



# UNIVERSITÀ DEGLI STUDI DI PALERMO

<b>DEPARTMENT</b>	Promozione della Salute, Materno-Infantile, di Medicina Interna e Specialistica di Eccellenza "G. D'Alessandro"		
<b>ACADEMIC YEAR</b>	2022/2023		
<b>BACHELOR'S DEGREE (BSC)</b>	DIETISTICS		
<b>INTEGRATED COURSE</b>	FOOD CHEMISTRY AND PRODUCTION - INTEGRATED COURSE		
<b>CODE</b>	18948		
<b>MODULES</b>	Yes		
<b>NUMBER OF MODULES</b>	2		
<b>SCIENTIFIC SECTOR(S)</b>	AGR/03, CHIM/10		
<b>HEAD PROFESSOR(S)</b>	FARINA VITTORIO	Professore Ordinario	Univ. di PALERMO
<b>OTHER PROFESSOR(S)</b>	FARINA VITTORIO DI STEFANO VITA	Professore Ordinario Professore Associato	Univ. di PALERMO Univ. di PALERMO
<b>CREDITS</b>	6		
<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>	<b>DI STEFANO VITA</b> Monday 9:00 11:00 <b>FARINA VITTORIO</b> Tuesday 15:00 17:00 Dipartimento di Scienze Agrarie, Alimentari e Forestali. Viale delle Scienze, Edificio 4, piano terra, ingresso H, studio n° 35 Thursday 09:00 13:00 Dipartimento di Scienze Agrarie, Alimentari e Forestali. Viale delle Scienze, Edificio 4, piano terra, ingresso H, studio n° 35		

DOCENTE: Prof. VITTORIO FARINA

<b>PREREQUISITES</b>	Knowledge required for entry to degree course program.
<b>LEARNING OUTCOMES</b>	<p>The student at the end of the course will have acquired a good knowledge of the principles, techniques and tools that operate in the field of chemistry and production of plant-based foods.</p> <p><b>Knowledge and understanding</b> Learn and understand aspects related to the management of the factors of production of the most important food products, their conservation and the influence of these parameters on the final quality. Understand and be able to apply the methods of evaluating the quality of plant-based foods. Knowledge of the composition, for classes of substances, of the major fresh and preserved foods. Acquisition of concepts, knowledge and terminology from scientific text, papers and other sources.</p> <p><b>Ability to apply knowledge and understanding</b> The ability to modulate cultivation techniques, methods of storage and processing technologies can positively affect the final quality of fruit. Ability to provide information and advice on the principles of healthy eating.</p> <p><b>Autonomy of judgement</b> Ability to suggest appropriate solutions for orchard management and evaluation of the quality of plant-based foods and products. Be able to evaluate the chemical composition of foods and their role in the diet. Interpretive abilities and comparison of experimental data with extrapolation of valid and original conclusions.</p> <p><b>Communication skills</b> Be able to use a technically correct language, in addressing the technical choices related to the management of the factors of production in the orchard and along the supply chain, in the understanding of the chemical composition of foods.</p> <p><b>Learnability</b> Ability to upgrade own knowledge with the consultation of the scientific papers.</p>
<b>ASSESSMENT METHODS</b>	<p>Learning is assessed through an oral test. Intermediate evaluation tests may be carried out depending on the level of learning attained by the class in order to facilitate the learning objectives. The test is aimed at assessing the knowledge acquired, elaboration and expository skills. The assessment, expressed in thirtieths, with a minimum mark of 18 for sufficiency and a maximum of 30 cum laude, follows the following evaluation scheme</p> <p>1) knowledge of the subjects, ability to deduce and process information, ability to apply and analyse, exposition ability assessed just sufficient (mark 18-21)</p> <p>2) knowledge of the subject matter, ability to deduce and process information, ability to apply and analyse, exposition ability assessed fair (mark 22-25)</p> <p>3) knowledge of the subject matter, ability to deduce and process information, ability to deduce and process information, ability to apply and analyse, exposure ability assessed good to high (mark 26-28)</p> <p>4) subject knowledge, ability to deduce and process information, ability to apply and analyse assessed, exposure ability excellent to advanced (mark 29-30 cum laude)</p>
<b>TEACHING METHODS</b>	Teaching will be divided into lectures, exercises and laboratory activities.

