health risk in the distribution system). - **Factors related to biofilms formation** *-Corrosion control and Pipe Materials* -Risks and hazardous resulting in biofilms -Health Risks from microbial Growth Methods used for controlling and removing biofilms and possible indicators of the presence of a biofilm problem	**3**
11.	Microbiological treatment of wastewater -Domestic wastewater -Industrial wastewater -Infiltration and inflow Considerations in plant design -Preliminary treatment -Pumping stations -Clarification -Biological filtration -Rotating biological contactors Biological aeration -Stabilization ponds -Effluent disinfection -Individual household disposal systems -Characteristics and quantities of wastewater -Selection and arrangement of wastewater processes -Gravity wastewater thickening -Thickening of waste activated wastewater -Anaerobic and Aerobic digestion Agricultural land application	**6**

12	Behavior of pathogens in wastewater treatment process - Viruses in feces - Bacterial pathogen removal from wastewater treatment plants - Fate and behavior of parasites in wastewater treatment system	3
13	Problems in wastewater treatment processes - Activated sludge bulking and foaming - Odor generation - Heavy metals in wastewater treatment process	3
Total		45

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Formative assessment: problem solving exercises, discussions	Every week	10 %
2.	Mid Term Exam	6	20 %
3.	Seminar	11	20 %
4	Summative assessment: Final Exam	16	50 %
	Total Mark		100%

*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	(1)- Selendy J. (2019) Water and Sanitation-Related Diseases and the Changing Environment: Challenges, Intervention and Preventative Measures 2nd edition. Wiley, (ISBN: 1119416213) (2)-Nath K, Sharma V. (2018) Water and Sanitation in the New Millennium. Springer, (ISBN: 8132239008) (3)- Saxena S. (2020) Water-Associated Infectious Diseases. Springer, (ISBN: 9811391998) (4)- Bitton G. (2014) Microbiology of Drinking Water: Production and Distribution. Wiley, (ISBN: 111874392X) (5)- Spellman F. (2019) Microbiology for Water and Wastewater Operators. CRC Press, (ISBN: 0367399156)
Supportive References	
Electronic Materials	

Other Learning Materials	

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (Projector, smart board, software)	Projector
Other equipment (Depending on the nature of the specialty)	

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Indirect: Regular surveys to evaluate teaching effectiveness and course relevance. Direct: CLO' assessment
Effectiveness of students assessment	Peer Review	Direct: Annual review of course content by faculty members and external experts
Quality of learning resources	Students	Indirect: Regular surveys to evaluate Quality of learning resources
The extent to which CLOs have been achieved	Peer Review	Direct: Annual review of course content by faculty members and external experts
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

2023
TPG-153

Course Specification
(Postgraduate)

Course Title:	Master's Graduation Research
Course Code:	FS6097
Program:	M.Sc. Food Hygiene and Safety
Department:	Department of Biology
College:	Faculty of Science
Institution:	Umm Al-Qura University
Version:	2
Last Revision Date:	December 2024

Table of Contents

A. General information about the course:

1. Course Identificationn:

1. Credit hours: (6 credit hours)				
6 credit hours				
2. Course type				
A.	☐University	☐College	☒ Department	☐Track
B.	☒ Required		☐Elective	
3. Level/year at which this course is offered: (Level 4 / Year 2)				
4. Course general Description:				
At the end of this course student should be able to evaluate the different approaches used and suggest future experiments or alternative strategies for addressing the problem. The student should be able to conversant with writing a scientific report and presenting scientific data in a clear accessible manner. The skills learnt will be applicable to problem solving exercises encountered in all types of employment				
5. Pre-requirements for this course (if any)**:**				
N/A				
6. Pre-requirements for this course (if any)**:**				
N/A				
7. Course Main Objective(s):				
Gain practical and/or theoretical knowledge about particular area of microbiology. Work independently on the research project under the supervision of academic member of staff, and should be able to design experiments to answer the particular question posed, and critically analyzed the results. There will be scope for initiative in this element of the project. Be able to set the work in the context of work done by other experimentalists, and provide a concise summary of relevant literatures.				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom		
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	
2.	**Laboratory/Studio**	90
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)……**	
	Total	90

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Design experiments to answer the particular question posed, and critically analyze the results. There will be scope for initiative in this element of the project	K4	- Perform laboratory experiments	Final report
1.2	Evaluate other experimentalists, and modify research methods	K4	Perform laboratory experiments	Final report
2.0	**Skills**			
2.1	Design methods for isolation and identification of unknown pathogens	S1, S2	- Perform laboratory experiments	Final report
2.2	Perform basic and advanced laboratory	S3	- Perform laboratory experiments	Final report

