

Syllabus

Course description

Course title	Food chemistry
Course code	44705
Scientific sector	CHIM/10
Degree	Food Sciences for Innovation and Authenticity
Semester	II
Year	I
Academic year	2019/20
Credits	6
Modular	No
Total lecturing hours	36
Total exercise hours	24
Attendance	Yes
Prerequisites	-----
Course page	-----
Specific educational objectives	<p>Aims</p> <p>The course discusses the basic principle of food chemistry. The chemistry of carbohydrates, lipids, proteins, and other constituents in fresh and processed foods are discussed and related to their effect on food quality. The course will offer also a deep understanding of the analysis of foods. Students take an active role in learning course content (presented via Power Point presentations), which is available to class participants on the Food Chemistry web site, as well as laboratory activities. These include the chemical analysis of fruits and vegetables; milk and dairy products and wine.</p> <p>Educational objectives:</p> <ol style="list-style-type: none"> 1) the student is able to describe the main chemical properties of foods and ingredients and their functional role to the resulting food quality. 2) The student is able to describe the main analysis needed for quality control and how to report the results of the analysis.
Lecturer	<p>Matteo Scampicchio, Palazzo della Regione 5th floor, matteo.scampicchio@unibz.it , +30 0471017210</p> <p>Ksenia Morozova, NOI Tech Park, ksenia.morozova@unibz.it, +30 0471017211</p>
Scientific sector of the lecturer	AGR/15

Teaching language	English
Office hours	32
Teaching assistant (if any)	Dott. Sebastian Imperiale (24 hours)
Office hours	16
List of topics covered	<p>Food Analysis Expression of concentrations. Measurement of pH, the use of mass balance, titration methods, refractometry, density and brix value. Buffer capacity and buffer preparation. Expression of the results. Repeatability and reproducibility. Trueness and recovery. Calibration, sensitivity, linearity and limit of detection.</p> <p>Chemistry of fruits Reducing sugars. Antioxidants. Vitamins. The role of pectin. Pectinase activity. The role of water activity, pH and organic acids in fruits. Effect of thermal treatments on the chemical quality of processed fruits (fruit juices, canned fruits, jams, jellies and marmalades). Pectin properties. Formation of pectin gel. Pectin extraction and pectin test. Effect on turbidity and chill haze problems. Main chemical analysis for the quality control of fruit products.</p> <p>Chemistry of milk and dairy products Lactose, proteins (casein and whey proteins), lipids, emulsion, foaming, creaming phenomena. Yogurt gelation. Cheese curd formation. Ice cream overrun. Cheese maturation and effect on flavor and taste. Main chemical analysis in the quality control of milk and dairy products.</p> <p>Chemistry of bakery products Chemistry of cereals and flour. Reducing Group Reactions. Starch and degraded starch properties. Gelation, gelatinization and retrogradation reactions. Osbourne fractions. Gluten formation. Shortening in biscuits and pastry. Acrylamide formation during cooking. Heat induced changes in bakery product quality. Maillard Reaction. Main chemical analysis in the quality control of bakery products.</p> <p>Chemistry of beer Wort formation. Saccharification reactions. Role of pH on amylase activity. Fermentation reactions. Effect of processing on the chemical quality of beer. Main chemical analysis in the quality control of the brewing process.</p>
	Frontal lectures, exercises, labs, projects

Learning outcomes	<p>The learning outcomes are:</p> <p>Knowledge and understanding</p>
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	<p>Students are expected to understand and be able to control the major chemical and biochemical (enzymatic) reactions that influence food quality with emphasis on food industry applications. To understand how the properties of different food components and interactions among these components modulate the specific quality attributes of food systems, and to understand the principles that underlies the biochemical/enzymatic techniques used in food analysis.</p> <p>Applying knowledge and understanding The student will be able to apply the theoretical knowledge of on the chemical changes occurring to foods.</p> <p>Making judgements The student will be able to analyze and compare the chemical properties of foods and their effect on its quality.</p> <p>Communication skills Communication skills will be evaluated in class through the discussion of case studies and in the lab through the evaluation of the laboratory activity.</p> <p>Learning skills The student will learn practical laboratory methods to analysis the chemical properties of foods.</p>
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Assessment	The oral assessment is based on oral exam to test the knowledge on the course topics.
Assessment language	English
Evaluation criteria and criteria for awarding marks	<p>The evaluation consists of:</p> <ul style="list-style-type: none"> oral exams (100%) <p>Criteria for the oral examination:</p> <ul style="list-style-type: none"> Knowledge of the main chemical properties of foods Understanding of the effect of chemical properties on the resulting food quality. Ability to communicate in a concise and precise way.
Required readings	Slide and spreadsheets discussed during the lecture.
Supplementary readings	H. D. Belitz, Foods chemistry, Springer, Doi: 10.1007/978-3-540-69934-7.