Alghe e microAlghe: Applicazioni Industriali e Nutraceutiche [1301321]

Offerta didattica a.a. 2024/2025

Docenti: SARA CIMINI

Periodo: Primo Ciclo Semestrale

Obiettivi formativi
The objective of the course is to provide solid knowledge of the cytological, histological and morphological organization of marine plant organisms. This will provide an understanding of the various modes of reproduction and relationships among different algal groups. In addition, objective of the course is also to discuss possible applications of the use of algae and microalgae in human and animal nutrition, wastewater treatment, CO_2 capture, and biofuel production. Finally, the use of algae and microalgae cultivation for the production of compounds with high nutraceutical and biopharmaceutical value will be discussed.

SDGs:
Goal n°2: Zero Hunger
Goal n°3: Good Health and Well-being
Goal n°4: Quality Education
Goal n°15: Life on Land

Prerequisiti
Good knowledge of Plant Biology are prerequisites for understanding the topics covered in the teaching.

Contenuti del corso
ALGAE BIOLOGY: cytology, anatomy, physiology, reproduction and secondary metabolism of algae and microalgae. Types of algal growth.
Lectures: 2 (4 hours)
Laboratory activities: light microscope observation 1 (2 hours)

FROM BASIC RESEARCH TO APPLIED RESEARCH: Case studies of the use of algae and microalgae as biofactories for chemical, nutraceutical and pharmaceutical products.
Lectures: 2 (4 hours)
Laboratory Activities: Methods of microalgae cultivation - Micro and macronutrients. Preparation of culture media. Isolation and sterilization techniques. 2 (4 hours)

INDUSTRIAL AND NUTRACEUTICAL APPLICATIONS: Microalgae for Biomass Production. Nutritional quality and bioactive properties of algal peptides; Bioproduction (biodiesel and biohydrogen); Bioplastics from microalgae.
Lectures: 3 (6 hours)

MICROALGES AND SUSTAINABLE DEVELOPMENT: application of microalgae for wastewater treatment, carbon dioxide capture and utilization, and bioproductions. Bioeconomics of microalgae processes and products.
Lectures: 2 (4 hours)

Metodi didattici
The course includes 3 CFUs (24 hours) of face-to-face lectures.
The face-to-face lectures are conducted in the classroom with the aid of a video projector and PowerPoint presentations and involve the use of web-based platforms to foster student-faculty interactivity and to deliver formative teaching quizzes centered on the lectures just given.

Modalità di verifica dell'apprendimento
Methods and criteria for the evaluation of learning:
The learning assessment consists of a written test during which the student will have to answer two open-ended questions and 20 multiple-choice questions on different topics from the course syllabus.
The assessment will take into consideration not only the acquisition of the course content but also the mastery of the program topics, language property and the ability to make connections between the different course contents.

Criteria for measuring learning and awarding the final grade:
The grade awarded will be 1 point for each multiple-choice question and 5 points for open-ended questions. Honors

will be given for correct answers on all questions administered and in consideration of the level of completeness of the answers to the open-ended questions.

Testi di riferimento
Teaching materials used and recommended teaching materials:
Bold H.C. and Wynne M.J., Introduction to the algae.
Pasqua, Abbate, Forni, General Botany and Plant Diversity, Piccin, Padua, Italy
Evert, Eichhorn, The Biology of Raven's Plants, Zanichelli

Other materials such as scientific journal articles and/or PowerPoint presentations of selected topics will be made available to students as needed

Altre informazioni
Specific Learning Outcomes:
- Knowledge and understanding of algae biology.
- Knowledge of biotechnological applications of microalgae, such as the production of food, molecules with high nutraceutical value, chemicals and biofuels;
- Knowledge of the basic principles of microalgal photobioreactors in light of algal metabolism and the mechanisms and timing of algal growth.
- During the course, the student will also acquire skills for the proper interpretation and comparison of scientific data pertaining to the application of microalgae in various nutraceutical and industrial sectors.
- Through laboratory experiences, the student will acquire skills in the preparation of fresh preparations for the observation of algae through the use of optical microscopy. The student will also gain skills in the preparation of growth media and propagation of algal cultures.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell’Alimentazione e della Nutrizione Umana (2021)	comune	3	BIO/04

Stampa del 02/07/2025

Nutrition for health maintenance [1301003]

Offerta didattica a.a. 2024/2025

Docenti: GRETA LATTANZI

Periodo: Secondo Ciclo Semestrale

Obiettivi formativi
The course aims at provide knowledge about the role of nutrition on human health and the mechanisms of action of food components that are beneficial or harmful to human health with particular attention to new foods. The course allow the acquisition of a global understanding of the problems concerning prevention interventions in nutrition presenting new intervention strategies suggested by the main international organizations (WHO, FAO, WCRF).

Sustainable Development Goals (SDGs – Agenda 2030):
Goal 3. Ensure healthy lives and promote well-being for all at all ages.

Prerequisiti
Knowledge in: food chemistry, biochemistry, molecular biology, physiology, nutritional biochemistry.

Contenuti del corso
Classification of preventive interventions. Evidence-based prevention. Prevention of obesity and chronic diseases (cancer, cardiovascular diseases, neurodegenerative diseases). Critical analysis of nutritional preventive interventions. Foods and beverages as carriers of potentially harmful compounds: anti-nutritional factors, toxins, xenobiotics and toxic compounds resulting from technological treatments. Foods and beverages as carriers of beneficial active compounds: dietary fiber, probiotics, essential fatty acids, phenolic compounds, isothiocyanates, allyl sulfides, carotenoids.

Metodi didattici
The course includes classroom lectures conducted through the use of PowerPoint presentations.
It is also considered a practice exercise during which students will develop a prevention project.

Modalità di verifica dell'apprendimento
The exam consists of a written test (questionnaire consisting of 20 questions with multiple choice answers and open ended questions, lasting 20 minutes).
Students will demonstrate the ability to recognize nutrients and dietary patterns suitable for preventing food-related diseases and to develop targeted prevention interventions.
The evaluation will be based on a 30-point score and the minimum number of correct answers to pass the exam is 12.

Testi di riferimento
Slides and teaching materials provided by the professor
Alimentazione e nutrizione umana (Terza edizione riveduta e aggiornata di fondamenti di nutrizione umana), Mariani, Cannella, Tomassi, Il Pensiero Scientifico, 2016.

Altre informazioni
Knowledge and understanding
Students will acquire theoretical knowledge about the role of correct nutrition in the prevention of pathologies. Students will be able to identify nutrients and know their mechanisms of action, therefore, they will be able to identify the effectiveness of food in the prevention of diseases.

Ability to apply knowledge and understanding
Students will be able to actively participate in the design of interventions aimed at the prevention of diseases with nutritional risk factor.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell’Alimentazione e della Nutrizione Umana (2021)	comune	3	MED/49

Stampa del 02/07/2025

Experimental Data Analysis [1301004]

Offerta didattica a.a. 2024/2025

Docenti: MARCO SANTONICO

Periodo: Primo Ciclo Semestrale

Obiettivi formativi

The course will provide the student with the basic knowledge of statistics necessary for the understanding of the main methodologies for data analysis.
SDGs
Goal 3: good health and well-being
Goal 4: quality education
Goal 12: responsible consumption and production

Prerequisiti

None
Knowledge of the mathematical fundamentals is suggested.

Contenuti del corso

Marco Santonico (32 hours)
Analytical representation of data, calibration and regression, elements of statistics and statistic regression. Analysis of variance. Correlation study. Statistical tests. Data arrays: Multiple Linear Regression, Principal Component Analysis, Principal Component Regression, Partial Least Square. Elements of Pattern recognition. Elements of Experimental Design. Examples of data analysis performed on data provided by sensorial systems applied in food and medical field.

Giorgio Pennazza (16 hours)
Introduction to the instrumental parameters affecting the quality of the experimental data.

Metodi didattici

Lectures (35%) will provide the theoretical basis. Exercises (65%) will consist of the application of the analysis techniques to dataset coming from experiments in the food and medical field.