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	techniques and operate equipment in the field of microbiology			
3.3	Design the techniques used for food analysis	S4	- Perform laboratory experiments	Final report
3.0	**Values, autonomy, and responsibility**			
3.1	To demonstrate independently and with multi-disciplinary teams.	V1	- Perform laboratory experiments	Final report
3.2	To cooperate in providing scientific and technical services in microbiology	V2	- Perform laboratory experiments	Final report
3.3	To demonstrate responsibility and accountability	V3	- Perform laboratory experiments	Final report

C. Course Content:

No	List of Topics	Contact Hours
1.		
2		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
Total		

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Final Report	16	100 %
2.			
3.			
4			
	Total Mark		100%

*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	(1)- FDA (2021) Bacteriological Analytical Manual (BAM). US Food and Drug Administration, Maryland, USA. (https://www.fda.gov/food/laboratory-methods-food/bacteriological-analytical-manual-bam) (2)- Johnson, T., Case, C. (2018) Laboratory Experiments in Microbiology 12th edition. Pearson, (ISBN: 0134605209) (3)- Yousef, A., Perry, J. (2022) Analytical Food Microbiology, Laboratory Manual 2nd edition. Wiley, (ISBN: 0470425113) (4)- Schnieder, A. (2022) Bacteriological Methods in Food and Drug Laboratories: with and Introduction to Micro-Analytical Methods. Legare Street Press, (ISBN: 1019105127) (5) Smith, H, Brown, A. (2021) Benson's Microbiology Application Laboratory Manual. McGraw-Hill, (ISBN: 126025898X) (6) LeBoeff, M. (2021) A Photographic Atlas for the Microbiology Laboratory. Morton Publishing Company, (ISBN: 1617319031) (7)- da Silva N. (2017) Microbiological Examination Methods for Food and Water: a Laboratory Manual. CRC Press, (ISBN: 978-1138451971)
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Well equipped research laboratory for performing basic and advanced microbiological testings
Technology equipment (Projector, smart board, software)	
Other equipment (Depending on the nature of the specialty)	

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Indirect: Regular surveys to evaluate teaching effectiveness and course relevance. Direct: CLO' assessment
Effectiveness of students assessment	Peer Review	Direct: Annual review of course content by faculty members and external experts
Quality of learning resources	Students	Indirect: Regular surveys to evaluate Quality of learning resources
The extent to which CLOs have been achieved	Peer Review	Direct: Annual review of course content by faculty members and external experts
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TPG-153

Course Specification
(Postgraduate)

Course Title:	Research Methodology and Ethics
Course Code:	FS6025
Program:	M.Sc. Food Hygiene and Safety
Department:	Department of Biology
College:	Faculty of Science
Institution:	Umm Al-Qura University
Version:	2
Last Revision Date:	December 2024

Table of Contents

A. General information about the course:

1. Course Identificationn:

1. Credit hours: (3 credit hours)				
3 credit hours				
2. Course type				
A.	☐University	☐College	☒ Department	☐Track
B.	☒ Required		☐Elective	
3. Level/year at which this course is offered: (Level 2 / Year 1)				
4. Course general Description:				
This course provides an in-depth understanding of the principles and practices of scientific research and the ethical considerations that guide responsible conduct in research. Students will explore key methodologies for designing, conducting, and analyzing research across disciplines, with a focus on critical thinking, data integrity, and reproducibility. The course also emphasizes ethical frameworks, including issues such as plagiarism, authorship, conflicts of interest, and the protection of human and animal subjects. By the end of the course, students will be equipped to conduct rigorous and ethically sound research while adhering to professional standards				
5. Pre-requirements for this course (if any)**:**				
N/A				
6. Pre-requirements for this course (if any)**:**				
N/A				
7. Course Main Objective(s):				
Understand Research Methodologies. Develop Research Skills. Ensure Ethical Research Practices. Master Academic Writing and Presentation. Promote Integrity and Professionalism. Apply Research Knowledge Across Disciplines:				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	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**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)……**	
	Total	45

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Explain the principles of ethical research and the regulations governing the use of human and animal subjects	K1	- lectures, - Seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
1.2	Identify common challenges in research, such as bias, reproducibility issues, and conflicts of interest, and understand how to address them	K1	- lectures, - Seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
2.0	**Skills**			
2.1	Design and implement a research project, including hypothesis formulation, data collection, and analysis	S4	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
2.2	Conduct critical evaluations of existing literature to identify gaps and construct a	S3	- Case studies and group work	-Quizzes -Assignments -Mid-term exam -Final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	solid research framework			
2.3	Apply appropriate statistical or qualitative techniques to analyze research data and derive meaningful conclusions	S2	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
2.4	Communicate research findings effectively through written, visual, and oral presentations tailored to diverse audiences	S3	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
2.5	Employ ethical decision-making in real-world research scenarios to maintain integrity and professionalism	S4	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
3.0	**Values, autonomy, and responsibility**			
3.1	To demonstrate independently and with multi-disciplinary teams.	V1	- Case studies - Group work	Final exam
3.2	To cooperate in providing scientific and technical services in microbiology	V2	- Case studies - Group work	Final exam
3.3	To demonstrate responsibility and accountability	V3	- Case studies - Group work	Final exam