**MODULE  
VEGETAL FOOD AND PRODUCTS**

*Prof. VITTORIO FARINA*

**SUGGESTED BIBLIOGRAPHY**

Colelli G. e Inglese P. (2020). Gestione della qualità e conservazione dei prodotti ortofrutticoli. Edagricole- New Business Media

Materiale didattico fornito durante lo svolgimento sotto forma di dispense delle lezioni integrate da articoli scientifici e tecnici. Copies of overheads and multimedia presentations supplemented by scientific and technical papers will be provided during the course.

<b>AMBIT</b>	10731-Attività formative affini o integrative
<b>INDIVIDUAL STUDY (Hrs)</b>	45
<b>COURSE ACTIVITY (Hrs)</b>	30

**EDUCATIONAL OBJECTIVES OF THE MODULE**

The aim of the course is to provide students 1) the relationship between cultivation techniques, postharvest management and qualitative traits of horticultural products 2) the characteristics of the principal fresh/processed agro-food products 3) the evaluation of their organoleptic quality with sensory and analytical methods.

**SYLLABUS**

Hrs	Frontal teaching
2	Agronomic techniques, cultivation methods, and their effect on the final quality of plant products and food including their qualitative profile. Role of abiotic and biotic stress/adversity. Identification of optimal harvest time due to maximize the final quality. Climacteric and not climacteric fruit.
2	Post-harvest characteristics and definition of quality along the supply chain. Shelf-life, chemical-physical quality and bioactive compounds of plant products: genetic differences (specific and varietal) and related to the degree of ripeness. Influence of storage techniques on nutraceutical quality. Coating and MAP. Consumer quality indices.
1	Conventional and organic farming practices. Effects on the nutritional components of products. Season products, greenhouse vegetables.
1	Quality marks: PDO; PGI, TSG, IGT, DOC, DOCG, Slow Food Presidia. Zero km supply chain, ecological footprint. Traceability. Seasonality and harvest period.
2	Fresh-cut products: definition, preparation and technology to maximize the qualitative traits. Other kinds of ready to eat food.
2	The processed plant products: dehydrated fruit, fruit juices, fruit jam, tomato sauce, modern beverage, plant-based drink and milk.. Effects of processing techniques on bioactive components.
2	Fruit supply chains: fruit tree species of temperate, (apple, pear, peach, apricot, plum, cherry), minor fruit species (loquat, persimmon, quince, mulberry), small fruit (blackberry, blueberry, ribes), citrus.
2	Fruit supply chains - nuts: hazelnut, walnut, almond, pistachio, macadamia nut, pecan.
2	Fruit supply chains: fruit tree species in tropical and subtropical climates: mango, avocado, papaya, lici, passiflora, banana, cacao, coffee, tea.
2	Viticulture: table grapes and wine.
2	Olive and oil: PDO and variety. Methods for processing table olives.Seed oil.
2	The supply chain of the main horticultural products: garlic, onion, asparagus, carrot, fennel, lettuce, artichoke, cauliflower, broccoli, spinach, watermelon, melon, cucumber, pumpkin, bean, strawberry, aubergine, pepper, tomato, potato.
2	The supply chain of cereals and derived products: wheat, corn, barley, rice. Whole-grain cereals. Gluten: technological and dietary aspects. Flours and refining processes. Nutritional values.
Hrs	Practice
2	Novel food and super food of vegetable origin: type, diffusion, nutraceutical characteristics and legislation. Vegetal food supplements. GMO. Mix tox. Fit food.
2	Comparison of similar types of commercial products: analysis of the composition on the basis of the label and nutritional contribution: chocolate, hazelnut creams, oils, dried pasta, flour, fruit juices.
Hrs	Workshops
2	Sensory analysis of plant products: trained panel, semi-trained panel, consumer panel. Use of USDA database.