Modalità di verifica dell'apprendimento

The laboratory activity, which will be carried out during the entire period of the lectures, will allow a constantly learning assessment in a step by step modality with the development of the program. During this ongoing activity, students will have to demonstrate that they know the statistical bases presented in the course and that they know how to use them to analyze the data.Each week the students will apply the data analysis techniques learned in the theory lecture to a database chosen and collected by themselves. The student will be supported by the teacher and tutor during his work in the classroom, in order to verify the ability to correctly apply the methods studied to analyze data and extract useful information.Knowledge will be verified by an oral test where the student will be asked to show the results obtained during the laboratory sessions. The student will have to show the results obtained from the analysis of their dataset using the analysis methodologies learned. The assessment assigned on the basis of the exposure, the mastery and the work done will be in the range from 18/30 to 30/30. The grade will be composed as follows: up to a maximum of 10 points will be awarded for the results obtained in the representation of the data and in the preliminary analysis of descriptive statistics; another 10 points will be awarded considering the results obtained with statistical tests and correlation studies; the last 10 points will be awarded based on the results obtained by multivariate data analysis.

Testi di riferimento

Material provided by the teacher

Further texts
Michael C. Whitlock, Dolph Schluter
The Analysis of Biological Data
W.H.Freeman & Co Ltd

Altre informazioni

Knowledge and understanding skills
The course will equip the student with the basic knowledge of statistics and the main methods of data analysis. The student will thus be able to understand how to manage a dataset from any source to extract its informative content.

Ability to apply knowledge and understanding
The course will provide the student with the ability to extract meaningful information on phenomena related to different fields of application, based on a pondered processing of data obtained from experimental investigations.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell’Alimentazione e della Nutrizione Umana (2021)	comune	6	ING-INF/01

Stampa del 02/07/2025

Biochemistry [1301218]

Offerta didattica a.a. 2024/2025

Docenti: ALBERTO FERRI

Periodo: Primo Ciclo Semestrale

Obiettivi formativi

The course aims to provide the student with the knowledge and understanding of the structure and function of biological macromolecules and of the main cellular metabolic pathways; moreover, the student will receive the necessary tools to understand the role of metabolic pathways in a physiological integration perspective.

Sustainable Development Goals (SDGs – Agenda 2030):
Goal 3: Ensure healthy lives and promote well-being for all at all ages;
Goal 4: Quality Education.

Prerequisiti

Organic chemistry

Contenuti del corso

Role of biochemistry. Amino acids, peptides and proteins. Dissociation of the amino acids: pK and PI. General reactions and specific reactions. Protein structure, denaturation and refolding. Protein function. Proteins that bind oxygen: hemoglobin and myoglobin, oxygen transport and CO2.
Enzymes and Coenzymes: Classification of enzymes, enzyme kinetics, Michaelis-Menten equation. Competitive and allosteric inhibitors of enzymes, Lineweaver-Burk equation. Enzymatic regulation. Role of coenzymes.
Carbohydrates - Mono-, oligo- and polysaccharides. Carbohydrate reserve and structural carbohydrates. Glycoproteins and glycolipids. Lipids: classification of lipids. Fatty acids, saturated and unsaturated. Steroids. Lipoproteins. Biological membranes and cellular compartmentalization. Biosignaling: signal transduction, enzyme and protein G receptors. Metabolic network, Introduction to metabolism. Bioenergetics: Free energy, enthalpy, entropy. The energy metabolism. Electron transporters and respiratory chain. Oxidative phosphorylation and ATP biosynthesis. Inhibitors and uncoupling agents. Glucose metabolism: Aerobic and anaerobic glycolysis. Gluconeogenesis. Pentose phosphate pathway. Krebs cycle. Anaplerotic reactions. Regulation of glucose metabolism. Lipid metabolism: Transport and mobilization of lipids. Beta-oxidation of fatty acids (odd and even number of C, saturated and unsaturated). Biosynthesis of fatty acids, triglycerides, phospholipids. Regulation of lipid metabolism. Protein metabolism. Degradation of endogenous proteins. Transamination, oxidative deamination. Decarboxylation of amino acids. Urea cycle. Nucleic acids, DNA and RNA: the transmission of genetic information and protein synthesis. The post-translational modifications.
Laboratory classes: The course provides students with laboratory experience that introduces to the standard biochemical techniques in the context of the current investigating methods routinely used in a research lab.

Metodi didattici

The course is delivered through lectures (6 CFU), integrated with laboratory activities (2 CFU). It also provides the critical analysis of specific issues, in order to put into practice of the general and integrated biochemistry knowledge, in line with the previously stated educational objectives.

Modalità di verifica dell'apprendimento

The exam consists of an oral examination, during which the writing of formulas, reactions and metabolic pathways described during the course may be required. The exam is aimed to establish the actual degree of learning and capacity of autonomous elaboration of knowledge and skills described in the training objectives. In particular, the test aims to reward the ability to identify the most important aspects of each topic (ie, recognizing the priority of the information for each theme) and expose them correctly but in a synthetic form. The oral examination will evaluate the use of an appropriate terminology and the ability to organically connect the different topics. On this basis the final grading system is formulated in thirties and possible laude.
The ability to apply knowledge and understanding will be achieved through theoretical and practical laboratory classes, and through the critical comments of scientific articles. These will be assessed through written reports on every experience performed in lab classes.
The exam will be passed if the student is able to answer at least sufficiently to all the questions. The final score will depend on the level of the acquired knowledge, the appropriateness of the scientific language and the acquired logical capability in the experimental context.

In particular:
18-23 basic knowledge, poor/modest language skills, poor/medium logical capability
24-27 basic/good knowledge, moderate/good language skills, moderate/good logical capability
28-30 optimal/excellent knowledge, optimal/excellent language skills, optimal/excellent logical capability
30L excellent knowledge, excellent language skills, excellent logical capability

Testi di riferimento

- Nelson e Cox, I Principi di Biochimica di Lehninger, 6° edizione, Zanichelli
- Garrett e Grisham, Biochimica 5a Edizione, Piccin 2014
- Siliprandi e Tettamanti, Biochimica Medica, Strutturale Metabolica e Funzionale, Piccin 2018

Altre informazioni

Knowledge and understanding:
The student will gain a good knowledge and understanding of key biological macromolecules, structure and function of oxygen transporters and metabolic enzymes and their regulation, from the molecular and cellular level up to organs, tissues and systems. Particular attention will be given to the ability to grasp the fundamental aspects of bioenergetics and the integration of metabolic pathways, both catabolic and anabolic, and the role of coenzymes and organic molecules involved in the regulation of cellular and tissue energy homeostasis. The main objective is to develop students' ability to understand the essential aspects of metabolism regulation of carbohydrates, lipids and amino acid in organs, tissues and systems developing an integral knowledge of the general regulation of energy metabolism. Appropriate tools will also be provided for the understanding of the regulatory mechanisms of metabolic reactions in response to nutrition and fasting and pathophysiology of metabolic diseases requiring nutritional intervention.
Ability to apply knowledge and understanding
The students must acquire skills and competencies aimed at applying biochemistry theoretical information and practical skills gained in the appropriate science and technology contexts. In particular, they must be able to cope actively and creatively with common biochemical issues and identify metabolic responses to the composition of the diet in the presence of metabolic defects

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell'Alimentazione e della Nutrizione Umana (2021)	comune	8	BIO/10, BIO/10

Stampa del 02/07/2025

Molecular Biology [1301215]

Offerta didattica a.a. 2024/2025

Docenti: GIOVANNA FRUGIS

Periodo: Secondo Ciclo Semestrale

Obiettivi formativi

The course aims to provide students with knowledge and understanding of the central dogma of molecular biology, that is, how the flow of genetic information passes from DNA to RNA to proteins in prokaryotic and eukaryotic cells, and how genetic information is stored and transmitted to subsequent generations. Particular attention will be given to mechanisms that regulate gene expression at different levels, and to the impact of gene regulation on cellular functions, metabolism and, in the case of multicellular organisms, development.

Sustainable Development Goals (SDGs – Agenda 2030):
Goal 3. Ensure healthy lives and promote well-being for all at all ages;
Goal 4. Quality Education;
Goal 12. Ensure sustainable consumption and production patterns.