C. Course Content:

No	List of Topics	Contact Hours
1.	Introduction to Research Methodology • Definition, importance, and scope of research • Types of research: basic, applied and transitional	3
2	Developing a Research Framework	3

	• Identifying research problems and gaps • Formulating research questions and hypotheses	
3.	Research Design and Planning • Types of research design: experimental, descriptive, exploratory • Sampling techniques and considerations	3
4.	Literature Review • Importance and methods of conducting a literature review • Tools for organizing and managing references	3
5.	Data Collection Methods • Quantitative vs. qualitative data collection techniques • Surveys, interviews, and observational studies	3
6.	Data Analysis Techniques • Introduction to statistical and qualitative analysis methods • Tools for data visualization and interpretation	3
7.	Writing Research Proposals • Structure and key components of a research proposal • Grant writing basics	3
8.	Ethical Foundations in Research • Historical context: notable case studies in research ethics • Principles of ethical research	3
9.	Research Ethics in Practice • Informed consent and confidentiality • Ethical considerations in human and animal research	3
10.	Avoiding Research Misconduct • Plagiarism, falsification, and fabrication • Tools for ensuring research integrity	3
11.	Authorship and Peer Review	3

	• Guidelines for authorship and collaboration • Understanding the peer review process and its challenges	
12.	Intellectual Property and Data Management • Understanding copyrights, patents, and intellectual property laws • Data storage, sharing, and reproducibility	3
13.	Communicating Research Findings • Writing research papers: structure and style • Presenting research findings to academic and non-academic audiences	3
14.	Interdisciplinary and Collaborative Research • Importance of collaboration in research • Strategies for effective teamwork across disciplines	3
15.	Social Responsibility in Research • The role of research in addressing societal challenges • Balancing scientific innovation and ethical responsibility	3
Total		45

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Formative assessment: problem solving exercises, discussions	Every week	10 %
2.	Mid Term Exam	6	20 %
3.	Seminar	11	20 %
4	Summative assessment: Final Exam	16	50 %
	Total Mark		100%

*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	(1)- Aguinis, H. (2024) Research Methodology: Best Practicies for Rigorous, Cridible and Impactful Research. SAGE Publication Inc. (ISBN: 1071871943) (2)- National Academy For Science (2008) On Being a Scientist: A Guide to Responsible Conduct in Research 3rd edition. National Academies Press. (ISBN: 0309119707) (3)- Creswell JW and Poth CN (2024) Qualitative Inquiry and Research Design: Choosing Among Five Approaches. SAGE Publication Inc. (ISBN: 1544398395)
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (Projector, smart board, software)	Projector
Other equipment (Depending on the nature of the specialty)	

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Indirect: Regular surveys to evaluate teaching effectiveness and course relevance. Direct: CLO' assessment
Effectiveness of students assessment	Peer Review	Direct: Annual review of course content by faculty members and external experts
Quality of learning resources	Students	Indirect: Regular surveys to evaluate Quality of learning resources

Assessment Areas/Issues	Assessor	Assessment Methods
The extent to which CLOs have been achieved	Peer Review	Direct: Annual review of course content by faculty members and external experts
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

2023
TPG-153

Course Specification
(Postgraduate)

Course Title: Public Health Microbiology During Hajj and Umrah Seasons
Course Code: FS6001
Program: M.Sc. Food Hygiene and Safety
Department: Department of Biology
College: Faculty of Science
Institution: Umm Al-Qura University
Version: 2
Last Revision Date: December 2024

Table of Contents

A. General information about the course:

1. Course Identificationn:

1. Credit hours: (3 credit hours)				
3 credit hours				
2. Course type				
A.	☐University	☐College	☒ Department	☐Track
B.	☒ Required		☐Elective	
3. Level/year at which this course is offered: (Level 1/Year 1)				
4. Course general Description:				
This course aims to explore the public health issues during Hajj and Umrah seasons. It brings the students to be aware of public health aspects during mass gathering events, communicable microbial diseases during Hajj and Umarah. It draws to students attention the importance and types of vaccination during Hajj and Umrah seasons, and surveillance, monitoring and communication aspects of public health issues during Hajj and Umrah. A study of personal hygiene; sanitary practices in food preparation causes investigation, control of illness caused by food contamination and workplace safety standards.				
5. Pre-requirements for this course (if any)**:**				
N/A				
6. Pre-requirements for this course (if any)**:**				
N/A				
7. Course Main Objective(s):				
To be aware of public health aspects during mass gathering events. To Know and identify the various foodborne, waterborne and airborne diseases during Hajj and Umrah seasons. Aware with the methods used in surveillance, monitoring and communication of communicable diseases during Hajj and Umrah seasons. Aware of Good hygiene practices for food manufacture. Aware with the Knowledge of the conditions and requirements for the implementation of quality systems and good manufacturing and others.				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	E-learning		
3	Hybrid • Traditional classroom		

