Faculty Science Nutrition and Industries Food

Faculty of Nutrition Science and Food Industries

Course Title: Statistical Quality Control of Food Materials

Audience: Master's students in Food Hygiene and Food Safety

Credits: 2 credits

Schedule: Mondays, 16:00–18:00

Instructor: Dr. Milad Rouhi Langeroudi

Semester: Spring 1402-1401

Prerequisites: None

Office Hours: Mondays at 18:00 for addressing questions.

Course Overview:

The course on Statistical Quality Control of Food Materials focuses on the quality of food in terms of microbiological, chemical, and physical aspects. It explores objectives of quality control, sampling methods and types, sample size determination, sample collection and transfer procedures, and how to manage sample analysis and presentation in official food laboratories.

Session Objectives (Specific to Session One):

1. Introduction to quality control methods and an overview of quality control principles.
2. Definitions and characteristics of population and sample.
3. Sampling techniques for liquids and gases.
4. Sampling techniques for solids.
5. Familiarity with key features in quality control.
6. Familiarity with probability distribution types.
7. Normal distribution.
8. Skewed distributions.
9. Uniform distribution.

10. Binomial distribution.

11. Multinomial distribution.

12. Solving sample size problems in normal distribution.

13. Linear performance characteristics.

14. Familiarity with control charts.

15. Presentation of descriptive articles from the past two years.

16. Discussion of case studies and recent articles.

17. Final examination.

First session

Detailed discussion on definitions, population characteristics, and sampling methods for quality control applications.

General Objectives

- Familiarizing students with the application and sampling in the food industry and specified parameters for teaching throughout the course.

Specific Objectives

1. Increasing students' awareness of the importance of the lesson.

2. Introducing existing resources for teaching and the mentioned unit.

3. Familiarizing students with the application of sampling in the food industry.

At the End of the Course, Students Will:

1. Recognize the mentioned chapter and its contents.

2. Be familiar with the resources presented in each session.

3. Understand the teaching method.

Second Session

Definitions and Characteristics of a Population and Sample

General Objectives

- Familiarizing with the definitions and characteristics of populations.
- Familiarizing with the definitions and characteristics of samples.

Specific Objectives

- Recognizing the differences and applications of populations and samples.

At the End of the Session, Students Will:

- Be familiar with the differences and applications of populations and samples.

Third Session

Sampling of Populations and Gases

General Objectives

- Reviewing sampling methods of populations and gases under various conditions.

Specific Objectives

1. Understanding suitable methods for sampling populations in various conditions.
2. Understanding suitable methods for sampling gases in various conditions.

At the End of the Session, Students Will:

- Be able to select and perform appropriate sampling methods for populations and gases in different conditions.

Fourth Session

Sampling from Solids

General Objectives:

- Reviewing methods of sampling from solids in different conditions.

Specific Objectives:

- Familiarizing with methods of sampling from solids in mines.
- Familiarizing with methods of sampling from solids under pressure.
- Familiarizing with methods of sampling from solids in different conditions.

At the End of the Session, Students Will:

- Be able to select and perform appropriate methods for sampling from solids in various conditions.

Fifth Session

Understanding Qualitative Characteristics in Quality Control

General Objectives:

- Understanding qualitative and quantitative characteristics.

Specific Objectives:

- Familiarizing with qualitative characteristics.
- Familiarizing with quantitative characteristics (closed and open types).

At the End of the Session, Students Will:

Be familiar with qualitative and quantitative characteristics (closed and open).

Sixth Session

Understanding Types of Probability Distributions

General Objectives:

- Becoming familiar with various types of probability distributions and their applications.

Specific Objectives:

- Familiarizing with various types of probability distributions.
- Familiarizing with the applications of probability distributions.

At the End of the Session, Students Will:

- Be able to choose appropriate probability distributions for solving relevant problems.

Seventh Session

Discrete Distributions

General Objectives:

- Understanding the types of discrete distributions.

Specific Objectives:

- Familiarizing with the classification of discrete distributions.

