



# UNIVERSITÀ DEGLI STUDI DI PALERMO

<b>DEPARTMENT</b>	Scienze e Tecnologie Biologiche, Chimiche e Farmaceutiche		
<b>ACADEMIC YEAR</b>	2022/2023		
<b>MASTER'S DEGREE (MSC)</b>	HUMAN FEEDING AND NUTRITION SCIENCES		
<b>INTEGRATED COURSE</b>	FOOD CHEMISTRY AND TECHNOLOGY		
<b>CODE</b>	21004		
<b>MODULES</b>	Yes		
<b>NUMBER OF MODULES</b>	2		
<b>SCIENTIFIC SECTOR(S)</b>	CHIM/10, AGR/15		
<b>HEAD PROFESSOR(S)</b>	DI STEFANO VITA	Professore Associato	Univ. di PALERMO
<b>OTHER PROFESSOR(S)</b>	TODARO ALDO	Professore Associato	Univ. di PALERMO
	DI STEFANO VITA	Professore Associato	Univ. di PALERMO
<b>CREDITS</b>	9		
<b>PROPAEDEUTICAL SUBJECTS</b>			
<b>MUTUALIZATION</b>			
<b>YEAR</b>	1		
<b>TERM (SEMESTER)</b>	2° semester		
<b>ATTENDANCE</b>	Mandatory		
<b>EVALUATION</b>	Out of 30		
<b>TEACHER OFFICE HOURS</b>	<p><b>DI STEFANO VITA</b> Monday 9:00 11:00</p> <p><b>TODARO ALDO</b> Monday 15:00 16:00 presso Ufficio 149 presso Ed.4 primo piano viale delle Scienze Microsoft TeamsContatto telefonicoEmail</p> <p>Wednesday 12:00 16:00 Ufficio 149 presso Ed.4 primo piano viale delle Scienze Microsoft TeamsContatto telefonicoEmail</p>		

**DOCENTE:** Prof.ssa VITA DI STEFANO

<b>PREREQUISITES</b>	<p>The course aims to give the student knowledge on the chemical structure and functional and nutritional properties of the constituents of foods.</p> <p>The purpose of the course is the study of the chemical reactions occurring in foods, following the technological processing and conservation treatments provided by the course program.</p>
<b>LEARNING OUTCOMES</b>	<p>The course proposes to provide the necessary knowledge on the composition of diverse classes of substances, of the main fresh and preserved foods, to expose the basic requirements in terms of composition, preparation and conservation rules also on the basis of current legislation. During the course, the main technological processes for the various food preparations and related chemical processes will be studied, with particular regard to vegetable products typical of the Mediterranean environment.</p> <p>Numerous essays and specific analytical techniques also well be described for authentic, hygienic and correct procedures, and for the detection of fraud, food adulteration in derivative products and beverages.</p>
<b>ASSESSMENT METHODS</b>	<p>The final score, which consists of an oral exam, will be given on the answers at questions regarding the program, with reference to the suggested texts.</p> <p>The oral exam aims to verify if the student has acquired the knowledge expected by the program of the course; it will also evaluate his elaboration abilities and his autonomy of judgement about the disciplinary contents with language properties. The score is expressed using a 30-point scale (from min 18/30 to max 30/30 cum laude). The student gains a minimum range score (with a score between 18/30 and 21/30) if he or she will demonstrate sufficient knowledge of the required arguments even if with scientific vocabulary not adequately articulated. The score will be increased (range score from 22/30 to 29/30) if the candidate shows a deep knowledge of the topics with deep personal study of the recommended texts. Positive scores will also be given if he/she shows autonomy of judgement and comprehension of acquired knowledge, with the correct use of scientific vocabulary.</p> <p>The score of 30/30 and 30/30 cum laude will be gained by the candidate who shows optimal knowledge of the topics, which he expresses in a clear and articulated way with optimal language skills and good analytical skills, showing his judgement autonomy and his application ability of the newly acquired knowledge.</p>
<b>TEACHING METHODS</b>	<p>The course will be organized in lectures. Some seminar activities on topics that will be considered useful to be addressed will be encouraged..</p> <p>The course aims to give the student knowledge on the chemical structure and functional and nutritional properties of the constituents of foods.</p> <p>The purpose of the course is the study of the chemical reactions occurring in foods, following the technological processing and conservation treatments provided by the course program.</p> <p>In addition, the course aims to give the student the tools for a proper knowledge of a food label in terms of compliance with current European legislation in order to evaluate possible food frauds.</p> <p>It will be appreciated the elaborate properties, the autonomy of judgment and the ability to apply new acquired knowledge. At the end of the course, the student will have to expose the arguments in a clear and articulated way using the appropriate scientific terminology required by course.</p>

