# Faculty of Applied Science and Health

# Department of Food Science and Microbiology

## Program overview (objectives & learning outcomes):

The Bachelor's degree program of the Food Science and Microbiology department is designed to produce graduates who will be in a high demand by the food and beverage industries due to the humanity reliance on a supply of safe food. The graduates will be equipped by courses covering food composition, food analysis, microbiology quality assurance provided by this program. Food Science and Microbiology is a multidisciplinary program involving the application of biology and chemistry to the study of food. Upon studying a comprehensive curriculum, the student will be able to understand how the raw materials become food and how the food science can affect the human health. Graduates will enter the food sector, where the concerned companies will exploit the food science and microbiology science to meet the demand of the markets in a safe way. Thus, the program aims to understand the equipment and processes used in processing, packaging, and distribution of food. Also, to learn how the various preservation techniques affect the quality and safety of food products. It also shows the role of food packaging in the preservation of food products.

In another words, the intended learning outcomes (ILOs) of the program could be summarized as:

1. The graduate student will be able to apply microbiological concepts and basic research findings through description, interpretation, and analysis,

2. Students will be able to utilize microbiological concepts to summarize, analyze, and synthesize scientific and microbiology-related literature
3. Students will be able to understand how to manufacture, package, preserve food products.
4. Students will be able to demonstrate: concerning microbial, chemical and biological safety of food, principles of sanitation for the food processing, food service and retail foods industries.
5. Students will be able to develop nutrition assessment skills and formulate of nutrition care plans for simulated patients including those requiring internal and parenteral nutrition.

6. Students will be able to gain an understanding of the factors contributing to sensory perception of foods.
7. Students will be able to use sensory methodology and statistical tools for evaluation of all sensory aspects of food.
8. Students will be able to implement, apply statistical analysis and interpretation of sensory data.

## Requirements

The student has to pass at least (132) credit hours to get B.Sc. Degree in Food Science and Microbiology as follows:

| Description | | Credit Hours |
|---|---|---|
| **University Requirements** | | **17** |
| **Faculty Requirements** | | **21** |
| **Department Requirements** | *Obligatory* | *78* |
| | *Elective* | *13* |
| | **Total** | **91** |
| **Free Electives** | | **6** |
| **Total** | | **135** |

## 1. University Requirements

Students must pass 17 credit hours as follows:

| Course # | Course Name | Contact Hours | | Cr. Hrs | Prerequisite/s |
|---|---|---|---|---|---|
| | | Theoretical | Lab | | |
| UR00101 | مهارات اللغة العربية | 3 | - | 3 | - |
| UR00111 | مهارات اللغة الانجليزية (1) | 3 | - | 3 | - |
| UR00112 | مهارات اللغة الانجليزية (2) | 3 | - | 3 | UR00111 |
| UR00121 | فكر وحضارة | 3 | - | 3 | - |
| UR00122 | تاريخ فلسطين | 3 | - | 3 | - |
| UR00131 | مهارات الحاسوب | 1 | - | 1 | - |
| UR00141 | مهارات القيادة والاتصال | 1 | - | 1 | |
| **Total** | | | | **17** | |

## 2. Faculty Requirements – 24 credit hours:

Students must pass 24 credit hours as follows:

| Course # | Course Name | Contact Hours | | Cr. Hrs | Prerequisite/s |
|---|---|---|---|---|---|
| | | Theoretical | Lab | | |

| | | | | | |
|---|---|---|---|---|---|
| NHFR113 | General Chemistry | 3 | 3 | 4 | - |
| NHFR111 | General Biology | 3 | 3 | 4 | - |
| NHFR115 | General Physics | 3 | 3 | 4 | - |
| NHFR121 | Organic Chemistry | 3 | 3 | 4 | NHFR113 |
| NHFR328 | Biostatistics | 3 | - | 3 | - |
| NHFR218 | Epidemiology and Public Health | 2 | - | 2 | - |
| **Total** | | | | **21** | |