Prerequisiti

Basic knowledge of mathematics, physics, chemistry, biochemistry

Contenuti del corso

From the discovery of DNA to the genetic code and structure of nucleic acids (Prof. Frugis)
The origins of molecular biology. Mendel's laws. The discovery of DNA as the repository of genetic information. The determination of the double helix structure of DNA. The central dogma of molecular biology and the discovery of genetic code.
Organization and evolution of genes, chromosomes and genomes (Prof. Frugis)
Structural organization of genetic material: chromosomes and chromatin. Nucleosomes and structural and functional properties of chromatin. Genome concept, structure and organization of genetic information in prokaryotic, eukaryotic and viral genomes. Organization of the genome in mitochondria and chloroplasts.
Genome replication and maintenance (Prof. Frugis)
DNA replication in prokaryotes and eukaryotes, similarities and differences. Semiconservative replication. Identification of replication origins. Replicative DNA polymerases. Replication of telomeres. Control of DNA replication during the cell cycle
DNA repair and recombination (Prof. Frugis)
Mechanisms of DNA damage repair. Cellular response to DNA damage and connections between DNA repair and cell cycle. Homologous or generalized recombination. Gene conversion. Properties and life cycle of lambda phage. DNA transposition.
Transcription and its regulation (Prof. Frugis)
Transcription and regulation of transcription in prokaryotes. Transcription and regulation of transcription in eukaryotes. Promoters and transcription factors. RNA maturation: processing and post-transcriptional modifications of rRNA and tRNA. The maturation of eukaryotic messenger RNA: capping, splicing and polyadenilation. Regulation of splicing, editing and translocation of RNAs from the nucleus to the cytoplasm. Mechanisms of alternative splicing.
Translation and its regulation (Prof. Frugis)
Translation apparatus and its components. Mechanism of protein synthesis. Regulation of translation.

Other levels of regulation: epigenetic and post-translational regulation, roled of non-coding RNA (Prof. Frugis)
Epigenetic regulation: DNA methylation and chromatin remodeling. DNA methylation and gene expression. Regulatory roles of non-coding RNAs. Post-translational modifications and regulation of proteins. Overview of "omics" sciences and systems biology.

Molecular biology techniques (Prof. Baima)
Extraction and purification of nucleic acids.
Qualitative and quantitative analysis of nucleic acids by: spectrophotometry; gel electrophoresis; molecular hybridization (Southern and Northern, microarray).
Amplification of nucleic acids using PCR and real-time PCR.
DNA sequencing (Maxam and Gilbert method, Sanger method, sequence method automation, Next Generation Sequencing).
Molecular cloning techniques: general characteristics of vectors, plasmid vectors, and phagic vectors; restriction

enzymes, ligation, bacterial transformation, recombinant screening; genetic transformation of higher organisms and genome editing (CRISPR/Cas9).

Metodi didattici
Frontal lesson hours: 40
Practice hours: 24

The course includes classroom lessons and laboratory exercises. Innovative/interactive teaching techniques will be applied to maximize and encourage constant confrontation between peers/students and teachers, and to identify the most effective teaching methods from a pedagogical point of view for the specific class group. Links will be made available, through the e-learning platform, for the display of short introductory videos of the topic that will be carried out in the classroom, which will form the basis for the interaction between students and teachers at the beginning of the lesson. The initial discussion will be followed by the presentation of the theoretical contents, around which small demonstration exercises will be organized.
The last part of the lesson, in the final part of the course, will be used for the performance of short thematic seminars by students organized in working groups. The practice hours are dedicated to laboratory experiences for the purification and analysis of nucleic acids. For these experiences students will be divided into groups of about 20-30 and a detailed protocol of the activity will be provided. A report on the activities covered by the exercise is required.

Modalità di verifica dell'apprendimento
Oral exam. Intermediate or final written tests of self-evaluation may be provided.

The exam consists of an oral examination, 20 minutes duration on average, that will cover all the topics covered during the course. On average, three questions will be asked, two on the theoretical part and one on the part of molecular biology techniques. The oral examination will verify the degree of knowledge and understanding: i) of the flow of genetic information from DNA to RNA to proteins in prokaryotic and eukaryotic cells; (ii) how genetic information is stored in the genome and passed on to subsequent generations; iii) the mechanisms that regulate gene expression at different levels and the impact of gene regulation on cellular functions, metabolism and development; iv) the basic methodologies used in molecular biology. Students will have to demonstrate that they have acquired, in addition to the knowledge of the topics covered, an adequate property of language and use of scientific terms, and the ability to recognize the importance of the different molecular processes in the expression of the functional characteristics of a biological organism. Students must also demonstrate that they have acquired the theoretical principles related to the techniques covered by the program, and have fully understood the protocols of the basic techniques for the analysis of nucleic acids covered by laboratory exercises. During the exam the ability to identify the most important aspects of each topic (i.e. recognising the priority of information for each topic), the ability to link different topics of the course and the ability to expose them correctly but concisely will be rewarded.
On a voluntary basis, the student will be able to take intermediate self-assessment tests that will consist of multiple choice questions and true/false questions. In agreement with the student, the evaluation obtained from the intermediate self-assessment test can be considered in the final evaluation.
The votes of 18-22 will be assigned in case a sufficient knowledge of the contents of the course is demonstrated, together with sufficient language properties, modest/poor logical-critical ability and connection between the topics. The votes of 23-26 will be assigned in case of a sufficient /good knowledge of the contents of the course, modest /good language property, modest /good logical-critical ability and connection between the topics. The votes of 27-30 will be attributed in case of very good/excellent knowledge of the contents, very good/excellent language properties, very good/excellent logical-critical ability and connection between topics. The vote of 30L will correspond to an excellent preparation in all aspects.

Testi di riferimento
Teaching material to support the teacher's learning Handouts for the exercises.

Consultation texts
Amaldi, Benedetti, Pesole, Plevani, BIOLOGIA MOLECOLARE, Casa Editrice Ambrosiana (recommended)
Watson, Baker, Bell, Gann, Levine, Losick, BIOLOGIA MOLECOLARE DEL GENE, Zanichelli
Allison, FONDAMENTI DI BIOLOGIA MOLECOLARE, Zanichelli

Altre informazioni
- Knowledge and understanding of the essential aspects of the information flow of the molecules of life, from DNA, to RNA, to proteins.
- Knowledge and understanding of the gene regulation mechanisms that allow the cell to adapt the expression of the information contained in the DNA to nutritional or environmental needs and, in complex organisms, to coordinate the different metabolic activities with growth and development
- Acquire solid knowledge on the molecular mechanisms that regulate genetic characteristics and metabolism
- Ability to understand and apply the basic techniques of molecular biology. Skills acquired with laboratory experience in the manipulation of nucleic acids and in the execution of protocols for molecular analysis with possible applications in the field of food science and nutrition.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell'Alimentazione e della Nutrizione Umana (2021)	comune	7	BIO/11, BIO/11

Stampa del 02/07/2025

Plant Biology [1301115]

Offerta didattica a.a. 2024/2025

Docenti: SARA CIMINI

Periodo: Primo Ciclo Semestrale

Obiettivi formativi

Specific Learning objectives:
Objective of the course is to provide solid knowledge on the morphological organization of plants and on their mechanisms of sexual and vegetative reproduction. The aim of the course is also to provide knowledge on the main plant families and genera used for human nutrition.

SDGs:
Goal n°3: Good Health and Well-being
Goal n°4: Quality Education
Goal n°15: Life on Land

Prerequisiti

No propaedeuticity.

Contenuti del corso

INTRODUCTION TO PLANT BIOLOGY. Autotrophy and eterotrophy. Role of plant foods in human nutrition. Procaryotic and eucaryotic cells.
Lectures: 3 (6 h)
Lab practices: 2 (4 h)

THE PLANT CELL. Plasma membrane. Cell wall: structure and function; cell wall constituents and their interest as foods. Endomembrane system and secretory pathway. Vacuoles: structure and function; storage of plant metabolites including compounds of food interest. Mitochondria. Plastids: structure and function of chloroplasts, chromoplasts and amyloplasts.
Lectures: 10 (20 h)
Lab practices: 5 (10 h)

Nucleus and chromosomes. Cell cycle and division.
Lectures: 2 (4 h)
Lab practices: 1 (2 h)

PLANT STRUCTURE. Hints of anatomy and histology. Shoots, leaves and roots and their interest as foods.
Lectures: 3 (6 h)
Lab practices: 3 (6 h)

PLANT REPRODUCTION. Vegetative and sexual reproduction. Flowers. Seeds; main storage compounds. Fruits. Various kinds of fruits and their interest as foods.
Lectures: 3 (6 h)
Lab practices: 1 (2 h)

PLANTS AS FOODS. Main plant species cultivated as food sources.
Lectures: 3 (6 h)

Metodi didattici

The course includes 6 CFU (48 h) of lectures and 2 CFU (24 h) of practical exercitations.
Lectures will be held in classroom with the help of a projector and PowerPoint presentations and include the use of web-based platforms to encourage student-teacher interactivity and to provide educational quizzes focused on the lectures.
Practical exercitation will be held in didactic laboratories and are made using fresh plant material and optical light microscopes. To carry out these practices, the students will be divided into small groups (about 30 students per group).

