

CHEM4043: FOOD CHEMISTRY

Effective Term

Semester A 2024/25

Part I Course Overview

Course Title

Food Chemistry

Subject Code

CHEM - Chemistry

Course Number

4043

Academic Unit

Chemistry (CHEM)

College/School

College of Science (SI)

Course Duration

One Semester

Credit Units

3

Level

B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

CHEM2003/BCH2003 Biochemistry or
CHEM2007/BCH2007 Principles of Organic Chemistry

Precursors

Nil

Equivalent Courses

BCH4043 Food Chemistry

Exclusive Courses

Nil

Part II Course Details

Abstract

This course in Food Chemistry will enable students to develop their knowledge and capability in dealing with the chemical nature of foods. Students will develop their understanding in the effect of chemical and biochemical reactions on the quality and safety of food. They will also identify and analyse the physico-chemical properties of foods and the origin of off-flavors in foods with respect to chemical changes in natural food constituents (oxidation, lipolysis, and browning). They will also apply various techniques to solve problems in situations encountered during storage of food.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Explain the chemical nature of foods and their major components (carbohydrates, lipids and proteins).		x	x	
2	Analyse the chemical and biochemical properties of foods.		x	x	x
3	Design protocols to use various techniques in analysing food samples.		x	x	x
4	Determine the deteriorative chemical and biochemical reactions, and their chemical kinetics in food handling, processing and storage.		x	x	
5	Evaluate the role and the functionalities of the chemical additives to foods, and each ingredient listed on a food label.		x	x	

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

LTAs		Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures and group activities	Students will engage in small group activities that introduce the chemical nature of foods and the major components (carbohydrates, lipids and proteins).	1	

2	Lectures, case studies and assignments	Students will engage in case studies and assignments that enable them to analyse the chemical and biochemical properties of foods.	2	
3	Case studies	Through case studies, students will design and discuss the various spectroscopic techniques and methods that are employed for food analysis.	3	
4	Case studies, discussion, and group projects	Through case studies, discussion, group projects and oral presentations, students will critically evaluate the deteriorative mechanisms in food handling, processing and storage.	4	
5	Case studies, group projects and presentations	Students will examine the role of chemical additives to foods and their functionalities critically through case studies, group projects and presentations.	5	

Assessment Tasks / Activities (ATs)

ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Tutorial Assignments	2	5
2	Quizzes / Assignments / Discussion	1, 3, 4, 5	35

Continuous Assessment (%)

40

Examination (%)

60

Examination Duration (Hours)

3

Additional Information for ATs

Starting from Semester A, 2015-16, students must satisfy the following minimum passing requirement for courses offered by CHEM: "A minimum of 40% in both coursework and examination components."

Assessment Rubrics (AR)**Assessment Task**

Tutorial Assignments

Criterion

Ability to understand and apply scientific knowledge in food chemistry

Excellent (A+, A, A-)

Able to demonstrate an excellent understanding of scientific knowledge and its applications in food chemistry.

Good (B+, B, B-)

Able to describe and explain various topics of scientific knowledge and their applications in food chemistry.

Fair (C+, C, C-)

Able to describe and explain some key scientific knowledge in selected topics and their applications in food chemistry.

Marginal (D)

Able to briefly describe isolated scientific knowledge in selected topics and their applications in food chemistry.

Failure (F)

Fail to accurately describe and explain relevant scientific knowledge of any topics in food chemistry.

Assessment Task

Quizzes / Assignments / Discussion

Criterion

1. Ability to analyse difficulties or problems in food processing and storage;
2. Ability to apply scientific knowledge in food chemistry to tackle challenges in food-related processes

Excellent (A+, A, A-)

Able to provide a comprehensive analysis of the difficulties or problems in the food industry and provide excellent suggestions to tackle challenges in the food-related processes.

Good (B+, B, B-)

Able to provide a good analysis of the difficulties or problems in the various aspects of the food industry and provide feasible suggestions to tackle challenges in the food-related processes.

Fair (C+, C, C-)

Able to provide a sound analysis of the difficulties or problems in some key aspects of the food industry and provide reasonable suggestions to tackle challenges in the food-related processes.

Marginal (D)

Able to briefly describe the difficulties or problems in isolated aspects of the food industry and provide suggestions to tackle challenges in the food-related processes.

Failure (F)

Fail to accurately describe the difficulties or problems in any aspects of the food industry.

Assessment Task

Examination

Criterion

1. Ability to explain in detail the chemical changes in food under different conditions and in various food processing;
2. Ability to explain the functional properties of different food components and ingredients;

3. Ability to propose solutions to tackle challenges in food-related processes based on scientific knowledge in food chemistry.

Excellent (A+, A, A-)

Able to demonstrate an excellent understanding of the chemistry and functional properties of different food components; Able to propose excellent solutions to tackle the challenges in food processes.

Good (B+, B, B-)

Able to describe and explain the chemistry and various functional properties of different food components; Able to propose feasible solutions to tackle the challenges in food processes.

Fair (C+, C, C-)

Able to describe and explain some key chemistry and functional properties of selected food components; Able to propose reasonable solutions to tackle the challenges in food processes.

Marginal (D)

Able to briefly describe and explain the isolated chemistry and functional properties of food components; Able to propose suggestions to tackle the challenges in food processes.

Failure (F)

Fail to accurately describe the chemistry and functional properties of any food components; Fail to propose any suggestion to tackle the challenges in food processes.

Part III Other Information

Keyword Syllabus

- Introduction to Food Chemistry
- Water and its physico-chemical characteristics
- Carbohydrate components in food
- Chemistry of lipids in relation to lipid characteristics, emulsions and gels
- Protein structure in relation to food characteristics and nutritional value
- Chemical and biochemical properties of foods
- Chemical food additives and their functionalities in food processing
- Analysis of foods

Reading List

Compulsory Readings

Title	
1	Nil

Additional Readings

Title	
1	Food Chemistry, 3rd Edition, O. R. Fennema Ed., Marcel Dekker, Inc., New York, 1996.
2	Food Chemistry, 3rd Edition, H.-D. Beliz, W. Grosch and P. Schieberle Eds., Springer, Berlin; New York, 2004.
3	Online Resources: N.A.