## 3. Departmental Requirements

Students must pass (91) credit hours as follows:

**A) Obligatory Requirements:** Student must pass (78) credit hours as follows:

| Course # | Course Name | Contact Hours | | Cr. Hrs | Prerequisite/s |
|---|---|---|---|---|---|
| | | Theoretical | Lab | | |
| NHFM117 | Food Science and Nutrition | 3 | - | 3 | - |
| NHFM123 | Microbiology | 3 | 3 | 4 | NHFR111 |
| NHFM125 | Human Physiology | 3 | - | 3 | NHFR111 |
| NHFM127 | Cell Biology | 2 | - | 2 | NHFR111 |
| NHFM129 | Molecular Biology and Genetics | 3 | - | 3 | NHFR111 |
| NHFM212 | Biochemistry | 4 | - | 4 | NHFR121 |
| NHFM214 | Food Microbiology | 3 | 3 | 4 | NHFM123 |
| NHFM216 | Food Science | 3 | - | 3 | NHFM123, NHFM117 |
| NHFM219 | Practical Biomedical Bacteriology | - | 3 | 1 | NHFM123 |
| NHFM222 | General Pathology | 3 | - | 3 | NHFM125 |
| NHFM224 | Food Analysis and Quality Control | 2 | 3 | 3 | NHFM216 |
| NHFM311 | Human Nutrition | 3 | - | 3 | - |
| NHFM312 | Food Chemistry | 3 | - | 3 | NHFM216 |
| NHFM313 | Food Technology and Safety | 3 | - | 3 | NHFM216 |
| NHFM314 | Human Microbial Diseases | 3 | - | 3 | NHFM228 |
| NHFM322 | Industrial Microbiology | 2 | 3 | 3 | NHFM123 |
| NHFM324 | Food Quality Assurance and Food Security | 3 | - | 3 | |
| NHFM326 | Biomedical Microbial Products | 2 | 3 | 3 | NHFM123 |
| NHFM327 | Microbial Communities and Interactions | 2 | 3 | 3 | NHFM123 |
| NHFM315 | Research Methodology | 3 | - | 3 | - |
| NHFM412 | Research Project | - | 9 | 3 | NHFM315 NHFM328 |
| NHFM414 | Food Preservation | 3 | - | 3 | NHFM216 |
| NHFM416 | Food Toxicology | 3 | - | 3 | NHFM216 |

| | | | | | |
|---|---|---|---|---|---|
| NHFM418 | Medical Nutrition Therapy Applications | 3 | - | 3 | NHFM311 |
| NHFM429 | Field Training | - | 18 | 6 | |

**B) Elective Courses:** Student must pass (13) credit hours from the following courses:

| Course # | Course Name | Contact Hours | | Cr. Hrs | Prerequisite/s |
|---|---|---|---|---|---|
| | | Theoretical | Lab | | |
| NHFM217 | Introduction to Immunology | 2 | 3 | 3 | NHFM123 |
| NHFM226 | Pharmacology & Toxicology | 3 | - | 3 | NHFM125 |
| NHFM228 | Cellular Microbiology and Virology | 3 | - | 3 | NHFM123 |
| NHFM325 | Animal Infectious Diseases | 3 | - | 3 | NHFM228, NHFM217 |
| NHFM417 | Applied Nutrition | 3 | - | 3 | NHFM117 |
| NHFM413 | Mechanistic and Regulatory Toxicology | 3 | - | 3 | |
| NHFM415 | Seminar | 1 | - | 1 | |
| NHFM418 | Special Topics | 1 | - | 1 | |
| NHFM223 | Food Safety and Sanitation | 2 | - | 2 | NHFM123 |
| NHFM321 | Chemistry and Technology of Milk and Dairy Products | 2 | - | 2 | NHFM117 |
| NHFM419 | New Food Product Ideas | 2 | - | 2 | 4th year level |
| NHFM420 | Sensory Evaluation of Foods | 2 | - | 2 | NHFM117 |
| NHFM325 | Food Processing | 2 | - | 2 | NHFM117, NHFM113, NHFM123 |

## 4. Free Electives

Students must pass (6) credit hours of courses offered by the university.