Modalità di verifica dell'apprendimento

Knowledge assessment methods and criteria:
The final evaluation will consist of an oral test during which the student must answer at least three questions on different topics of the course program: a question will focus on the plant cell structure; the second question on the structure of superior plants and the third on plant reproduction and food plants. During the final evaluation, the student will have to demonstrate the ability to know the identifying characteristics of the plant cell and of the plant and to apply this knowledge to food products of plant origin.
The evaluation will consider attainment of the course contents, including practical ones, technical language and critical/logic ability to apply the acquired knowledge and the ability to make connections between the different contents of the course.

Criteria for measuring learning and defining the final grade:
The exam will be considered passed if the student is able to answer, at least sufficiently, all the questions. The final score will depend on the level of the acquired knowledge, the appropriateness of the scientific language, the logical-critical skills acquired and the capability to connect different topics of the course. In particular, the grade assigned will be in the intervals indicated below:

18-23 basic knowledge of the course contents, sufficient/medium language skills, poor/medium logical-critical ability and connection between the topics.
24-27 sufficient / good knowledge of the course contents, moderate / good language skills, moderate / good logical-critical ability and connection between the topics.
28-30 very good / excellent knowledge of the contents, very good / excellent language skills, very good / excellent logical-critical and connection skills between topics.
30L excellent knowledge of contents, excellent language properties, excellent logical-critical and connection skills between topics.

Testi di riferimento

Teaching material:
Pasqua, Abbate, Forni, Botanica Generale e Diversità Vegetale, Piccin, Padova
Rinallo, Piante Alimentari, Piccin
Sadava, Hillis, Craig Heller, Hacker, Biologia, vol.4 La biologia delle piante (quinta edizione), Zanichelli
Mauseth, Botanica parte generale, Idelson Gnocchi
Evert, Eichhorn, La Biologia delle Piante di Raven, Zanichelli

More materials such as articles from scientific journals and/or PowerPoint presentations of selected topics will be made available to the students if necessary.

Altre informazioni

- Knowledge and understanding of the plant eukaryotic cell with its characteristic internal organization, as the basic unit of all plants. Understanding and distinguishing the different levels of biological organization: cell, tissue, organ, plant organism and the contribution of each in the characterization of plant-based foods. Knowledge of the main plant species cultivated for human consumption.
- Applying basic biological skills for the analysis and characterization of plant cells and tissues, mostly food species. By laboratory practices, skills for preparation of fresh histological samples and use of light microscopy for the observation and characterization of plant cells and tissues, especially of food interest.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell’Alimentazione e della Nutrizione Umana (2024)	comune	8	BIO/01, BIO/01

Stampa del 02/07/2025

Analytical Chemistry [1301211]

Offerta didattica a.a. 2024/2025

Docenti: SUSANNA DELLA POSTA

Periodo: Primo Ciclo Semestrale

Obiettivi formativi
The course will provide the student with the basic knowledge and fundamentals of analytical chemistry and analytical methods necessary for processing and evaluating analytical data and dealing with errors in chemical analysis.
Sustainable Development Goals (SDGs - Agenda 2030) Goal 2 End hunger, achieve food security, improve nutrition and promote sustainable agriculture.

Prerequisiti
Propedeuticities: Fundamentals of Chemistry exam.
Prerequisites: basic knowledge of Organic Chemistry and Physics.

Contenuti del corso
Part I - Quantitative Analysis.
Errors in chemical analysis.
Mean, median, precision and accuracy. Types of errors in experimental data: Systematic errors and Random errors.
Part II - Spectroscopic Methods.
Introduction to spectroscopic methods.
Properties of electromagnetic radiation and interaction with matter. Absorption process and absorption spectra. Beer's law and its limitations. Emission of electromagnetic radiation.
Instruments for optical spectroscopy.
Instrumental components. Photometers and spectrophotometers for ultraviolet/visible. Spectrophotometers for the infrared. Molecular absorption spectroscopy.
Molecular absorption spectroscopy in the ultraviolet and visible. Absorption spectroscopy in the infrared.
Part III - Chromatographic methods.
Gas chromatography.
Classification of chromatographic methods. Introduction capillary and packed columns, instrumentation, chromatograms, advantages and limitations of gas chromatography (GC). Band broadening theory. Detectors. Qualitative and quantitative analysis.
Liquid chromatography.
Classification of chromatographic methods. High performance liquid chromatography (HPLC). Hints of ion exchange and exclusion chromatography. Instrumentation for HPLC. Bound phase, normal phase and reversed phase chromatography. Optimization of separation. Van Deemter's equation. RIvelators. Qualitative and quantitative analysis.

Metodi didattici
The course is organized into classroom lectures (40 hours) and practical tests (12 hours).
In the classroom lectures, the topics covered will be explained with the help of PowerPoint presentations.
The practical exercises are conducted in a laboratory equipped with the necessary instruments and are organized in several shifts in case the number of students enrolled in the course is >25.
The first exercise involves an application of chemical analysis using the spectrophotometer.
Two other exercises involve applications of chemical analysis through the use of a gas chromatograph and a high-performance liquid chromatograph. A verification report is required to be written and discussed in the final exam.

Modalità di verifica dell'apprendimento
The examination consists of an oral interview designed to test the level of knowledge of the topics covered and assess the ability to use knowledge in describing the fundamental principles of instrumental analytical chemistry and applying them to the analysis of real samples. Students are expected to demonstrate the ability to develop a quantitative chemical analysis method, construct a calibration curve, and clear knowledge of analytical instrumentation, its use and applications in food and nutritional analysis.
The exam will be considered passed if the student is able to answer at least sufficiently all the questions. The grade awarded will depend on the degree of in-depth study of the topics, language property and logical-critical skills

acquired. Specifically, the grade awarded will be in the ranges below according to the learning parameters considered:
18-23 sufficient knowledge of topics, modest ownership of language, modest/poor logical-critical skills
24-27 sufficient/good subject knowledge, modest/good language properties, modest/good logical-critical ability
28-30 excellent/excellent subject knowledge, excellent/excellent language skills, excellent/excellent logical-critical ability
30L excellent subject knowledge, excellent language property, excellent logical-critical ability.

Testi di riferimento
The reference book for the course is:
-D.A. Skoog, D.W. West, F.J. Holler, S.R.Crouch, Fondamenti di Chimica Analitica, 2015, terza edizione, EDISES (Napoli).

The lecturer will provide supplementary material (eg presentations) uploaded in e-learning.

Other texts for comparison/depth study:
-Daniel C Harris, Chimica analitica quantitativa, 2017, terza edizione, Zanichelli

Altre informazioni
Knowledge and understanding skills.
The student will acquire theoretical and practical knowledge of the main instrumental techniques of analysis such as spectroscopic and chromatographic techniques and their possible qualitative and quantitative applications to the analysis of food and biological matrices.
The student will know the meaning and procedures of calculating calibration curves and quality parameters of an analytical method, such as linearity of response, sensitivity, selectivity.
Laboratory activities will enable the student to learn about the main laboratory equipment and how to use instruments.
Ability to apply knowledge and understanding
The student will be able to use the acquired knowledge of analytical chemistry to translate the theoretical information and operational skills acquired in the course into the professional context. In particular, he or she will be able to recognize and apply the various stages of the quantitative analytical method, the principles of operation and the limitations of the instrumentation used.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell’Alimentazione e della Nutrizione Umana (2021)	comune	6	CHIM/01, CHIM/01

Stampa del 02/07/2025

Food Chemistry and nutrients metabolism [1301219]

Offerta didattica a.a. 2024/2025

Docenti: LAURA DUGO

Periodo: Ciclo Annuale Unico

Obiettivi formativi
The course aims to provide adequate knowledge regarding the composition and chemical characteristics of food and dietetic products and on the metabolism of nutrients, the influence of the various components on the properties of food and the transformations related to production processes. Moreover the course aims for the students to understand the interactions between nutrients content in the diet and metabolism. The role of macronutrients and micronutrients in foods will be explained as well as their function in a biological system. Appropriate tools will also be provided for the understanding of the regulatory mechanisms of metabolic reactions in response to nutrition and fasting and pathophysiology of metabolic diseases requiring nutritional intervention. During classes attention will be drawn on the United Nations Sustainable Developmental Goals, specifically N.3 “Ensure healthy lives and promote well-being for all at all ages”, aiming to create concrete links between teaching topics and the promotion of health through diet and healthy food choices.