No	Mode of Instruction	Contact Hours	Percentage
	• E-learning		
4	Distance learning		

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)……**	
	Total	45

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe various public health aspects of mass gathering events	K2	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
1.2	Summarize the procedures of surveillance, monitoring and reporting of communicable diseases outbreak during Hajj and Umrah	K3	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
2.0	**Skills**			
2.1	Design prevention procedures for communicable diseases during hajj and umrah seasons	S2	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	Evaluate procedure for safety of the community during Hajj and Umrah seasons	S3	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
2.3	Criticize the methods used in surveillance and monitoring of communicable diseases during Hajj and Umrah seasons	S4	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
3.0	**Values, autonomy, and responsibility**			
3.1	To demonstrate independently and with multi-disciplinary teams.	V1	- Case studies - Group work	Final exam
3.2	To cooperate in providing scientific and technical services in microbiology	V2	- Case studies - Group work	Final exam
3.3	To demonstrate responsibility and accountability	V3	- Case studies - Group work	Final exam

C. Course Content:

No	List of Topics	Contact Hours
1.	Introduction to Public Health Microbiology	3
2.	Public Health Aspects during Mass Gathering Events	3
3.	Communicable microbial foodborne and waterborne diseases during Hajj and Umrah	3
4.	Communicable microbial airborne diseases during Hajj and Umrah seasons	3
5.	Health Requirements for Pilgrims	3
6.	Vaccination during Hajj and Umrah seasons	3
7.	Case studies of public health microbiology during hajj and umrah	9
8.	Surveillance, monitoring and reporting of communicable diseases during hajj and umrah	3

9.	Food Hygiene requirements for food Manufacturing: Food hygiene standards - Requirements for Control of pathogen microbes - Specific requirements in rooms where foodstuffs are prepared, treated or processed, Wrapping and Backing - Requirements for food equipment's	3
10.	- Requirements for movable and/or temporary premises - Requirements for food preservation, storage and stores temperature control Requirements for food Transport - Requirements for Food waste Requirements for Water supply used in food manufacturing	3
11.	Requirements for Personal hygiene of Food handlers	3
12.	Requirements for Manufacture and Processing of foodstuffs (Dairy, meat products, eggs, and juices)	3
13.	Food hygiene requirements in restaurants	3
Total		**45**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Formative assessment: problem solving exercises, discussions	Every week	10 %
2.	Mid Term Exam	6	20 %
3.	Seminar	11	20 %
4	Summative assessment: Final Exam	16	50 %
	Total Mark		100%

*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	(1)- Burlage R. (2022) Principles of Public Health Microbiology. Jones and Bartlett. (ISBN: 978-076-377-9825) (2)- Donelli, G. (2019) Advances in Microbiology: Infectious Diseases and Public Health. Springer, (ISBN: 3030077063)

	(3)- Khairatun N, et al. (2021) Food Safety Practices in Restaurant Industry. Business Science References, (ISBN: 179987415X) (4)- Fellows P. (2022) Food Processing Technology: Principle and Practice 5th edition. Woodhead Publishing, (ISBN: 032385737X) (5)- Norton, E. (2022) Handbook of Food Contamination and Safety. Murphy and Moore Publishing, (ISBN: 1639872309)
Supportive References	(1)- Collections of Review and Research articles on communicable diseases during Hajj and Umrah season. (2)- Saudi CDC (3)- Saudi Epidemiological Bulletin
Electronic Materials	
Other Learning Materials	

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (Projector, smart board, software)	Projector
Other equipment (Depending on the nature of the specialty)	

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Indirect: Regular surveys to evaluate teaching effectiveness and course relevance. Direct: CLO' assessment
Effectiveness of students assessment	Peer Review	Direct: Annual review of course content by faculty members and external experts

Assessment Areas/Issues	Assessor	Assessment Methods
Quality of learning resources	Students	Indirect: Regular surveys to evaluate Quality of learning resources
The extent to which CLOs have been achieved	Peer Review	Direct: Annual review of course content by faculty members and external experts
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

2023
TPG-153

Course Specification
(Postgraduate)

Course Title: Modern Methods for Food and Waterborne Pathogens Identification
Course Code: FS6031
Program: M.Sc. Food Hygiene and Safety
Department: Department of Biology
College: Faculty of Science
Institution: Umm Al-Qura University
Version: 2
Last Revision Date: December 2024