# Faculty of Applied Science and Health
# Food Science and Microbiology

# Advisory Plan

## *1st Year*

| 1st semester | | | 2nd semester | | |
|---|---|---|---|---|---|
| **Course #** | **Course Name** | **Cr. Hrs** | **Course #** | **Course Name** | **Cr. Hrs** |
| NHFR111 | General Biology | 4 | NHFR121 | Organic Chemistry | 4 |
| UR00111 | مهارات اللغة الانجليزية 1 (UR) | 3 | NHFM123 | Microbiology | 4 |
| NHFR113 | General Chemistry | 4 | NHFM125 | Human Physiology | 3 |
| NHFR115 | General Physics | 3 | NHFM127 | Cell Biology | 2 |
| NHFM117 | Food Science and Nutrition | 3 | NHFM129 | Molecular Biology and Genetics | 3 |
| | | | UR00131 | مهارات الحاسوب (UR) | 1 |
| | | | UR00141 | مهارات القيادة والاتصال (UR) | 1 |
| | **Total** | **17** | | **Total** | **18** |

## *2nd Year*

| 1st semester | | | 2nd semester | | |
|---|---|---|---|---|---|
| **Course #** | **Course Name** | **Cr. Hrs** | **Course #** | **Course Name** | **Cr. Hrs** |
| NHFM212 | Biochemistry | 4 | NHFM222 | General Pathology | 3 |
| NHFM214 | Food Microbiology | 4 | NHFM224 | Food Analysis and Quality Control | 3 |
| NHFM216 | Food Science | 3 | UR00101 | مهارات اللغة العربية | 3 |
| NHFM217 | Introduction to Immunology (D. E) | 3 | NHFM226 | Pharmacology and Toxicology (D. E) | 3 |
| NHFR218 | Epidemiology and Public Health | 2 | NHFM228 | Cellular Microbiology and Virology (D. E) | 3 |
| NHFM219 | Practical Biomedical Bacteriology | 1 | | Free Elective | 3 |
| UR00112 | مهارات اللغة الانجليزية 1 (UR) | 3 | | | |
| | **Total** | **19** | | **Total** | **18** |

## *3rd Year*

| 1st semester | | | 2nd semester | | |
|---|---|---|---|---|---|
| **Course #** | **Course Name** | **Cr. Hrs** | **Course #** | **Course Name** | **Cr. Hrs** |
| NHFM311 | Human Nutrition | 3 | NHFM324 | Food Quality Assurance and Food Security | 3 |
| NHFM312 | Food Chemistry | 3 | NHFM322 | Industrial | 3 |

| | | | | | |
|---|---|---|---|---|---|
| | | | | Microbiology | |
| NHFM313 | Food Technology and Safety | 3 | NHFM326 | Biomedical Microbial Products | 3 |
| NHFM314 | Human Microbial Diseases | 3 | NHFM327 | Microbial Communities and Interactions (D. E) | 3 |
| UR00121 | فكر وحضارة (UR) | 3 | NHFM328 | Biostatistics | 3 |
| NHFM315 | Research Methodology | 3 | UR00122 | تاريخ فلسطين (UR) | 3 |
| | **Total** | **18** | | **Total** | **18** |

### *4th Year*

| **1st semester** | | | **2nd semester** | | |
|---|---|---|---|---|---|
| **Course #** | **Course Name** | **Cr. Hrs** | **Course #** | **Course Name** | **Cr. Hrs** |
| NHFM412 | Research Project | 3 | NHFM429 | Field Training | 6 |
| NHFM413 | Mechanistic and Regulatory Toxicology | 3 | | | |
| NHFM414 | Food Preservation | 3 | | | |
| NHFM415 | Seminar (D. E) | 1 | | | |
| NHFM416 | Food Toxicology | 3 | | | |
| NHFM418 | Medical Nutrition Therapy Applications | 3 | | | |
| | Free Elective | 3 | | | |
| | **Total** | **19** | | **Total** | **6** |