Prerequisiti
Exams: Foundations of Chemistry, Organic Chemistry.

Contenuti del corso
Program: Food Chemistry (Laura Dugo and Elisa Pannucci) I semester
Introduction to food chemistry. Role of food chemistry in the quality control, evaluation of the authenticity and nutritional value of food. Main constituents of food. Bioavailability and bioaccessibility.
Lipids: classification, chemical and nutritional aspects. Dietary lipids: structure and distribution in foods.
Carbohydrates: classification and role in food. Structure and chemical-physical properties. Fiber: definition and types: soluble fiber and insoluble fiber.
Proteins: general properties of protein food systems. Functional properties. Proteins in food: interaction with other components.
Water: water structure. Classification of water in food: total, free, linked. Water activity. Micronutrients classification and distribution in food.
Nutrients modifications. Lipid degradation phenomena: auto-oxidation, photo-oxidation and enzymatic oxidation. Modifications of carbohydrates: fermentation and cooking of food. Stability and degradation reactions of amino acids and proteins in food, protein denaturation, Maillard reaction, modifications of proteins during cooking, putrefaction.
Olive oil: structure and composition of the olive. Chemical composition and product classification of oils. Extraction techniques. Refining and hydrogenation of oils. Seed oil: general and main seed oils, Margarine, definition and composition.
Milk and derivatives: structural components of milk, caseins and whey proteins, structure of casein micelles, lipids and fat globules. Heat treatments on milk and their effect. Special milks and fermented milk products. Butter: general characteristics, chemical composition, production methods. Cheese: classification and composition, coagulation and chemical modifications during ripening, proteolysis. Main classification criteria. Examples of some types of cheeses.
Cereals and derivatives: chemical composition of the main cereals, distribution of macro and micro components. Cereal proteins: classification and properties. Milling of wheat: flour end semolina. Bred and pasta. Rice, corn, barley, oats, rye.
Legumes, Vegetables and Fruits. Fresh cut products.

Program: Nutrients metabolism (Laura Dugo); II semester
Metabolism and nutrition; body composition, energy needs and balance. Body mass index; basal metabolism; thermogenesis. Digestion and absorption of macronutrients. Glycemic index and glycemic load. Bile acids and bile salts; transport of plasma lipids, lipoproteins; dietary lipids; essential fatty acids and eicosanoids, omega 3, 6 and 9 in nutrition; lecithin; Metabolism of cholesterol and phytosterols. Protein turnover and nitrogen balance; biological value of proteins; glucogenic and ketogenic amino acid; sulfur-containing amino acids, branched chain amino acids; other nitrogenous substances. Ethanol. Vitamins and minerals: metabolic role.
Oxidative stress, ROS and RNS; antioxidant systems. Synthesis and degradation of glycogen. Integration of metabolism: metabolism of the liver cell, muscle, heart, adipose, nerve, erythrocyte. Hormonal regulation of metabolism: hunger/satiety cycle and weight control; chetogenesis; insulin and glucagon, adipokines, gastric hormones. Malnutrition and obesity. Fasting, calorie restriction and autophagy.

Metodi didattici

The course is delivered through lectures (12 CFU), integrated with laboratory activities (2 CFU). Hours of lessons: 80
Practice hours: 12

Modalità di verifica dell'apprendimento

Learning evaluation will be carried out with an oral exam. The exam will evaluate the knowledge of: chemical composition of foods; foods modification having an impact on chemical composition and nutritional value; metabolic response induced by diet; metabolic regulation during fed and fasting.
Adequate scientific language and ability to organically connect different topics from both semester will be kept into consideration in the final evaluation. This will be formulated on a scale from 18 to 30 and eventually “lode”. An intermediate, optional evaluation step will be offered during the exam session at the end of first semester focusing on the Food Chemistry program only.

Testi di riferimento

Module of Food Chemistry:
Cappelli P, Vannucchi V. Principi di chimica degli alimenti – Conservazione - Trasformazioni – Normativa. Zanichelli, Bologna, II ediz. 2024.
Module of Nutrients metabolism:
Pignatti C. Biochimica della nutrizione. Società editrice Esculapio, 2022
Leuzzi, Bellocco, Barreca; Biochimica della Nutrizione, Zanichelli 2013
Verranno messi a disposizione degli studenti i supporti didattici utilizzati in aula (presentazioni power point) attraverso la piattaforma informatica e-learning di ateneo.

Altre informazioni

• Knowledge and understanding of the chemical composition of foods in terms of macro and micronutrients, and of other nutritionally relevant bioactive molecules.
• Knowledge and understanding of specific aspects of food processing that can have an impact on their chemical composition and nutritional value.
• Knowledge and understanding of metabolic responses to diet
• Knowledge and understanding of metabolic regulation in fed and fasting state
• Ability to apply in a nutritional contest the knowledge and understanding of the chemical composition of foods and of the metabolic response to nutrients

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell’Alimentazione e della Nutrizione Umana (2021)	comune	11	CHIM/10, CHIM/10, CHIM/10

Stampa del 02/07/2025

Organic Chemistry [1301112]

Offerta didattica a.a. 2024/2025

Docenti: TECLA GASPERI

Periodo: Secondo Ciclo Semestrale

Obiettivi formativi

This course aims to impart to the student a good knowledge of the basic Organic Chemistry elements. The main classes of organic compounds will be examined, focusing on: their more "formal" aspects, the main chemical and physical properties, chemical reactivity along with the main reaction mechanisms leading to the formation of synthetic products.

Prerequisiti

Students are expected to know the Fundamentals of General and Inorganic Chemistry.

Contenuti del corso

Chemical bond. Resonance. Acids and bases - Arrhenius, Lowry-Brönsted, and Lewis acids and bases. Factors influencing the strength of acids and bases.
Alkanes – Structural isomers. Nomenclature. Conformational analysis. Torsional strain. Cycloalkanes - Structure. Nomenclature. Ring strain. Cyclopropane, cyclobutane, cyclopentane and cyclohexane.
Stereochemistry – Stereoisomers: diastereoisomers and enantiomers. Chirality. Chirality centre. The R/S system. Fischer projections. Compounds containing more than one chirality centre. Meso isomers. Optical rotation. Racemates.
Alkenes – Structure and nomenclature. Geometric isomerism. Cis/trans and E/Z isomers. Stability of cis and trans alkenes. Reactivity addition of hydrohalic acids, addition of water, addition of halogens, palladium-catalyzed hydrogenation. Polymerization reaction.
Alkynes – Structure. Nomenclature. Acidity of terminal alkynes. Alkyl halides – Structure and nomenclature. Acidity of the terminal alkynes.
Alcohols – Structure. Nomenclature. Acidity and basicity of alcohols. Reactivity: synthesis of acetals, synthesis of esters, reaction with Hydrohalic acids (SN1, SN2); elimination of water (E1, E2). Ethers and epoxides – Structure. Nomenclature. Preparation of epoxides from olefins. Acid-catalyzed water addition.
Aliphatic amines – Structure. Nomenclature. Physico-chemical properties. Basicity of aliphatic amines. Aldehydes and ketones – Structure. Nomenclature. Nucleophilic addition reactions: reaction with water, reaction with alcohols. The acidity of C-H bonds alpha to a carbonyl group. Keto-enol tautomerism.
Carboxylic acids – Structure. Nomenclature. Acid-base reactions of carboxylic acids. Fischer esterification.
Carboxylic acid derivatives – Acyl halides; structure and reactivity. Anhydrides: structure. Esters: structure, nomenclature, hydrolysis under basic conditions. Thioesters: structure. Amides: structure, nomenclature and preparation from acyl chlorides.
Aromatic compounds – Benzene. The structure of benzene according to the resonance theory. Aromaticity and Huckel rule. Nomenclature.Substituent effects.
Phenols – Structure. Nomenclature. Ring effect on the reactivity of the hydroxyl group; hydroxy group effect on the reactivity of the aromatic ring. Aromatic amines – Structure. Nomenclature. Ring effect on the reactivity of the amino group; amino group effect on the reactivity of the aromatic ring. Carbohydrates – Classification. Nomenclature. Monosaccharides. The D/L notation. Cyclic structure of monosaccharides. Haworth projections. Mutarotation of D-glucose. Disaccharides: sucrose, lactose, maltose. Polysaccharides: cellulose, starch, glycogen.
Amino acids and proteins – Classification. The D/L system. Acid-base reactions. Peptide bonds. Classification of peptides.
Lipids – Fatty acids: nomenclature. Triglycerides: saponification. Soaps. Catalytic hydrogenation of oils.
Laboratory – The course is integrated with laboratory practices related to some important reactions examined during the theoretical lessons.