Table of Contents

A. General information about the course:

1. Course Identificationn:

1. Credit hours: (3 credit hours)					
3 credit hours					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (Level 4 / Year 2)					
4. Course general Description:					
This course will be cover description of the methods for isolation and identification of microorganisms from food samples and other samples. phenotypic and genotypic characterizations of unknown microorganisms will be discussed. Also, all the principles of modern and rapid identification techniques including API, BIOLOG, MICROSCAN, VITEK as well as MALDI TOF will be described. All molecular identification techniques including with details discussed.					
5. Pre-requirements for this course (if any)**:**					
Food Microbiology FS6002/ Water Health and Sanitation FS6005/ Microbiological Analysis of Food FS6017					
6. Pre-requirements for this course (if any)**:**					
N/A					
7. Course Main Objective(s):					
Aware with principles of modern and rapid techniques based on biochemical reactions for identification of unknown bacterial isolates that isolated from foods and any other sources. Able to chose the suitable techniques for identification of unknown bacterial cultures based on biochemical reactions.					

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	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**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)……**	
	Total	45

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe phenotypic and genotypic methods for pathogen identification	**K3**	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
1.2	Compare between the modern methods and classical methods for bacterial identification	**K4**	- lectures, - Seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
2.0	**Skills**			
2.1	evaluate methods for isolation and identification of unknown pathogens	**S3**	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
2.2	Criticize mentoring and enumeration methods of microorganisms	**S3**	- Case studies and group work	-Quizzes -Assignments -Mid-term exam -Final exam
2.3	Design the techniques used for food analysis	**S2**	- lectures, - seminars - Discussion	
3.0	**Values, autonomy, and responsibility**			
3.1	To demonstrate independently and with multi-disciplinary teams.	**V1**	- Case studies - Group work	Final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.2	To cooperate in providing scientific and technical services in microbiology	V3	- Case studies - Group work	Final exam
3.3	To demonstrate responsibility and accountability	V3	- Case studies - Group work	Final exam

C. Course Content:

No	List of Topics	Contact Hours
1.	❖ Introduction: ❖ Principle of Bacterial identification and characterization by modern techniques ❖ Phenotypic characteristics -Chromogenic media for rapid isolation, Selective media, enrichment media for bacterial isolation -Morphological data (Colony morphology, colony color, shape and size, pigment production and Cellular morphology, cell size, cell shape, flagella type, reserve material, Gram reaction, spore and acid-fast staining, mode of sporulation - physiological and biochemical data (Oxygen tolerance, pH range, temperature optimum and range, salinity tolerance, Carbon utilization, carbohydrate oxidation or fermentation, enzyme patterns) -Chemotaxonomic characteristics; (Fatty acid profile, the patterns of polar lipids present in the membrane, Composition of cell wall)., microbial toxins, whole cell composition)	9
2	Rapid methods for identification of bacteria based on physiological and biochemical characterization: 1. API kits 2. BIOLOG system 3. Microscan 4. VITEK 5. Protein profile analysis by matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF-MS) and similar variations have also been explored.MALDI-TOF-MS	6

	6. Serotyping: (Serological techniques such as ELISA (enzyme-linked immunosorbant assay or NAAT (nucleic acid amplification techniques) -Advantage and limitations of each methods for bacterial identification	
3.	❖ Genotypic characteristics - DNA-DNA Hybridization - the guanine (G)+ cytosine (C) content (% GC). - Multilocus Sequence Typing (MLST) - DNA profiling (PCR, real-time PCR, RAPD-PCR)	6
4.	❖ Phylogenetic Analysis : - 16S rRNA gene sequence analysis - House keeping gene sequencing - ITS sequencing - Multi-gene sequence analysis - Whole-genome sequence analysis	6
5.	BIOINFORMATICS 1. Analysis of Nucleic Acid Sequences 2. Sequence Similarity Searching 3. ORF Prediction 4. Multiple sequence Alignment 5. Pairwise sequence alignment using BLAST and FASTA 6. Gene Structure and Function prediction 7. Protein structure analysis 8. Phylogenetic tree construction 9. Phylogenetic analysis using PHYLIP	6
6.	Methods for preservation of bacterial cultures: Bacterial and Fungal Preservation Methods 1. Agar Slant Cultures 2. Agar Slant Culture Covered with Oil (Parafin Method) 3. Saline Suspension 4. Refrigeration (in glycerol 20%) 5. Preservation at Very Low Temperature 6. Preservation by Drying in Vacuum 7. Cryopreservation 8. Lyophilization (Freeze-Drying)	6
7.	Emerging identification methods - Raman spectroscopy	6

	- Biosensors	
Total		**45**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Formative assessment: problem solving exercises, discussions	Every week	10 %
2.	Mid Term Exam	6	20 %
3.	Seminar	11	20 %
4	Summative assessment: Final Exam	16	50 %
	Total Mark		100%