## COURSES DESCRIPTION OFFERED BY THE DEPARTMENT OF "FOOD SCIENCE AND MICROBIOLOGY"

**NHFR111 General Biology (4 Cr hrs, 3 theory and 1 Lab.)**
**Prerequisites: ------**
It covers basic knowledge in diverse biological topics, membrane structure and function, cell structure, function, division, Introduction to metabolism Cellular respiration, macromolecules structure and function, basics of genetics including meiosis and sexual life cycles, Mendelian genetics, photosynthesis, and chromosomal and molecular basis of inheritance. The practical part will cover practical study of microscope, cell structure and function, enzymes, membrane and their transport mechanisms, chemical composition of the cells, respiration, fermentation, cell division, photosynthesis, principles in genetics and animal and plant tissues.

**NHFR113 General Chemistry (4 Cr hrs, 3 theory and 1 Lab.)**
**Prerequisites: ------**

It covers nomenclature, kinetic-molecular theory, stoichiometry, gas laws, electronic structure, and chemical bonding. Periodicity, as well as Stoichiometry. Practical part will cover Laboratory safety and basic laboratory techniques, limiting reactant, empirical formula of a compound, molecular weight of a volatile liquid, acid base titration; oxidation reduction titration, percentage composition, water of hydration gas properties, and energy changes.

**NHFR115 General Physics (4 Cr hrs, 3 theory and 1 Lab.)**
**Prerequisites: ---------**
Topics include vectors, Newton's laws of motion, motion in one and two dimensions, work and energy, conservation of energy, center of mass, conservation of linear momentum, dynamics of system of particles, collisions, impulse, rotational kinematics, rotational dynamics, simple harmonic motion and conservation of angular momentum. The practical part demonstrate the concepts that are covered in the theoretical part.

**NHFM117 Food Science and Nutrition (3 Cr. hrs)**
**Prerequisite: -------**
This course covers the main food components (water, carbohydrates, fats, and protein) in terms of their role and nature in food. It also covers the nutritional principles of protein, carbohydrates, and fat and how dietary macronutrient requirement values are utilized. Such aspects emphasize the areas of nutrition and food science that follow later on in the program.

**NHFM123 Microbiology (4 Cr. hrs, 3 theory and 1 lab)**
**Prerequisite: NHFM111**
The aim of this course is to introduce students to microorganisms, to the main cellular activities they perform and to how it affect humans and the environment. The students study the microorganisms that cause disease as well as those who have characteristics we apply for the benefit of people. The laboratory will help students learn and practice many basic microbiological techniques, which are important for the cultivation and study of microorganisms. This course provides students with important skills and a wide knowledge of microbiology; a fundamental discipline required for medically-related fields.

**NHFM125 Human Physiology (3 Cr. hrs)**
**Prerequisite: NHFM111**
To learn physiological concepts and to develop skills required in physiological experimentation when using animal tissues, aligned with Biosciences programmes. It develops an integrated view of homeostasis as well as the functions of different organs and more complex systems in the body.

**NHFM127 Cell Biology (2 Cr. hrs)**
**Prerequisite: NHFM111**
This course introduces students to the organelles and other structures within a cell and their functions, and the mechanisms by which cells divide and die. The course considers how cell structure and function can be manipulated to specialize cells for certain purposes, and begins to consider how different types of cells are able to communicate with one another and their environment in order to form tissues and organs.

**NHFM129 Molecular Biology and Genetics (3 Cr. hrs)**
**Prerequisite: NHFM111**
The purpose of this course is to give an introduction to the important concepts of molecular biology and genetics that are essential to the biosciences students. Lectures will focus on the central dogma of molecular biology, moving on to mutation and its consequences in human disease. Students will be introduced to basic methods in molecular biology including PCR, gene cloning, and mutation analysis. It will also covers the difference in genome structure and provide an introduction into genomics. It will focus on the control of gene expression in bacteria and eukaryotes.

