**Faculty of Nursing Pharmacy and Health**

**Food Microbiology NUTD343**

**Course Outline 2020/2021**

**Course Description**

The aims of the course are to review the different types of microorganism encountered in food and their role in causing food related diseases. In addition to study food preservation, food spoilage, food poisoning and quality assurance programs. In addition to study the role of microorganisms and their fermentative products on foods such as dairy, pickles, cheeses and others The Laboratory experiments include proper sample collection, processing and identification of the microorganisms that may be present and their significance. Samples that will be tested include water, fruits, vegetables, dairy, juices and meats and others.

1. **Intended Learning Outcomes**
2. Students will be able to understand the fundamental concepts of food microbiology.
3. To be able to recognize organisms most commonly found in different foods.
4. To gain understanding of food spoilage and causative organisms.
5. Students will become familiar with procedures and techniques used to detect and enumerate microorganisms in foods.
6. Students are expected to understand the effect of different factors on the growth of microorganisms in foods.
7. Knowledge of food-borne pathogens
8. Knowledge of organisms involved in food industry
9. Knowledge of preservation and preservatives
10. Critical thinking, problem solving, writing reports and making presentations

**Instructor:** Dr. Mohammad Farraj, Office number: NHP308

**Office hours:** Monday-Thursday through ritaj or before and after each lecture.

**In the Lab:** It is mandatory for all students to follow the safety implemented to protect from contracting or spreading the Corona virus and the laboratory safety rules and wear a clean laboratory coat and gloves during the lab.

**Grading:** The final grade will be calculated according to the following criteria

First hour exam: 15%

Midterm Exam: 15%

Laboratory reports 20%

Cases, articles, Term Paper 20%

Final exam 30%

**Course Outline**

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| **Lecture** | **Title** | **Chapter** |
| **BASIC FOOD MICROBIOLOGY** | | |
| 1 | Review of microbiology and Introduction to food microbiology | 1, 2 |
|  | Microbial Growth Characteristics  Microbial Metabolism | 5 |
| 2 | Detection and enumeration of microbes in food | 4 |
| 3 | Factors that influence Microbes in Food | 6 |
| 4 | Rapid and automated microbial methods | 5 |
| 5 | Indicator microorganisms and microbiological criteria | 6 |
| 6 | Spores and their significance | 3 |
|  | **First hour exam** |  |
| **Foodborne Infections** | | |
| 7 | Enteropathogenic E. coli, , | 9 |
| 8 | Salmonella/Salmonellosis | 7 |
| 9 | Shigella/Shigellosis | 8 |
| 10 | Campylobacter/Campylobacteriosis | 11 |
| 11 | Yersinia/Yersiniosis | 10 |
| 13 | Listeria/Listeriosis |  |
| 14 | Vibrio species | 12 |
| 15 | Enteric Viruses and Prions |  |
| 116 | Brucella/Brucellosis |  |
|  | **Midterm** |  |
| **Foodborne Toxicoinfection** | | |
| 17 | C. perfringens | 13 |
| 18 | Bacillus cereus | 14 |
| 19 | C. botulinum, , | 15 |
| 20 | S. aureus | 16 |
| 21 | Viruses and Prions | 17 |
| **22, 23** | **Parasites** |  |
| **24, 25** | **Molds** |  |
| **MICROBES IMPORTANT in FOOD** | | |
| 26 | Lactic acid bacteria and food fermentations | 18 |
| 27 | Yeast –based and other fermentations | 19 |
| 28 | Spoilage organisms | 20 |
| **CONTROL OF MICROORGANISMS IN FOOD** | | |
| 29 | Antimicrobial preservation.  Meat , Fish, Milk and dairy products, produce and grains | 23 |
| 30 | Biologically based preservation and probiotic bacteria | 24 |
| 31 | Physical methods of food preservation | 25 |
| 32 | Industrial strategies for ensuring safe foods  Sanitation, HACCP | 36 |
|  | **Final Exam** |  |

**Laboratory Outline**

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| **Week** | **Title** |
| 1 | Direct microscopy, Gram stain, spore stain by malachite green, fluorescent stain (acridine orange and calcouflour white).  Selective Media  Enumeration of bacteria and yeast by direct microscopy using a counting chamber. |
| 2 | Coliform and E. coli from water  Most probable number method  Water filtration Experiment (مركز بيرزيت) |
| 3 | Ground beef microflora  Detection of Clostridium perfringens in dairy and general food products  Isolation of organisms from milk and dairy products |
| 4 | Enumeration of yeast and mold from foods |
| 5 | Detection and identification of Salmonella species  Isolation of campylobacter from foods |
| 6 | Enumeration of Staphylococcus aureus from foods  Detection of Bacillus Cereus in dairy and general food products |
| 7 | Isolation of Listeria from refrigerated foods |
| 8 | Identification of microorganisms by ELISA  Identification of organisms directly from food by molecular methods (PCR) |

**Textbooks and References:**

1. Fundamental Food Microbiology, 5th edition, Ray & Bhuna, 2014.

2. Food Microbiology: an introduction, Montiville, Thomas J, 2nd edition, 2008.

3. Recent articles related to the topics will be send by ritaj.