- Familiarizing with the difference between Poisson and Binomial distributions.

- Familiarizing with the applications of Poisson and Binomial distributions.

At the End of the Session, Students Will:

Be familiar with the classification of discrete distributions.

Eighth Session

Approximation of Distributions

General Objectives:

- Understanding conditions and approximations for distributions.

Specific Objectives:

- Familiarizing with the approximation of geometric distributions with Poisson.

- Familiarizing with the approximation of Binomial distributions with Poisson.

- Familiarizing with the approximation of geometric distributions with Normal.

At the End of the Session, Students Will:

- Be familiar with conditions and methods for approximating distributions.

Ninth Session

Continuous Distributions

General Objectives:

- Understanding the types of continuous distributions.

Specific Objectives:

- Familiarity with **t-distribution**.

- Familiarity with **normal distribution**.

At the End of the Session, Students Will:

- Be familiar with the types of continuous distributions.

Tenth Session

Normal Distribution

General Objectives:

- Understanding the calculations of normal distribution.

Specific Objectives:

- Familiarizing with the calculations of normal distribution.
- Familiarizing with Z-distribution.
- Familiarizing with the use of normal distribution in standard results.
- Familiarizing with the normal distribution for specific samples.

At the End of the Session, Students Will:

- Be familiar with the calculations of normal distribution.
- Be familiar with the normal distribution for specific samples.

Eleventh Session

Exam Preparation

(No specific content provided, likely focused on reviewing prior sessions.)

Twelfth Session

Sample Size Calculation in Normal Distribution

General Objectives:

- Understanding sample size calculations in normal distribution.

Specific Objectives:

- Familiarizing with sample size calculations in normal distribution for specific samples.

At the End of the Session, Students Will:

- Be familiar with sample size calculations in normal distribution for specific samples.

Thirteenth Session

Concepts of Regression

General Objectives:

- Understanding some regression concepts.

Specific Objectives:

- Familiarizing with some regression concepts and their applications.

At the End of the Session, Students Will:

- Be familiar with some regression concepts and their applications.

Fourteenth Session

Overview of Research Approaches

General Objectives:

- Understanding different research approaches and standards for selecting samples.

Specific Objectives:

- Familiarizing with different research approaches.
- Familiarizing with various standards for selecting samples.

At the End of the Session, Students Will:

- Be familiar with different research approaches and standards for selecting samples.

Fifteenth Session

Presentation of Descriptive Articles from the Last Two Years

General Objectives:

- Presentation of descriptive articles from the last two years.

Specific Objectives:

- Learning sampling methods in descriptive studies.

- Strengthening students' ability to articulate and participate in class discussions.

At the End of the Session, Students Will:

Be familiar with the latest sampling methods presented in reputable descriptive articles.

Sixteenth Session

Presentation of Descriptive Articles from the Last Two Years

General Objectives:

- Presentation of descriptive articles from the last two years.

Specific Objectives:

- Learning sampling methods in descriptive studies.

- Strengthening students' ability to articulate and participate in class discussions.

At the End of the Session, Students Will:

- Be familiar with the latest sampling methods presented in reputable descriptive articles.

Seventeenth Session

Final Exam

General Objectives:

- Final evaluation of students.

References:

1.   Adams, M.R. and Moss, M.O. Food Microbiology. Chapter 11: Controlling the Microbiological Quality of Foods. New Age International Publishers, New Delhi, India, Latest Edition.

2.   Bonnel, A. Quality Assurance in Food Processing: A Practical Guide. Sampling. Chapman & Hall, New York, Latest Edition.

3.   Gacula, M.C., Singh, J., and Schweigert, B.S. Statistical Methods in Food and Consumer Research. Academic Press Inc. (London) Ltd. UK, Latest Edition.

4.   Goddard, M., Jewell, K., Morton, R.S., Painter, O., Ruegg, J., and Voysey, P.A. Designing and Improving Acceptance Sampling Plans. A Tool Compendium. Chorleywood Food Research Association, Latest Edition.