## MODULE FOOD SCIENCE AND TECHNOLOGIES

*Prof. ALDO TODARO*

### SUGGESTED BIBLIOGRAPHY

Appunti delle lezioni;  
Zanoni Bruno, 2011, Tecnologia Alimentare, Libreriauniversitaria;  
Pompei C., 2005, La trasformazione industriale di frutta e ortaggi, Edagricole;  
Simone S. Eugenio S, Gabriele. 2018. Manuale di ispezione e controllo delle carni. Zanichelli ;  
Pompei C., 2009, Operazioni Unitarie della tecnologia alimentare, Casa Editrice Ambrosiana;  
Cappelli P., Vannucchi V., 2005, Chimica degli Alimenti. Zanichelli.

Lettere consigliate:

Fellows, 2000, Food Processing Technology Principles and Practice, CRC Press

Heldman D.R. & Lund D.B., 2007. Handbook of Food Engineering. CRC Press

<https://nzifst.org.nz/resources/unitoperations/index.htm>

<b>AMBIT</b>	20989-Attivit Formative Affini o Integrative
<b>INDIVIDUAL STUDY (Hrs)</b>	51
<b>COURSE ACTIVITY (Hrs)</b>	24

### EDUCATIONAL OBJECTIVES OF THE MODULE

The course aims to provide students the knowledge on technologies for the production of baked, tomato products, also we will address the issue of what techniques and technologies adopted to maintain the quality of fruit and vegetable products in the post-harvest and the quality of the food products from animals and fisheries. The module has two purposes: knowledge of the industrial technologies of processed food, and the knowledge of the chemical and physical characteristics and composition of food products.

## SYLLABUS

Hrs	Frontal teaching
2	Course overview and introduction
3	Tomato processing. Chemical, physical and sensory analysis
3	Juice processing, jam processing: definition, law, chemical, physical and sensory analysis.
3	Bakery and pasta processing
3	Cooked food product from animals and fisheries
Hrs	Practice
3	ISI paper: study and evaluation
3	PITCH RESEARCH PROJECT: paper evaluation and presentation
Hrs	Others
4	Technical visits.

## MODULE FOOD CHEMISTRY

*Prof.ssa VITA DI STEFANO*

### SUGGESTED BIBLIOGRAPHY

L. Mannina, M. Daglia, A. Ritieni, La chimica e gli alimenti. Nutrienti e aspetti nutraceutici, CEA 2019  
P. Cabras, A. Martelli. "Chimica degli alimenti ". Ed. Piccin (Padova, 2004)  
P. Cappelli, V. Vannucchi. "Chimica degli alimenti - Conservazione e trasformazioni ". Ed. Zanichelli (2015)  
J. Velisek, The Chemistry of Food, ISBN: 978-1-118-38384-1 February 2014  
O. R. Fennema, Food Chemistry, Marcel Dekker Ed. (New York, USA)

<b>AMBIT</b>	50515-Discipline per la Caratterizzazione degli Alimenti e Gestione del Sistema Agroalimentare
<b>INDIVIDUAL STUDY (Hrs)</b>	102
<b>COURSE ACTIVITY (Hrs)</b>	48

### EDUCATIONAL OBJECTIVES OF THE MODULE

#### FOOD CHEMISTRY

The course aims to give the student knowledge on the chemical structure and functional and nutritional properties of the constituents of foods.

The purpose of the course is the study of the chemical reactions occurring in foods, following the technological processing and conservation treatments provided by the course program.

In addition, the course aims to give the student the tools for a proper knowledge of a food label in terms of compliance with current European legislation in order to evaluate possible food frauds.