Metodi didattici

The course is carried out through lectures in the classroom, using a digital blackboard. Learning verification can be assessed with exercises carried out in class and which will be provided at the end of each topic. The course is integrated with practices laboratory related to some important reactions examined during the course.

Modalità di verifica dell'apprendimento

The examination consists of an oral interview with a minimum duration of 25-30 min. It is focused to verify the

degree of learning of the topics course, by means of drawing of molecular structures and reaction mechanisms and finally the interpretation of the chemical and physical behavior in relationship of functional groups. The assessment of learning involves the awarding of a final grade expressed in thirtieths.
The examination is considered passed with a grade of at least 18/30.
The oral examination is aimed at evaluating the level of knowledge and understanding of students as well their ability of using their way what they learned.

Testi di riferimento

The main manual book for this course is:
Paula Yurkanis Bruice "essential Organic Chemistry,"EdiSES, Naples, Italy

Altre informazioni

This course aims to impart to the student a good knowledge of the basic Organic Chemistry elements. The main classes of organic compounds will be examined, focusing on: their more "formal" aspects, the main chemical and physical properties, chemical reactivity along with the main reaction mechanisms leading to the formation of synthetic products.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell'Alimentazione e della Nutrizione Umana (2024)	comune	6	CHIM/06, CHIM/06

Stampa del 02/07/2025

Cytology Histology and Anatomy [1301216]

Offerta didattica a.a. 2024/2025

Docenti: SIMONE CAROTTI, FEDERICA SPANI

Periodo: Ciclo Annuale Unico

Obiettivi formativi

The course aims at pursuing, among the 17 Sustainable Development Goals (SDGs - Agenda 2030):
Goal 3. Ensure healthy lives and promote well-being for all at all ages
Goal 4. Quality education.
The student, in fact, will reach a solid knowledge base in the fields of Cytology, Histology and Anatomy thanks to cutting-edge teaching methods that use technologcal supports such as the anatomical table and the digital library of histological specimens, but also by participating in the laboratory activities. By this way, he will be able to better understand and deal with both the study of the effects of nutrients on human health and the possible consequences of not-so-good eating habits.

Specific learning objectives:
At the end of the course the student will know the morphological and structural organization of the human body, and the existing relationships at different levels of complexity (cellular, tissue, organ and organism), as well as the close morpho-functional correlations related to the reproduction of animal organisms. Knowledge at the microscopic level of cells and tissues will therefore be integrated with the macroscopic knowledge of organs and systems with their functions. The student will have to acquire that Forma Mentis that allows him to understand how the study of Cytology, Histology and Anatomy of the human body represents the indispensable starting point for understanding the mechanisms underlying physiology. To be able to describe main components and cellular mechanisms, tissues, organs, systems in appropriate scientific language, according to the level established during the lessons.

Prerequisiti

Basic knowledge of biology, chemistry and general physics applied to the principles of functioning of the human body are required as recommended prerequisites. According to the Study Program Regulations, there are no mandatory prerequisites.

Contenuti del corso

Ist semester: Cytology and Histology
Cytology (Spani – lessons). The cell theory and methods of studying the cell: the microscope. Cell shapes and sizes. Overview of the main macromolecules of nutritional interest, their composition and nucleic acids. Cell membranes: chemical composition, fluid mosaic model. Intrinsic and extrinsic proteins. Permeability and active transport. Ion channels. Intercellular junctions: zonula occludens, zonula adherens and desmosomes. Cytoplasmic and secretory pathways, the endoplasmic reticulum, origin and sorting of secretory and membrane proteins. Golgi apparatus. Lysosomes, Peroxisomes. Endocytosis, phagocytosis, exocytosis. Structure of mitochondria and notes on energy metabolism: respiration. The cytoskeleton: microtubules, microfilaments and intermediate filaments. Cilia and flagella. The centrioles. Cell movement. Notes on the nucleus and nucleolus of eukaryotes. The cell cycle: interphase (G1, S and G2 phases) and cell division. Haploid, diploid and polyploid cells. Mitosis in animal cells. meiosis. Phases and subphases of meiosis. Properties of Stem Cells. Cell death: necrosis and apoptosis.
Embryology. Principles of general embryology: stages of the life cycle, gonadal development, gametogenesis (spermatogenesis and ovogenesis), fertilization, segmentation, gastrulation, embryonic sheets and derivatives. Development of the fetus and embryonic adnexa.
Histology (Spani – laboratory). Through the use of virtual aids and access to the virtual histological library, the basic concepts related to epithelial tissue, cells and matrix of tissues of mesenchymal origin, connective tissues proper, and cartilage tissue, bone tissue, blood, immune system and hematopoiesis will be introduced. Muscle tissue and nervous tissue.

II semester: Human Anatomy (Carotti)
Principles of general anatomy. General organization of the human body: body shapes and surface anatomy. General notions on the locomotor system. General classification of bones, joints and muscles. Fundamental systematic anatomy of skeletal segments, joints and muscles with elements of topographic and functional anatomy with particular attention to the axial portion of the human body.
Systematic study of splanchnology. Circulatory system: heart and pericardium, arteries, veins, lymphatics; blood and lymph; spleen, thymus and lymph nodes. Respiratory system: airways, lungs, pleurae. Digestive system: alimentary tract and related glands. Uropoietic system: kidneys and urinary tract. Endocrine system. Male reproductive system:

testicles, spermatic ducts, external genitalia. Female reproductive system: ovaries, genital tracts, external genitalia. Integumentary system. General morphology of the organs with hints of organogenesis; architecture, structure and ultrastructure and elements of functional and clinical anatomy. Clinical and topographic anatomy of the head, neck, thorax, abdomen and pelvis.
Neuroanatomy. General principles and ontogenesis of the nervous system; systematic and functional anatomy of the central nervous system: pathways and nerve centers. Peripheral nervous system; vegetative nervous system; sense organs: eye and ear
Anatomy (Zingariello – Laboratory of Microscopic Anatomy). Through the direct observation of histological preparations and the consultation of the digital histoteca, the microscopic structure of the main organs addressed will be illustrated with particular attention to the digestive system.

Metodi didattici

Knowledge and understanding
The student will acquire a good knowledge and understanding of the organization and structure of the human body from the microscopic level to the macroscopic and system level.
In particular, the first part of the course provides the student with knowledge of the structure and ultrastructure of the cells and tissues that will be integrated with notions of histophysiology and embryology.
This knowledge provides the basis for the second part of the course which deals with the systematic study of organs and systems, with morphological (Systematic and Topographic Anatomy) and morpho-functional contents to prepare the study of the function in the course of Physiology.

Ability to apply knowledge and understanding
The student will acquire skills and competences to translate the theoretical information and operational abilities obtained in morphological sciences to the scientific and technological contexts of the specific professional field; to describe tissues, organs, systems with scientific language; to correlate structure and function, integrating the microscopical study of cells and tissues with the macroscopic study of organs, systems and their general functions; to understand how the study of histology and anatomy of the human body is needed for understanding the physiology.

Modalità di verifica dell'apprendimento

The course is delivered through lectures (80%) and exercises (20%) with laboratory activities at light microscope, using preparations of cell and tissue types, aimed to provide skills in the interpretation of the histological specimens and with practical activities at the Anatomy Virtual Table. Otherwise, laboratory activities can also be enjoyed in the classroom thanks to the use of images of tissue preparations, explaining the distinctive characteristics of each preparation and comparing different tissues with each other.

Testi di riferimento

- Rosati. Istologia. Edi Ermes
- Calligaro et al. Citologia e Istologia Funzionale. Edi Ermes.
- Rizzoli et al. Guida illustrata all'Istologia. Piccin.
- Rosati et al. Embriologia Generale. Edi Ermes
- Carinci, Gaudio, Marinozzi, Morini, Onori. Anatomia Umana e Istologia. Elsevier.
- Saladin. Anatomia e Fisiologia. Piccin
- Netter, Atlante di Anatomia Umana, Elsevier.
- AAVV, Guida alla lettura dell'atlante di Anatomia Umana di Frank Netter, Elsevier
- Colombo R., Olmo E., Cellula e Tessuti, Edi Ermes
- Dalle Donne I., Citologia e Istologia, Edises

Altre informazioni

At the end of the course the student will know the morphological and structural organization of the human body, and the existing relationships at different levels of complexity (cellular, tissue, organ and organism), as well as the close morpho-functional correlations related to the reproduction of animal organisms. Knowledge at the microscopic level of cells and tissues will therefore be integrated with the macroscopic knowledge of organs and systems with their functions. The student will have to acquire that Forma Mentis that allows him to understand how the study of Cytology, Histology and Anatomy of the human body represents the indispensable starting point for understanding the mechanisms underlying physiology. To be able to describe main components and cellular mechanisms, tissues, organs, systems in appropriate scientific language, according to the level established during the lessons.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.