5.   Hubbard, M.C. Statistical Quality Control for the Food Industry. Chapman & Hall, London, Latest Edition.

6.   Legan, J.D., Vandeven, M.H., Dahms, M.B., and Cole, M.B. Determining the Concentration of Microorganisms Controlled by Attributes Sampling Plans. Food Control 12:137-147. Latest Edition.

7.   McMeekin, T.A. Detecting Pathogens in Food. Sampling Techniques. CRC Press, USA, Latest Edition.

8.   Montgomery, G. Introduction to Statistical Quality Control. John Wiley & Sons, New York, Latest Edition.

9.   Pomeraz, Y. and Meloan, C.E. Food Analysis: Theory and Practice. Chapter 2: Sampling. Chapman & Hall, New York, Latest Edition.

10.   Schilling, E.G. Acceptance Sampling in Quality Control. Marcel Dekker, New York, Latest Edition.

11.   Wood, R., Wilson, A., and Wallin, H. Quality in the Food Analysis Laboratory. Chapter 10: Experiences in the Implementation of Quality Assurance and Accreditation into the Food Analysis Laboratory: Sampling, Sample Handling, and Sample Preparation. Royal Society of Chemistry (RSC), Latest Edition.

Teaching Approach

•   Use of PowerPoint.

•   Discussion-Based Approach: Engaging students with different topics and encouraging participation.

Evaluation and Grading

Exam Type	Weight	Method	Date	Time
Class Participation	20%	Via PowerPoint	TBD	TBD
Quiz	5%	Short Quiz	TBD	TBD
Final Exam	75%	Written (descriptive)	TBD	TBD

Class Rules

- Timely completion of assignments.
- Observing discipline and proper behavior.

Student Expectations

- Students are expected to gain sufficient knowledge about various sampling methods and quality control techniques for materials under different conditions and be able to calculate sample sizes.

Instructor Information

- Instructor's Name:
- Department EDO Representative:
- Group Manager's Name:

The schedule of the statistical quality control course of food

Session	Date	Topic of the Session	Instructor	Teaching Method / Educational Tools (Software)
1	1401/11/24	Introduction to the necessity of this lesson and quality control	Dr. Rouhi	In-person class (PowerPoint)
2	1401/12/01	Definitions and characteristics of population and sample	Dr. Rouhi	In-person class (PowerPoint)
3	1401/12/08	Sampling of populations and gases	Dr. Rouhi	In-person class (PowerPoint)
4	1401/12/15	Sampling from solids	Dr. Rouhi	In-person class (PowerPoint)
5	1401/12/22	Understanding qualitative characteristics in quality control	Dr. Rouhi	In-person class (PowerPoint)
6	1402/01/21	Understanding types of probability distributions	Dr. Rouhi	In-person class (PowerPoint)
7	1402/01/28	Discrete distributions	Dr. Rouhi	In-person class (PowerPoint)
8	1402/02/04	Approximation of distributions	Dr. Rouhi	In-person class (PowerPoint)
9	1402/02/11	Continuous distributions	Dr. Rouhi	In-person class (PowerPoint)
10	1402/02/18	Normal distribution	Dr. Rouhi	In-person class (PowerPoint)
11	1402/02/23	Midterm Exam	Dr. Rouhi	In-person class
12	1402/02/25	Sample size calculation in normal distribution	Dr. Rouhi	In-person class (PowerPoint)
13	1402/03/01	Regression concepts	Dr. Rouhi	In-person class (PowerPoint)
14	1402/03/06	Introduction to research approaches	Dr. Rouhi	In-person class (PowerPoint)
15	1402/03/08	Presentation of descriptive articles from the last two years	Dr. Rouhi	In-person class (PowerPoint)
16	1402/03/22	Presentation of descriptive articles from the last two years	Dr. Rouhi	In-person class (PowerPoint)
17	1402/04/10	Final Exam	Dr. Rouhi	In-person class