

ACADEMIC YEAR: **2018/2019**

COURSE: **Food Chemistry**

TYPE OF EDUCATIONAL ACTIVITY: **Curricular**

TEACHER: **Mauro De Nisco**

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mobile (optional):

Language: **Italian**

ECTS: **6 (5 + 1)**

n. of hours: **56 (40 + 16)**

Campus: **Potenza**

Semester: **I**

Dept./School: **School of
Agriculture, Forestry, Food and
Environmental Sciences (SAFE)**
Program: **Food Technology**

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

The goal of food chemistry course is to provide a thorough knowledge of the constituents of food chemistry and the basic principles of food quality.

Knowledge and understanding

The student must demonstrate to possess the basic knowledge of organic chemistry, paying specific attention to biomolecules, to be able to: a) understand the structural characteristics of the organic components of food; b) to analyze the transformation of food in industrial and domestic processing and conservation; c) understand the function of food additives; d) Know the components of the foods responsible for the organoleptic characteristics.

Applied knowledge and understanding

The student must demonstrate knowledge of applying the acquired information in the evaluation of the nutritional implications of food transformation/alteration processes; the presentation of the topics is aimed at favoring the development of the ability to autonomously examine a) the effects of the structural variations of the main components on the macroscopic properties of the food matrices and b) the effectiveness and applicability in different cases of the strategies.

Autonomy of judgment

The student must be able to: a) propose effective methods compatible with food safety to preserve the fundamental components of food; b) knowing how to draw information from non-scientific literature or other sources; c) be able to identify any additives in the description of the composition of industrial products and understand their function; c) deepen and update the basic knowledge provided during the course.

Communication skills

The student must demonstrate a) to be able to clearly illustrate, by appropriately exemplifying them, the characteristics of common foods in terms of the main constituents and the peculiar components that determine their organoleptic characteristics; b) to have understood and be able to explain the aims of the main strategies used to preserve food; c) to be able to explain the transformation of foods following common breeding practices in a simple but correct way.

Learning capacity

The student must a) develop the ability to understand independently a text or a scientific work also in English that deals with topics related to food, their composition, transformation and conservation; b) be able to update or expand their knowledge also drawing from non-scientific literature or other sources and evaluate information with a critical

sense; c) gradually acquire the ability to follow specialist seminars, conferences, masters etc. in the food and nutrition sectors; d) understand the needs of companies in terms of knowledge, skills and abilities and possible areas of application.

PRE REQUIREMENTS

A good knowledge of Organic Chemistry and Biochemistry

SYLLABUS

Introduction (2h)

Basic Nutrition Principles. Characteristics of food. RDI (Reference Daily Intake). Definition of nutraceuticals and functional foods.

Lipids (6h + 4 Lab)

General information and chemical classification. Saturated fatty acids, mono and polyunsaturated; configuration of double bonds; melting points, fatty acid composition of oils and greases, essential fatty acids. Reactions of unsaturated fatty acids: hydrogenation, oxidation. Lipid peroxidation, hydroperoxides. Mechanisms of formation of Acrolein, toxicity and metabolism. Polymerization processes.

Carbohydrates (9h + 6 Lab)

General information and chemical classification. Reactions: oxidation of sugars, glucose enzymatic determination; reductions. Glycosides and glycosidic linkage. Oligosaccharides Non-enzymatic Browning processes: thermal processes; the Maillard reaction; hydroxymethylfurfural; Amadori compounds; maltol, isomaltol; melanoidins. Polysaccharides: classification; starch composition, structure and properties. Non-starch polysaccharides and dietary fibre.

Protein (8h + 6 Lab)

General information and chemical classification. Protein composition of the most common foods; Denaturing processes; Essential amino acids and protein quality. Analysis of proteins in food; which quantitative analysis/amino acids; Lowry method, Kjeldahl method. Protein foods; the milk: casein micelles structure; gluten proteins; bread leavening processes.

Organoleptic properties (4h)

Artificial and Natural dyes in food. Taste and smell.

Risk factors for foods and their Prevention Methods (4h)

Food Preservation: sodium chloride, nitrites, Sulfur dioxide, and organic acids. Antibiotics. Food Irradiation. Classification of Mycotoxins.

Vitamins (3h)

General information and chemical classification. Investigation of the nutritional and scientific properties of vitamins. Food Sources of Essential Vitamins. Signs and Symptoms of Vitamin Deficiency.

Water (2h)

Chemical and physical properties of water, water activity, Drinking water and mineral water.

Mineral (2h)

Presence in the organism of minerals, biological functions of minerals, requirements and food sources of calcium, magnesium, potassium, sodium, chlorine, phosphorus, zinc, iron, iodine, fluorine, selenium, copper, molybdenum, sulfur, cobalt, manganese, nickel, vanadium, arsenic, cadmium, chromium, mercury and lead.

TEACHING METHODS

Theoretical lessons and Classroom Tutorials

More in details. The course includes 56 hours of teaching between lessons and exercises. In particular, 40 hours of lectures and 16 hours of classroom exercises are planned.

PURPOSE AND EVALUATION METHODS

a) Learning outcomes to be tested: The student's ability to orient himself with ease throughout the entire teaching program, linking the concepts learned during the lectures to the description of a) structure, properties and reactivity in conditions of relevance to food processing of the main classes of organic compounds present in food; b) structural characteristics of the minor components of foods responsible for organoleptic properties and correlations with chemical-physical properties; c) types and functions of the main food additives.

b) Type of examination: written test and oral exam. **The written examination consists in 20 multiple-choice questions and 2 open questions.**

The final evaluation will be expressed with a mark of thirty

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

- **Patrizia Cappelli & Vanna Vannucchi "Chimica degli Alimenti" Zanichelli**
- **Paolo Cabras & Aldo Martelli "Chimica degli Alimenti" Piccin**
- **Tom P. Coultate "Chimica degli Alimenti" Zanichelli**
- **All course material is regularly provided to students by sharing in a Dropbox folder.**

INTERACTION WITH STUDENTS

At the beginning of the course, after describing the objectives, program and verification methods, the teacher makes the teaching material available to the students. At the same time, the list of students intending to enroll in the course is collected, with name, surname, registration number and e-mail.

Students will be received on Mondays from 16 to 18 and on Tuesdays from 10 to 12 at the office of Prof. Manfra for any clarification on the course. In addition to the weekly reception timetable, the teacher is available at all times for a contact with the students, through his own e-mail.

EXAMINATION SESSIONS (FORECAST)¹

04/02/2019, 04/03/2019, 03/06/2019, 01/07/2019, 19/09/2019, 07/10/2019, 04/11/2019, 02/12/2019

EVALUATION BOARD

M. De Nisco (Presidente); Eugenio Parente; Annamaria Ricciardi e Antonio Scopa

SEMINARI DI ESPERTI ESTERNI SI NO

FURTHER INFORMATION

¹ Potrebbero subire variazioni: consultare la pagina web del docente o del Dipartimento/Scuola per eventuali aggiornamenti