Degree course	Corso di Laurea in Scienze dell’Alimentazione e della Nutrizione Umana (2021)	comune	12	BIO/06, BIO/16, BIO/06, BIO/16

Stampa del 02/07/2025

Comunicazione in Campo Nutrizionale e Agroalimentare [1301221]

Offerta didattica a.a. 2024/2025

Docenti: MARCO MAGHERI

Periodo: Secondo Ciclo Semestrale

Obiettivi formativi
The aim of the course is to provide an adequate basic knowledge to learn about the reputational and media scenario of food, nutrition and agrifood, food and wine production, in order to be able to recognize the elements of value useful for one's professional activity.

SDGs,
Goal 12. Ensure sustainable patterns of production and consumption
12.6 Encourage companies, particularly large multinational corporations, to adopt practices that are sustainable practices and to integrate sustainability information into their annual reports
12.7 Promote sustainable practices in public procurement, in accordance with policies and national priorities
12.8 By 2030, ensure that all people everywhere have the relevant information relevant and proper awareness of sustainable development and a way of life in harmony with nature

Goal 16. Promote peaceful and inclusive societies for sustainable development
16.5 Significantly reduce corruption and abuses of power in all their forms
16.6 Develop effective, accountable and transparent institutions at all levels
16.7 Ensure accountable, open to all, participatory and representative decision-making at all levels
16.10 Ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements

Goal 17. Strengthen means of implementation and renew the global partnership for sustainable development
17.6 Strengthen North-South, South-South, regional triangular cooperation and international and access to scientific discoveries, technology and innovations, and improve knowledge sharing on the basis of agreed modalities through greater coordination among existing mechanisms especially at the United Nations level and Through a global mechanism for access to technology

Prerequisiti
None

Contenuti del corso
• Media diet in the food and nutrition sectors
• Communication in the food sector
• The image of the agri-food sector in public opinion
• DCA: Eating disorders
• The news chain in the agri-food and nutrition field
• The food and nutrition sector in the media and social scenario
• Communication of food and wine productions
• Communication of food and nutrition as a determinant of health
• Nutritainement: food as an experience and as a show business.
• Verbal misrepresentations in advertising and mass media
• Toxicity of poor communication in nutrition and food
• Communication of sustainable nutrition and the Mediterranean diet
• Promotion of the territorial agro-food system
• Creative strategies for the identity of a food and wine product
• Storytelling, health and made in Italy

Metodi didattici
The course includes interactive lectures, workshops for the construction of communication kits through the production of papers by the student for a service / product in the food or nutritional field, testimonials from managers in the sector: institutions, research centers, companies, agencies advertising, television programs, newspapers, producer associations, consumer associations, influencers.
Thanks to the seminar and laboratory activities, research activities and the testimonies of stakeholders, the student will be facilitated in the analysis of the sources and in distinguishing the tools used in the world of communication,

information and advertising to convey instrumental messages to encourage the consumption of products or the use of treatments without an adequate scientific basis.

Modalità di verifica dell'apprendimento
Verification of learning takes place through an oral test that includes questions on the entire course program. It aims to evaluate the acquisition of the expected knowledge and skills and consists of a discussion with questions on all the topics of the program.

Criteria for measuring learning and defining the final grade:
The score of the exam is attributed by means of a mark expressed out of thirty. The criteria that will be taken into account for the formulation of the mark will be: level of knowledge of the program, reasoning skills, language skills and correct use of the language.

Testi di riferimento
The teaching aids used in the classroom (power point presentations) will be made available to students through the university's e-learning computer platform.
AA.VV., Il bias dell'informazione. Infodemia, fake news, echo chamber, Durango Edizioni, 2022

Altre informazioni
- Knowledge and understanding of the tools used by the media to convey messages related to the consumption of food products.
- Knowledge and understanding of the tools used by the media to transmit messages related to health, nutrition and the agri-food sector.
- Knowledge of the mechanisms of fake news, heuristics and cognitive biases in the processing of news about food.
- Ability to apply knowledge and understanding and, in particular, communication methods for effective and correct transmission, based on evidence, of information in the field of nutrition.
- Ability to know how to disseminate scientific knowledge in the agri-food sector in a popular way.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell’Alimentazione e della Nutrizione Umana (2021)	comune	3	MED/49

Stampa del 02/07/2025

Ethics and culture of feeding [13012C3]

Offerta didattica a.a. 2024/2025

Docenti: VITTORADOLFO TAMBONE, FRANCESCO DE MICCO

Periodo: Primo Ciclo Semestrale

Syllabus non pubblicato dal Docente.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell’Alimentazione e della Nutrizione Umana (2021)	comune	2	M-DEA/01

Stampa del 02/07/2025

Physics [1301108]

Offerta didattica a.a. 2024/2025

Docenti: CHRISTIAN CHERUBINI

Periodo: Secondo Ciclo Semestrale

Obiettivi formativi

The Physics course deals with the fundamental concepts of physics, providing the elements for a basic knowledge and understanding of physical phenomena and physical processes and for their correct description in mathematical terms. The main educational objective is the development by the student of the ability to grasp the essential aspects of a physical phenomenon, framing it in a coherent descriptive model and placing it in relation to chemical and biological phenomena of interest for the Science of Nutrition and Food. The main target is to obtain adequate bases for a comprehension of biological processed and food technologies.
Sustainable Development Goals (SDGs – Agenda 2030):
Goal 4. Quality Education.
Goal 12. Ensure sustainable consumption and production patterns

Prerequisiti

None but basic high school mathematics knowledge is required.

Contenuti del corso

-Scientific method, units of measurement, conversions (1 hour).
-one and two dimensional kinematics of point particles, scalars and vectors, angular quantities (4 hours).
-dynamics of point particles: Newton's laws (3 hours).
-Circular motion and gravitation (2 hours).
-Work and energy: kinetic and potential energy (3 hours).
-linear momentum and collisions (1 hour)
-torque, angular momentum, rotational kinetic energy (2 hours).
-equilibrium of bodies (1 hour)
-statics and dynamics of fluids (4 hours).
-Vibrations and waves, sound (1 hour).
-Temperature and heat. The principles of thermodynamics (4 hours).
-Electric charge, electric potential and electric field (4 hours)
-Electric current, electric circuits (2 hours).
-Magnetic fields (3 hours).
-Electromagnetic induction and Faraday and Lenz laws, Electromagnetic waves (2 hours).
-Light waves and geometrical optics. Optical tools (3 hours).
-Exercises on the topics of the course (12 hours)

Metodi didattici

The course consists in theory lectures (around 75%) and frontal exercises (around 25%) carried out with slides and on the blackboard.

Modalità di verifica dell'apprendimento

The exam, taking totally 1 hour and 30 minutes, consists in solving 2 problems and answering a theoretical question on paper. In particular, students must demonstrate that they can apply knowledge and understanding to specific problems and can expose the principal laws and phenomenologies of physics. The two exercises receive in total a score out of 15 as well as the theoretical question.
The total score is obtained adding the two aforementioned scores. A sufficient result starts from 18/30 or higher and such a score is confirmed or modified during the compulsory vision and comment of the examiners with the student during the exam of the test. Also those ones who did not reach a sufficient result can view their exam in this phase. The exam is passed if a score of 18/30 or higher is obtained after such a vision and discussion phase. In such a case, the exam grade coincides with the score. Laude is given if the exam got a score of 30/30 and has been performed in an overall exemplary manner. If it results sufficient (18/30) or higher, the exam grade, if accepted by the student, is recorded electronically and in a paper booklet. On the other hand, if the score is below 18/30, the exam is considered not sufficient. The student does not keep any score and must try another exam session.

Testi di riferimento

-D. Giancoli, Physics: Principles with Applications (7th Edition), Pearson (2013).

-Material made available by the lecturer on e-learning course webpage.