*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	(1)- Doyle M, et al. (2019) Food Microbiology: Fundamentals and Frontiers 5th edition. ASM Press, (ISBN: 1555819966) (2)- Johnson, T., Case, C. (2018) Laboratory Experiments in Microbiology 12th edition. Pearson, (ISBN: 0134605209) (3)- Yousef, A., Perry, J. (2022) Analytical Food Microbiology, Laboratory Manual 2nd edition. Wiley, (ISBN: 0470425113) (4)- Huang, L, Hwang, A. (2023) Practical Methods for Predictive Food Microbiology. CRC Press, (ISBN: 1482260646) (5) Smith, H, Brown, A. (2021) Benson's Microbiology Application Laboratory Manual. McGraw-Hill, (ISBN: 126025898X) (6) Bridle, H. (2020) Waterborne Pathogens: Detection Methods and Application. Academic Press, (ISBN: 0444643192)
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (Projector, smart board, software)	Projector
Other equipment (Depending on the nature of the specialty)	

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Indirect: Regular surveys to evaluate teaching effectiveness and course relevance. Direct: CLO' assessment
Effectiveness of students assessment	Peer Review	Direct: Annual review of course content by faculty members and external experts
Quality of learning resources	Students	Indirect: Regular surveys to evaluate Quality of learning resources
The extent to which CLOs have been achieved	Peer Review	Direct: Annual review of course content by faculty members and external experts
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

2023
TPG-153

Course Specification
(Postgraduate)

Course Title:	Food and Waterborne Diseases
Course Code:	FS6012
Program:	M.Sc. Food Hygiene and Safety
Department:	Department of Biology
College:	Faculty of Science
Institution:	Umm Al-Qura University
Version:	2
Last Revision Date:	December 2024

Table of Contents

A. General information about the course:

1. Course Identificationn:

1. Credit hours: (3 credit hours)				
3 credit hours				
2. Course type				
A.	☐University	☐College	☒ Department	☐Track
B.	☒ Required		☐Elective	
3. Level/year at which this course is offered: (Level 3 / Year 2)				
4. Course general Description:				
The major objective of the course is to provide in depth knowledge and exposure to various Waterborne and Foodborne diseases and infections and their impact on human health and combat the problem through standard technology and guidelines. The structure developed include various fundamental and applied aspects of waterborne microbial infections, role of transmission of diseases.				
5. Pre-requirements for this course (if any)**:**				
Food Microbiology FS6002/ Water Health and Sanitation FS6005				
6. Pre-requirements for this course (if any)**:**				
N/A				
7. Course Main Objective(s):				
Understanding the mechanisms of waterborne and foodborne infections. Explain various types of microbial and viral agents associated with waterborne and foodborne infections. Identify and differentiate symptoms associated waterborne and foodborne infections. Critically evaluate their personal performance both as an individual and within a team				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	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**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)……**	
	Total	45

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	describe the infections mechanisms of foodborne and waterborne infections	K4	- lectures, - Seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
1.2	Describe the routes of transmission of microbial waterborne and foodborne agents	K2	- lectures, - Seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
2.0	**Skills**			
2.1	Criticize the role of microorganisms in disease development and symptoms in foodborne and waterborne infections	S3	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
2.2	Criticize the steps of foodborne and	S3	- Case studies and group work	-Quizzes -Assignments -Mid-term exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	waterborne infections			-Final exam
2.3	Evaluate prevention measures in controlling food and waterborne infections	S2	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
3.0	**Values, autonomy, and responsibility**			
3.1	To demonstrate independently and with multi-disciplinary teams.	V1	- Case studies - Group work	Final exam
3.2	To cooperate in providing scientific and technical services in microbiology	V3	- Case studies - Group work	Final exam
3.3	To demonstrate responsibility and accountability	V3	- Case studies - Group work	Final exam

C. Course Content:

No	List of Topics	Contact Hours
1.	Introduction to Food and water-borne diseases Disease processes in food and waterborne illness	**3**
2	- Bacterial agents: - all bacterial waterborne and foodborne agents will be discussed as follows: - Basic microbiology; - Metabolism and physiology; - Clinical features; - Survival in the environment; - Enhanced growth in biofilms; - Methods of detection; - Antimicrobial control; - Risk assessment	**18**

3.	Protozoan agents: - all protozoan agents will be discussed as follows: - Basic microbiology; - Life cycle and taxonomy; - Clinical feature; - Survival in the environment; - Methods of detection; - Treatment; - Risk assessment	6
4.	Viral agents: - all viral waterborne and foodborne agents will be discussed as follows: - Basic microbiology; - Pathogenesis and clinical features; - Transmission and epidemiology; - Distribution in the environment; - Risk assessment	9
5.	Impact of climate change on water-and foodborne pathogens	3
6.	Worldwide water and food safety	3
7.	Risk and hazard analysis of water and food	3
	Total	45