**NHFR212 Biochemistry (4 Cr. hrs)**
**Prerequisite: NHFM121**
It covers a detailed analysis of the properties, structures, and functions of proteins, carbohydrates, and lipids; theory for the purification and analysis of proteins introduction to carbohydrate metabolism. It also covers a detailed analysis of the reactions involved in intermediary metabolism, transcription, translation, and replication.

**NHFM214 Food Microbiology (4 Cr. hrs, 3 theory, 1 lab)**
**Prerequisite*:* NHFM123**
To study of the physiology, nature, and interactions of microorganisms in food. Introduction to foodborne diseases, effects of food processing on the microorganisms of foods, principles of food spoilage, food preservation, and foods produced by microorganisms. Also, to utilize laboratory techniques to diagnose, quantify, and identify microorganisms in foods.

**NHFM216 Food Science (3 Cr. hrs)**

**Prerequisite*:* NHFM123, NHFM117**
The aim of this course is to make the students understand key aspects of food science including browning reactions, the use of additives, the perception of food, and food spoilage and preservation. It is a key component of the dietetics and nutrition programs, as it joins these to the study of chemistry and food.

**NHFM217 Introduction to Immunology (3 Cr. hrs)**
**Prerequisite*:* NHFM123**
The purpose of this course is to provide learning of the key principles of human immunology, including the immune response to infection and foreign antigens. Such an understanding is important in many other parts of the program, including the pathogenicity of infectious disease, oncology and pharmacology.

**NHFR218 Epidemiology and Public Health (2 Cr. hrs)**
**Prerequisite*:* ---**
It covers the basics of epidemiology and the basic health indicators, the principles of health education and promotion and the types of diseases. The course also includes types of health care professions, the main principles of health care systems, and the main principles of health care management.

**NHFM222 General Pathology (3 Cr. hrs)**
**Prerequisite: NHFM125**
The purpose of this course is to provide an understanding of the pathological basis of disease from a perspective of abnormal metabolic states. The course aims to build a knowledge and understanding of disease, which can then be utilized to improve the nutritional and pharmacological management of hospitalized patients. As such, it has specific utility for nutritional scientists, dietitians working in a clinical environment.

**NHFM224 Food Analysis and Quality Control (3 Cr. hrs, 2 theory and 1 lab)**
**Prerequisite: NHFM216**
This course provides theoretical and practical knowledge and skills required to perform food analysis and quality control in order to improve the safety and quality of food products.

**NHFM219 Practical Biomedical Bacteriology (1 Cr.hr Lab)**
**Prerequisite*:* NHFM123**

This is a practical course, it aims to equip students with the key technical skills used in bacteriology and to make them familiar with key diagnostic tests. It also introduces students to many medically and environmentally important bacteria.

**NHFM226 Pharmacology and Toxicology (3 Cr. hrs)**
**Prerequisite: NHFM125**
This course aims to cover the study of the principles of the pharmacokinetics and pharmacodynamics of the biological mechanisms, actions, uses, side effects, toxicity, interactions and adverse reaction of drugs acting on cardiovascular and central nervous systems. It also deals with the analysis of heavy metals, drugs, and other chemical agents in tissues and body fluids for the purpose of the patient care.

**NHFM228 Cellular Microbiology and Virology (3 Cr. hrs)**
**Prerequisite: NHFM123**
This course is designed to introduce the concepts of virology, bacteriology, and protozoology with a particular emphasis on microbial pathogens. The course is organized phylogenetically with each lecture or group of lectures studying a particular group of microbes.

**NHFM311 Human Nutrition (3 Cr. hrs)**
**Prerequisite: ----**
This course aims to provide an understanding of nutritional principles in relation to the micronutrient and macronutrient components of the diet. Also, to understand the biochemical characteristics of nutrients in the human diet; requirements, function, absorption, transport and metabolism.

