UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Food Chemistry

2526-1-F0602Q129

Aims

The course aims to provide an in-depth understanding of the chemical composition of foods (macronutrients, micronutrients, and non-nutrient compounds), with a particular focus on their health-related and nutraceutical aspects. Chemical transformations of food components during processing techniques will be examined, as well as the main analytical methods for their qualitative and quantitative determination.
At the end of the course, students will acquire specific skills enabling them to:
• Distinguish between food and nutrients.
• Understand how nutrients influence biological and food transformation processes.
• Apply analytical techniques for the chemical analysis of food.

Dublin Descriptors
The course contributes to achieving the five Dublin Descriptors:

1. Knowledge and understanding
   Students will acquire theoretical and practical knowledge concerning food chemistry and related chemical and analytical processes.
2. Applying knowledge and understanding
   Students will be able to apply the acquired knowledge to assess food quality, interpret nutritional labels, and understand food alteration/adulteration phenomena.
3. Making judgements
   Students will develop the ability to critically analyze chemical problems related to food composition and transformation, and to formulate well-founded evaluations.
4. Communication skills
   Students will learn to communicate scientific concepts clearly and effectively, using appropriate technical language in the field of food chemistry.
5. Learning skills
   Students will be encouraged to autonomously deepen the topics covered by consulting scientific literature and supplementary teaching materials.

Contents

The course explores the composition, transformation, and analysis of the main chemical constituents of food.

Detailed program

• Introduction to food chemistry
• Macronutrients: proteins, lipids, carbohydrates – structure and chemical reactivity
• Micronutrients: vitamins, water, and minerals
• Non-nutritional components: additives, preservatives, colorants, contaminants
• Organoleptic properties of food
• Chemical transformations during processing and food preservation
• Chemical food contaminants (pesticides, heavy metals, natural toxins, environmental and processing contaminants)
• Qualitative and quantitative methods for the analysis of components and contaminants
• Case studies: milk and dairy products, oils, beer, beehive products, cereals

Prerequisites

To ensure proper understanding of the course content and achievement of the learning objectives, students should have prior knowledge of:
• Inorganic chemistry
• Organic chemistry
• Biochemistry

Teaching form

The course uses a blended approach, combining lectures and laboratory activities. Approximately 70% of the lessons are delivered through traditional lectures, and 30% through interactive formats.
• 13 in-person lectures of 2 hours each
• 4 remote lectures of 2 hours each
• 1 in-person laboratory/practical session of 4 hours
• 1 interactive supplementary session of 4 hours
Blended teaching structure:
• 70% expository method
• 30% interactive method

Textbook and teaching resource

Slides and supplementary materials will be made available through the e-learning platform.
Textbooks

• P. Cabras, A. Martelli, Chimica degli Alimenti, Piccin
• L. Mannina, M. Daglia, A. Ritieni, La chimica e gli alimenti. Nutrienti e aspetti nutraceutici, Zanichelli
• P. Cappelli, V. Vannucchi, Chimica degli alimenti, Zanichelli

Semester

First semester

Assessment method

The assessment consists of a final oral exam. No midterm assessments are planned. The following competencies will be evaluated during the final exam:
• Knowledge and understanding: comprehension of key concepts in food chemistry
• Applying knowledge and understanding: ability to relate theory to practice
• Judgement: critical and scientifically supported discussion of topics
• Communication skills: clarity of expression and use of technical language
• Learning skills: initiative in exploring topics beyond the provided material

Evaluation is based on scientific accuracy, ability to apply concepts, logical reasoning, and technical communication.
Grading scale:
• 18–21: basic knowledge, simple exposition
• 22–25: good knowledge, moderate application
• 26–28: complete knowledge, appropriate technical language
• 29–30 cum laude: excellent knowledge, confident exposition, high critical thinking ability

Office hours

By appointment via email: luca.campone@unimib.it

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING | RESPONSIBLE CONSUMPTION AND PRODUCTION