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Formative assessment: problem solving exercises, discussions	Every week	10 %
2.	Mid Term Exam	6	20 %
3.	Seminar	11	20 %
4	Summative assessment: Final Exam	16	50 %
	Total Mark		100%

*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	(1)- Bhunia, A. (2018) Foodborne Microbial Pathogens: Mechanisms and Pathogensis. Springer, (ISBN: 1493992465). (2)- Labbe RG, Garcia S. (2013) Guide to Foodborne Pathogens 2nd edition. Wiley. (ISBN: 978-111-868-4856)

	(3)- Bridle H. (2020) Waterborne Pathogens: Detection Methods and Applications. Academic Press. (ISBN: 044-464-3192). (4)- Bari L, Ukuku D (2021) Foodborne Pathogens and Food Safety. Taylor & Francis (ISBN: 978-036-773-7525)
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (Projector, smart board, software)	Projector
Other equipment (Depending on the nature of the specialty)	

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Indirect: Regular surveys to evaluate teaching effectiveness and course relevance. Direct: CLO' assessment
Effectiveness of students assessment	Peer Review	Direct: Annual review of course content by faculty members and external experts
Quality of learning resources	Students	Indirect: Regular surveys to evaluate Quality of learning resources
The extent to which CLOs have been achieved	Peer Review	Direct: Annual review of course content by faculty members and external experts
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

2023
TPG-153

Course Specification
(Postgraduate)

Course Title:	Food Quality Assurance
Course Code:	FS6010
Program:	M.Sc. Food Hygiene and Safety
Department:	Department of Biology
College:	Faculty of Science
Institution:	Umm Al-Qura University
Version:	2
Last Revision Date:	December 2024

Table of Contents

A. General information about the course:

1. Course Identificationn:

1. Credit hours: (3 credit hours)				
3 credit hours				
2. Course type				
A.	☐University	☐College	☒ Department	☐Track
B.	☒ Required		☐Elective	
3. Level/year at which this course is offered: (Level 3 / Year 2)				
4. Course general Description:				
The course will introduce students to food quality assurance, food quality control and food standards. students will be introduced to variety of topics important in quality of food such as food quality management, food packaging, food adulteration and food fraud. Also, the course will introduce food quality standards and their types. Also, students will be introduced to main food quality management programs such as HACCP, ISO9000, ISO22000.				
5. Pre-requirements for this course (if any)**:**				
Food Microbiology FS6002/ Food Processing Microbiology FS6007				
6. Pre-requirements for this course (if any)**:**				
N/A				
7. Course Main Objective(s):				
Obtain advanced understanding to food quality control and food quality assurance. Aware of the different food standards. Familiar with quality standards. Provide students with knowledge with regards to food quality management. Aware with knowledge of the principles of the essential quality and food safety standards used in the food industry (HACCP, ISO 9001, BRC, ISO 22000). Aware of food inspection process and its responsibilities				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	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**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)……**	
	Total	45

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	list the principles of good manufacturing practice concerning food safety	K3	- lectures, - Seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
1.2	Describe food inspection and food sampling in terms of duties and specifications	K4	- lectures, - Seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
2.0	**Skills**			
2.1	Criticize the different food quality standards	S3	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
2.2	Design food sampling procedures and the	S2	- Case studies and group work	-Quizzes -Assignments -Mid-term exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	considerations related to food sampling			-Final exam
2.3	evaluate food inspection process and its responsibilities	S3	- lectures, - seminars - Discussion	-Quizzes -Assignments -Mid-term exam -Final exam
3.0	**Values, autonomy, and responsibility**			
3.1	To demonstrate independently and with multi-disciplinary teams.	V1	- Case studies - Group work	-Quizzes -Assignments -Mid-term exam -Final exam
3.2	To cooperate in providing scientific and technical services in microbiology	V3	- Case studies - Group work	-Quizzes -Assignments -Mid-term exam -Final exam
3.3	To demonstrate responsibility and accountability	V3	- Case studies - Group work	-Quizzes -Assignments -Mid-term exam -Final exam

C. Course Content:

No	List of Topics	Contact Hours
1.	Introduction to food Quality Assurance - Concept of food quality, Food quality control vs food quality assurance - The reasons that made the countries of the world tend to implement food quality control programs. - Government Regulations (The reasons that led the governments to issue food laws and legislation) - The principles and practices required for the development, maintenance and monitoring of systems for food quality and food safety. Types of food Quality properties:	**3**