**NHFM312 Food Chemistry (3 Cr. hrs)**
**Prerequisite: NHFM216**
This course covers a variety of important components in foods that comes up from the biochemical and chemical transformations which occur during the processing, storage and preparation of foods. It helps to understand the complex reactions that occur in foods. This will be done through reviewing the published research that has occurred in the field. It focuses on understanding how the compounds are formed, the levels present and their role in food safety and acceptability.

**NHFM313 Food Technology and Safety (3 Cr. hrs)**
**Prerequisite: NHFM216**

This course covers a variety of important aspects related to Food Technology and Safety. It covers aspects related to Food Safety in particular in relation to food-borne disease. It focusses on the processes used in food production and preservation (Food Technology). It also, covers the role of freezing and refrigeration in food preservation as well as food packaging, including the safety considerations.

**NHFM314 Human Microbial Diseases (3 Cr. hrs)**
**Prerequisite: NHFM228**
The course will discuss the mechanism by which human pathogens interact with their host to cause a disease. It describes the pathogenesis of a range of viral, bacterial, and protozoal diseases including diseases caused by enteric bacteria, neisseria, legionella, staphylococci, mycobacteria, streptococci, protozoa and major human viruses.

**NHFM315 Research Methodology (3 Cr. hrs)**
**Prerequisite*:* -----**
This course aims to teach the student how to solve biomedical research problems by applying scientific research methods., Students will explore research design principles; design research project; write research proposals; conduct the research; analyze the data, write a report and present the results. This course is designed to be carried out in two semesters and students are urged to register it during their final year.

**NHFM324 Food Quality Assurance and Food Security (3 Cr. hrs)**
**Prerequisite: 3rd year level**
This course aims to provide a detailed theoretical understanding of Food Quality Assurance as well as Water and Food Security in order to improve the provision of safe food that have high nutritional and organoleptic quality.

**NHFM325 Animal Infectious Diseases (3 Cr. hrs)**
**Prerequisite: NHFM228**, **NHFM217**
This course aims to provide students with a greater understanding of the scientific basis behind approaches to control animal infectious diseases that affect human health and safety. This includes detailed knowledge of the pathogen, its transmission routes, the host response to infection, and its impact on other animals and/or the human population.

**NHFM326 Biomedical Microbial Products (3 Cr. hrs, 2 theory and 1 lab)**

**Prerequisite: NHFM123**
This course provides a description of the application of the principles of the microbial and biochemical sciences to the discovery, production and manufacture of commercially important products for the food and chemical and pharmaceutical industries, with examples and case studies.

**NHFM327 Microbial Communities and Interactions (3 Cr. hrs)**
**Prerequisite: NHFM123**
It aims to give an understanding how the microbes species exist together in rich and diverse ecosystem. Together with their ability to communicate via chemical signaling, the world of microbes shows an interesting complexities in regard to health and disease, and biotechnology.

**NHFR328 Biostatistics (3 Cr. hrs)**
**Prerequisite: ---**
Introduction to linear models; correlation multiple regression,; residual analysis; analysis of covariance; dummy variables; one-, two-way analysis of variance; randomized blocks; random and fixed effects (repeated measure, factorial designs); multiple comparisons . Real biomedical data sets will be analyzed.

**NHFM417 Applied Nutrition (3 Cr. hrs)**
**Prerequisite: NHFM117**
This course takes a life course approach to discuss the effect of nutrition in the prevention and etiology of key disorders, for example: heart disease and cancer and the nutritional requirements of key population groups, for example children, older adults and pregnant women.

**NHFM412 Research Project (3 Cr. hrs)**
**Prerequisite: 4$^{th}$ year level, NHFM315, NHFM328**
The final year research project is designed to utilize all the practical, analytical, literature and presentation skills developed during the typical undergraduate degree program. The project will run over two semesters. The student and supervisor(s) will discuss how the work is to be divided into background research, laboratory work, data analysis as well as report writing. Students will be expected to follow good laboratory practice and adhere to local safety rules at all times.