The course proposes to provide the necessary knowledge on the composition of diverse classes of substances, of the main fresh and preserved foods, to expose the basic requirements in terms of composition, preparation and conservation rules also on the basis of current legislation.

Numerous essays and specific analytical techniques also well be described for authentic, hygienic and correct procedures, and for the detection of fraud, food adulteration in derivative products and beverages.

## SYLLABUS

Hrs	Frontal teaching
2	Authentication and food traceability, food fraud, analytical solutions to authentication problem .
6	Lipids. General, classification and structure of fatty acids, essential fatty acids, cis and trans fatty acids. Biosynthesis. Saturated and unsaturated fatty acids. Omega and delta nomenclature of fatty acids. Triglycerides, Diglycerides. Unsaponifiable fraction of oils. Terpenes, Phytosterols. Polyphenols, Cholesterol. Waxes. Complex lipids, phospholipids and glycolipids. Nutritional properties of lipids. Reactions to lipids in food: hydrogenation, isomerization, oxidation
4	Proteins. Amino acids, peptides, proteins: structure, properties, classification. Essential amino acids and protein quality. Nutritional properties, protein value of foods. Functional properties of proteins. Modifications of proteins in food during technological treatments. Indicators of thermal degradation of proteins and amino acids: isopeptides, lysinoalanine, furosine, Maillard reaction
6	Carbohydrates. classification. Monosaccharides: Haworth and Fischer projections. Disaccharides and oligosaccharides. Oxidation and reduction, polyols. Polysaccharides. Starch. Dextrin. Glycogen. Dietary fiber. Cellulose, hemicellulose and lignin. Pectins. Polysaccharides from marine algae. Gums and mucilages. Nutritional aspects and carbohydrate metabolism. Reactions of sugars in an acidic, alkaline environment and with heat. Molecular indicators of thermal degradation, hydroxymethylfurfural, lactulose, Caramelization. Maillard reaction
2	Sweeteners. Sweetening power Natural sweeteners Synthetic sweeteners Polyalcohols Sweet proteins Safety of intensive sweeteners
4	Contaminants Direct and indirect contamination. Environmental contaminants: dioxins, PCBs, legislation, pesticides, heavy metals. Medicines for veterinary use Contamination from packaging: phthalates, BPA, semicarbazide, melamine, plastificants. Process contamination: acrylamide, monochloropropanediol and glycidol Natural toxins: mycotoxins, legislative aspects
2	Proteic foods and food supplements Animal and vegetable proteins Milk and derivatives Production, applications and uses of amino acids and proteins
2	Cereals Wheat Rice Corn Components and nutraceutical activity of cereals
2	Bioactive molecules of vegetable origin
2	Anti-nutritional factors.
4	Food additives: classification and legislation
2	Food labeling: legislation Food labeling Nutritional labeling: nutriscore and battery label
2	Preservation methods: food alteration. Physical and chemical conservation methods. Use of heat. Freezing. Freezing. Drying. Lyophilization. Ionizing radiations

4	Olive oil: spread of the olive tree. The oil and the olive tree, fruit ripening, characteristics of the oils and types. Extraction of oil from olives. . Extraction systems. Composition of olive oil. Legislation. Quality and purity control. Refining and rectification of oils. Pomace oil. Oil and Mediterranean diet. Sensory analysis of the oil. Chemical analysis of olive oil: determination of acidity, analysis of the fatty substance, analysis of the sterol fraction, search for dienes and trienes, determination of the iodine number, determination of the number of peroxides, determination of chlorophyll. Labeling.
2	Minerals: Bioelements and biological role. Micro and macro elements. LARN, Calcium, Magnesium, Potassium, Sodium, Chlorine, Zinc, Iron. Toxic metals (As, Pb, Hg, Cd, Cr), poisoning, toxicological aspects, contaminated food.
2	Water: Structure and properties of water. Colligative properties. Osmotic pressure. Water in food. Water activity (aw). Influence of water on the speed of food spoilage. Drinking water. Hydrogeological criteria, organoleptic criteria, physical criteria, chemical criteria. Water: Hardness. Microbiological criteria. Physical and chemical disinfection. Microbiological pollution indicators. Bioelements and biological role.