	- Quantitative Quality attributes - Sensory Quality attributes Hidden Quality attributes	
2	❖ Food quality control systems: I- national Organization for Standards (ISO) II- H A C C P (Hazard Analysis of Critical Control Points ❖ International Organization for Standards (ISO): - Concept of food standard. - Implementation systems of national standards and quality mark (FAD, WHO, Codex, FAD , ESO, SASO). - Inclusions (contents) of the standard. - Objectives of food Standard - Considerations that must be taken into account when preparing standard specifications Examples of important standards developed by food standard authorities: - Standard specifications for existing and used food products. - Standard specification for food factories and their employees. - Standard specification for requirements in the packaging of food products. - Standard specification for food products expiration dates. - Standard specification for standard tests used to evaluate food products. - Standard specification for food products storage requirements. - The standard specification for the requirements of transporting food products. - Standard specification for methods of sampling food products. - Standard specification for requirements for surfaces in contact with food products. Standard Operating Procedures: - Preparing scope, quality policy and quality objectives of food processing company, - Defining Standard operating procedure – purpose- Format - developing and implementing, effective writing. SOP for purchasing raw materials, receiving raw materials, storage, cleaning, holding, cooling, freezing, thawing, reheating, personal hygiene, facility and equipments. - Systems in laboratory accreditation	**9**
3.	Hazard Analysis of Critical Control Points (HACCP): - HACCP concept. - Aims and Benefits of HACCP - Guidelines for application of HACCP principles (Introduction, Prerequisite Programs, Education and Training, Developing a HACCP Plan, *Assemble the HACCP team*, *Describe the food and its distribution*, *Describe*	**3**

	the intended use and consumers of the food, Develop a flow diagram which describes the process, Verify the flow diagram, Conduct a hazard analysis (Principle 1), Determine critical control points (CCPs) (Principle 2), Establish critical limits (Principle 3), Establish monitoring procedures (Principle 4), Establish corrective actions (Principle 5), Establish verification procedures (Principle 6), Establish record-keeping and documentation procedures (Principle 7) - Reasons for applying the HACCP system. - Foundations of the HACCP system. - Advantages of HACCP. Implementation and Maintenance of the HACCP Plan	
4.	Pre-request programs for HACCP: - Good Manufacturing practice (GMP) - Good Hygienic Practice (GHP) - Total Quality Management - Pest Control - Personal hygiene - Storage, - Training - Transportation, - Product Recall - Traceability, - Health and hygien for buildings and periodic maintenance of devices and equipment.Recording consumer complaints Follow the instructions of the Codex Authority regarding the health affairs of food for international exchange.	**6**
5.	Food Quality Management Systems (FQMS) - Principles and practices of FQMS in food processing - Total quality management - Good Manufacturing Practices (GMPs) and HACCP concept - Quality Management (QM) systems in food industries and food supply chain systems Management responsibilities, vision – mission quality policy, Management tools, quality function deployment, house of quality. - Continuous improvement in Food Processing Industries - Management of testing equipment	**3**
6.	Food Lot and food evaluation systems: - Concept of food lot, Food batch. - Considerations for food sampling. - Systems for evaluation of food lot: - Two level system (Accepted x Rejected) - Three level system (Accepted x Rejected , marginal)	**3**
7.	Good Manufacturing practices GMP in food production: Consequences of GMP Non-compliance	**3**

	Top 10 observations as per US FDA Inspection (Procedure not in writing ,fully followed, Scientifically sound Laboratory Control, Investigations of discrepancies, failures, Absence of written procedures, Written procedures not established/ followed, Procedure for sterile drug products, Testing and release for distribution, Cleaning/ sanitising/ maintenance, Calibration/Inspection/ checking not done, Lack of written stability programme)	
8.	Food inspection and food sampling: - Individuals responsible for food inspection - Actions taken when detecting suspected food product - Individuals responsible for sampling - Procedures and actions taken while food sampling Food fraud and food adulteration -The difference between fraud and fraud -Controls for removing fraud from the food commodity that has been seized	**3**
9.	Quality Mark Certificate: - ISO 22000 - ISO 9000 - Certificate of Conformity - Implementation systems of national standards and quality mark - Quality Mark - The benefits of quality labels - Basic principles of quality marks - System and steps for granting a quality mark license - Certificate of Conformity - European mark of conformity (CE-Mark)	**3**
10.	Food safety: -Who is responsible for food safety -The role of governments in food safety -The role of food industries in food safety -The role of distributers and retailers in food safety -The role of consumer in food safety	**3**
11.	Traceability in Food Supply Chain Systems: - Developing traceability systems across the food supply chain: an overview - Traceability for food safety and quality control - Technology for traceability (bar code, RFID, DNA profiling, remote sensing etc.)	**3**
12.	Overview of food regulations and food agencies in Saudi Arabia. - Saudi Food and Drug Administration SFDA - Sanitary and Phytosanitary agreement SPS - General agreement on Tariffs and Trade TBT	**3**
Total		**45**

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