**NHFM413 Mechanistic and Regulatory Toxicology (3 Cr. hrs)**
**Prerequisite: 4$^{th}$ year level**
It aims to cover a series of procedures, both experimental and regulatory, designed to decrease the risk of harm to humans from exposure to any of chemicals that we use every day. In this course, students will be

introduced about the basic mechanisms of how chemicals may harm the living organisms, and the testing procedures in place to detect such adverse effects. It will explore how safety data is extrapolated from animal models to humans, and the important role on in vitro testing in replacing animal testing.

**NHFM414 Food Preservation (3 Cr. hrs)**
**Prerequisite*:* NHFM216**
This course aims to understand the equipment and processes used in processing, packaging, and distribution of food. Also, to learn how the various preservation techniques affect the quality and safety of food products. It also shows the role of food packaging in the preservation of food products.

**NHFM415 Seminar (1 Cr. hr)**
**Prerequisite: 4$^{th}$ year level**
This course aims to teach students how to review current diagnostic as well as biomedical research topics in the literature, acquire an understanding of a new field, in the absence of a textbook discussion, give a presentation using visual aids and clear English language in limited time and discuss and communicate with the audience questions.

**NHFM416 Food Toxicology (3 Cr. hrs)**
**Prerequisite: NHFM216**
This course will cover topics such as the characteristics, formation, and control of various toxins (natural and synthetic) that occur in the storage, production, handling, and preparation of food. Basic concepts will be covered including dose-response relationships, absorption of toxicants, storage and distribution of toxicants, biotransformation and elimination of toxicants, target organ toxicity, mutagenesis, carcinogenesis, food allergy, and risk assessment.

**NHFM429 Field Training (6 Cr. hrs)**
**Prerequisite: 4$^{th}$ year level (Final semester)**
In field training course the students get whole semester training. Each credit hour of field training course is equivalent to 100 contact hours.
The students will be full time trainees in recognized food companies and centers. They are expected to understand how to manufacture, package, preserve food products. At the end of this course, students should write a report about all methods and techniques learnt during the course.

**NHFM418 Special Topics (1 Cr. hr)**

This course will discuss an important subjects that have a strong effect at food quality, preservation, packaging, and distribution. The subjects will be chosen by the lecturer.

**NHFM418 Medical Nutrition Therapy Applications (3 Cr. hrs)**
**Prerequisite: NHFM311**
This course focuses on development of nutrition assessment skills and formulation of nutrition care plans for simulated patients including those requiring internal and parenteral nutrition as well as common chronic diseases and disorders.

**NHFM322 Industrial Microbiology (3 Cr. hrs, 2 theory and 1 lab)**
**Prerequisite: NHFM123**
The course will present microbiological and technological principles of the industrial application of microorganisms followed by specific examples. Lectures will cover the basics of metabolic pathways and how these can be manipulated through selection or genetic engineering to increase productivity. The main focus of the course will be in the production of biomass, alcoholic beverages, solvents, amino acids and organic acids of direct relevance to the food industry. The laboratory component of the course will include different metabolite production, beer brewing and dairy fermentations. Field trips to a commercial industries will also aid the learning experience.

**NHFM223 Food Safety and Sanitation (2 Cr. hrs)**
**Prerequisite: NHFM123**
Lectures, discussions, and demonstrations concerning microbial, chemical and biological safety of food, principles of sanitation for the food processing, food service and retail foods industries.

**NHFM321 Chemistry and Technology of Milk and Dairy Products (2 Cr. hrs)**
**Prerequisite: NHFM117**
The course provides a biochemical foundation to understand the composition of milk, including the chemistry, structure and function of its individual components. Various dairy products will be discussed from the perspective of changes in milk, and its constituents, upon processing.

**NHFM419 New Food Product Ideas (2 Cr. hrs)**
**Prerequisite: 4th year level**
The course is intended to familiarize students with the initial stages of food product development including the definition and articulation of a problem, the generation of ideas to solve the problem, the screening of ideas, and the formal presentation of a new product concept. Students will learn the importance of group communication and teamwork and how to conduct and terminate a project in an orderly manner.