## 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, 2019, CEA editrice  
P. Cabras, A. Martelli. "Chimica degli alimenti ". Ed. Piccin (Padova, 2004)  
P. Cappelli, V. Vannucchi. "Chimica degli alimenti - Conservazione e trasformazioni ". Ed. Zanichelli (2015)  
T. P. Coultate, "La Chimica degli Alimenti", Ed. Zanichelli (Bologna, 2004). H.D. Belitz, W. Grosch, P. Schieberle.  
"Food Chemistry, 3° revised edition". Springer-Verlag Ed. (Berlin, Germany, 2004) O. R. Fennema, Food Chemistry, Marcel Dekker Ed. (New York, USA)

<b>AMBIT</b>	10347-Scienze della dietistica
<b>INDIVIDUAL STUDY (Hrs)</b>	45
<b>COURSE ACTIVITY (Hrs)</b>	30

### EDUCATIONAL OBJECTIVES OF THE MODULE

The aim of the course is knowledge on the chemical structure and properties of food constituents. The chemical composition of the main foods and the chemical reactions that take place following technological processing and preservation treatments will be illustrated.

An important aspect is also that of quality control, through analytical and sensorial methods.

## SYLLABUS

Hrs	Frontal teaching
2	Introduction. What is Food Chemistry. Food and food principles. Main and secondary components of foods. Energy content, basal metabolism and body mass index
2	Preservation methods: alteration of foods. Methods of physical and chemical conservation. Use of waste. Freezing. Frozen food. Drying. Lyophilization. Ionizing radiations.
4	Organic components. Carbs. Overview, classification. Monosaccharides: structure and reactivity. Disaccharides and oligosaccharides. Oxidation and reduction, polyols. Polysaccharides. Starch. Dextrin. Glycogen. dietary fiber. Cellulose, hemicellulose and lignin. Pectins. Polysaccharides from seaweed. Gums and mucilage. nutritional and carbohydrate metabolism. Reactions of sugars in acid, alkali and heat, thermal degradation of molecular markers, hydroxymethylfurfural, lactulose, Caramelization. Maillard reaction
4	Lipids. Overview, classification, fatty acids, essential fatty acids, cis and trans fatty acids. Biosynthesis. Saturated and unsaturated fats. Nomenclature of fatty acids. Triglycerides. Diglycerides. Unsaponifiable fraction of the oil. Terpenes, phytosterols. Polyphenols, Cholesterol. Waxes. complex lipids, phospholipids and glycolipids. Nutritional properties of lipids. Reactions of lipids in foods: hydrogenation, isomerization, oxidation
4	Protein. Amino acids, peptides, proteins: structure, properties, classification. Essential amino acids and protein quality. nutritional, protein value of food. functional properties of proteins (emulsifying properties, moisturizing). Modifications of proteins in foods during technological treatments. thermal degradation indicators of protein and amino acids: isopeptidi, lysinoalanine, furosine, Maillard reaction
2	Additives: Classification. Description of the chemical properties of the main classes of food additives (preservatives, antioxidants, emulsifiers, etc.).
4	Undesirable substances. Toxicology Background. toxic substances naturally present in food. Contaminants of natural origin: mycotoxins, bacterial toxins. Chemical contaminants: pesticides, heavy metals, waste packaging, environmental pollutants. toxic substances which originate during the thermal treatments of foods. Toxic metals (As, Pb, Hg, Cd, Cr)
2	Proteins: LARN. Food sources. Analytical methodologies for the separation of proteins and peptides. Electrophoresis on agar and polyacrylamide, SDS PAGE. Revelation. Protein quantification. Amino acid analysis. Proteomic analysis through MS. Kjeldahl method. Butter, chemical composition, fatty acids. Margarines, functional, dietetic foods and supplements containing omega-3 FA
4	Oil and olive, ripening of fruits, characteristics of oils and typologies. Extraction of oil from olives. Extraction systems. Composition of olive oil. Legislation. Quality and purity control. Refining and grinding oils. Sage oil. Oil and Mediterranean Diet. Sensory analysis of oil. Chemical analysis of olive oil: detoxification of acidity, analysis of fat, sterol fraction analysis, dienes and trienes analysis, iodine number, determination of peroxides number , determination of chlorophyll. Labeling.
2	Food labeling: function, mandatory indications, nutrition declaration, expiry date, compulsory supplementary information, indications of ingredients that cause allergies and intolerances. Current legislation. Glycemic index. Synthetic sweeteners: saccharin, aspartame, acesulfame, cyclamates, steviol glycosides, Neotame, advantame, Sweet proteins, Polyols, DGA. EFSA Claims 2012.