**NHFM420 Sensory Evaluation of Foods (2 Cr. hrs)**
**Prerequisite: NHFM117**
This course is an introduction to sensory science. Students will gain an understanding of the factors contributing to sensory perception of foods. Sensory methodology and statistical tools for evaluation of all sensory aspects of food will be provided and all students will gain hands-on experience with implementation, statistical analysis and interpretation of sensory data. Consumer sensory testing methods will also be discussed.

**NHFM325 Food Processing (2 Cr. hrs)**
**Prerequisite: NHFM117, NHFM113, NHFM123**
Food processes and the relationships between chemistry, microbiology, and engineering as they apply to food processing are discussed. The following topics are included: high and low temperature processes; moisture control and intermediate moisture foods; concentration and dehydration processes; and novel food processing techniques.

**Lab & Equipment**:
An 8*8 meter square room has been designed by specialist to be used as lab for microbiology. The design includes the furniture as the required equipment's.

## Acceptance Policy

1. Before the beginning of each academic year, the University Council shall determine the number of new students who can be in each college and program.
2. The University shall abide by the admission criteria approved by the Higher Education Council of the Ministry.
3. The students applying for the university shall be admitted competitively according to the average of the student in the

Tawjihi and high school and other criteria determined by the admissions committee and others in the university. The average score (rate) of the student in the secondary school shall be not less than the minimum approved by the Higher Education Council. The applicant will be enrolled in accordance with the instructions of the Higher Education Council. The average score (minimum) for each program subtracted from the university is determined based on the number of applicants applying for that program, and therefore the competitive rate changes each year, which is not fixed.

4. Students with Bagrut certificate and IB, SAT, CAT and GC certificates are accepted after being awarded by the Ministry of Higher Education, and their marks are transferred internally from the Admissions Department to the equivalent of the Palestinian High School marks and then applied to the standards.
5. Prescription: The student must not have passed the high school certificate more than ..... years for all colleges.
6. Application dates are determined each year.
7. Instructions are subject to modification annually by the competent authorities at the University.

**Faculty members and other staff:**

The Council of Administration has hundreds of curricula vitae for faculty members in many disciplines and is currently being sorted. Suitable persons, who fit job titles, will be called for transparent interviews and then appointment.

**Library, Books & Databases:**

Al Zaytona University of Science and Technology (ZUST) will have a digital library with many electronic databases. We start contacting some of them such as:

- The IEEE base, specialized in engineering and electronics, has an annual subscription of about $ 28,000.

- EBSCO, which specializes in several areas with an annual subscription of $ 9,000.
- EMERALD, which specializes in management, business and business, has three levels: small, medium and large, with an annual subscription of $ 12,000. Of course, other levels are less expensive.
- Some databases do not require fees, such as: (IMF) (International Monitoring Fund) belongs to the World Bank, Royal Society that specializes in physics and related disciplines around, Bioone that specializes in biology, and Oxford Dictionary.

Moreover, hundreds of library books and text books were bought from Cairo Book Exhibitions 2018 and 2019. The focus was on books related to the expected academic programs at ZUST. The following are samples from Cairo Book Exhibition 2018 only:

| | | | |
|---|---|---|---|
| 9 | 1 | S. C. Patil, R. Naidu | Laboratory Methods in Microbiology |
| 9 | 1 | Abhilash Jain | Advanced Microbiology |
| 3 | 1 | P. SHRIVASTAVA | FOOD AND MICROORGANISMS |
| 20 | 1 | Jenness | Principles Of Dairy Chemistry (Pb) |
| 20 | 1 | PANDA | Handbook of Microbiology & Parasitology |
| 3 | 1 | Sharma, Dipiti | Textbook on Food Science and Human Nutrition |
| 3 | 1 | Sharma A. | Textbook of Food Science and Technology, 3e India |
| 3 | 1 | Gillian Evans | Essentials of Food Micro Biology |
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