Altre informazioni

-Knowledge and understanding
Student knows the main laws and phenomena of physics, the quantities necessary to describe such phenomena, the physical principles and phenomenological laws that link these quantities and their representation in mathematical terms through laws and principles; he/she is also able to quantitatively evaluate the quantities involved. A test is represented by the final exam.
-Applying knowledge and understanding
The student knows how to translate the theoretical information and operational skills acquired in the field of physics to the scientific and technological contexts of the biological profession. In particular, the student, through the understanding of the fundamental laws of physics, knows how to reinterpret and apply them in the chemical / biological and in the technological / instrumental field. The ability to apply knowledge and understanding to specific problems will be achieved through classroom exercises. Specific examples in line with SDG goals will be addressed. A test is represented by the final exam.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell’Alimentazione e della Nutrizione Umana (2024)	comune	6	FIS/03, FIS/03

Stampa del 02/07/2025

Physiology and Human nutrition physiology [1301314]

Offerta didattica a.a. 2024/2025

Docenti: PARASKEVI KRASHIA, MARCELLO D'AMELIO

Periodo: Ciclo Annuale Unico

Obiettivi formativi
The student will gain a good knowledge and understanding of the human body functions that are essential to the expert of Nutritional Sciences in order to understand the organic dysfunction.
Sustainable Development Goals (SDGs - Agenda 2030):
Goal 3. Ensure healthy lives and promote well-being for all at all ages Goal 4. Quality education.

Prerequisiti
Having passed all the 1st year exams; Having passed the Biochemistry exam and the Cytology, Histology and Anatomy exams of the 2nd year.
The understanding of the principles of human physiology requires a good knowledge of the basics of mathematics, physics, general chemistry, inorganic and organic, cell and molecular biology, biochemistry and human anatomy.

Contenuti del corso
The course takes place over two semesters: the first, Physiology corresponding to 8 CFU; Paraskevi Krashia), and the second, Physiology and Pathophysiology of human nutrition (corresponding to 5 CFU; Marcello D'Amelio). Physiology addresses the basic principles of cellular physiology and organs, and Physiology and Pathophysiology address principles of pathophysiology.
I semester
1) Human Physiology: principles; 2) Cell membranes and transport; 3) electric membrane phenomena; 4) cells and nerve signals; 5) Ion channels; 6) neurotransmission and synaptic plasticity; 7) General properties of the nervous system; 8) Sensory functions and motor control; 9) Autonomic functions; 10) Muscle Contraction (skeletal, smooth, cardiac muscle); 11) Blood and rheological properties; 12) Cardiovascular system and functions; 13) Pathophysiology of nervous and cardiovascular systems.
II semester
1) Respiratory system and gas exchange; 2) Renal system; 3) Gastrointestinal system; 4) Control of intracellular and extracellular pH; 5) Endocrine physiology; 6) Elements of respiratory, gastrointestinal and endocrine pathophysiology.

Metodi didattici
The course is delivered through lectures (100 hours) and frontal/practical exercises (4 hours).

Modalità di verifica dell'apprendimento
The exam consists of a written and an oral test.
The written test consists of 30 questions, of which 20 multiple choice questions and 5 open-ended questions on the entire program. The multiple-choice questions are aimed at ascertaining the knowledge of specific topics; the open-ended questions aimed at ascertaining the level of learning, the ability to reworking of knowledge acquired, of synthesis and the appropriate use of terminology.
The oral examination consists of the discussion of the written test. Such evidence has a dual purpose: it offers students additional possibility of review of the program parts that were unclear from the elaborate correction written and allows the teacher to assign a rating that is as faithful to the preparation. Students will have to demonstrate that they have acquired clear knowledge and understanding of the main normal functions of the human body, be able to solve simple problems of applied physiology and be able to identify the derailment of a normal function in the most common pathological processes.
Written exam evaluation: A score between 0 and 1 point will be assigned to each multiple-choice; each open answer will be scored between 0 and 2. The minimum score for the admission to oral exam is 18 points out of a maximum of 30.
Oral exam and final grade assignment: The final grade will take into account the outcome of the written exam and the oral exam: the commission might add up to 6.0 points to the grade of the written exam; students with a final

written mark equal to or higher than 25/30 might obtain 30/30 cum laude. The points are awarded on the basis of the clarity of the answers and the property of language demonstrated.

Testi di riferimento

For Both Modules
· Vander’s Human Physiology, of Eric P. Widmaier, Hershel Raff, Kevin T. Strang; ISBN: 8808280020
· Human Physiology – Fundamentals, ISBN: 9788870515442
· Slices from the Professors published in the e-learning platform of the University.
For first Module (Physiology)
· From neuron to Brain, of John G. Nicholls, A. Robert Martin, David A. Brown, Mathew E. Diamond, David A. Weisblat, Paul A. Fuchs; Sixth Edition; ISBN: 0878936092

Altre informazioni

Knowledge and understanding
The student will gain a good knowledge and understanding of the mechanisms regulating the functioning of the human body and of the various organs, and the principal human body functions that are essential to the expert of Nutritional Sciences to understand the organic dysfunctions. Hence the reason to associate, within the same teaching, topics related to the Physiology and Pathophysiology of human nutrition (see course content).
Particular emphasis will be given to the mechanisms by which the different organs and systems are functionally related to each other, so as to ensure that the entire body continues to function properly. Additionally, the student will understand the mechanisms of hormonal control of the principal functions of the human body.
The main training objective is to gain knowledge of the mode of operation of the various organs of the human body, their dynamic integration in apparatuses and the general mechanisms of functional control, with particular focus on the physiology of nutrition
Ability to apply knowledge and understanding
The student should gain skills and expertise aimed at knowing how to transfer the theoretical information acquired as part of human physiology to the scientific and technological contexts of an expert in Science of Human Nutrition. In particular, the student should: a) be able to solve simple problems of applied physiology; b) be able to identify, in the most common pathological processes, the alteration of a physiological function; c) being able to predict what type of intervention (nutritional, pharmacological or surgical) will bring benefit to some diseases of the digestive tract.
The ability to apply knowledge and understanding will be achieved by means of theoretical and practical exercises in the classroom, also through the study of scientific articles.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell’Alimentazione e della Nutrizione Umana (2021)	comune	13	BIO/09, BIO/09

Stampa del 02/07/2025

Plant physiology and its relevance for food security and safety [1301214]

Offerta didattica a.a. 2024/2025

Docenti: LAURA DE GARA

Periodo: Secondo Ciclo Semestrale

Obiettivi formativi

The general aims of the course is to improve the knowledge in the students of the logic of living organisms (with specific focus to plants) in particular in order to understand:
- the relation between shape and function,
- the dynamic between endogenous or exogenous stimulus and responses,
- the plasticity typical of living organisms within the limit imposed by genetics,
- the relevance of plant physiology and biochemistry for food security and safety.

Sustainable Development Goals (SDGs – Agenda 2030):
Goal 2. Zero hunger (prioritygoal in the course);
Goal 4. Quality Education (since it promotes in the students knowledge and skills needed to promote sustainable development (target 4.7)).

Prerequisiti

Plant Biology (I year, I semester)
The course also require basic knowledge of Biochemistry

Contenuti del corso

1. Plants as primary producers
The concept of food security
CO2 Fixation. Photosynthesis: light reactions. The Calvin Cycle and its regulatory mechanisms.
The photo-respiratory carbon oxidation cycle.
Mechanisms of CO2 concentration: CO2-HCO3- pumps; The C4 carbon cycle; Crassulacean Acid metabolism.
Effect of the enrichment of atmospheric CO2 on plant productivity, competition between C3 and C4 plants.
Radioisotopic ratio and food analysis
Synthesis of sucrose, cell wall carbohydrates and starch.
Translocation in the phloem from source to sink sites. Mechanisms of phloem loading.
Plant productivity and food security.

2. Mineral nutrition
Water and mineral absorption by the roots. Solution movement through xylem.
Assimilation of mineral nutrient: nitrogen, sulphur, phosphate assimilation. Nutritional problems related to excess of nitrate in plant tissues.
Cation assimilation with particular attention to iron.
Different kind of fertilization.
Radical symbiosis and mineral nutrition: mycorrhizae and N-fixing bacteria.
Uptake of heavy metals and pollutants in plants / food chain.
Effects of mineral nutrition and nutritional value of plants, implication for food safety and food bio-fortification.
Mineral nutrition and hidden malnutrition.
Effects of contaminants and pollutants in food security and safety
Outline of phytoremediation.

3. Plant development
Hormonal regulation in plants:
Auxins, Gibberellins, Cytokinins, Ethylene, Abscissic Acid.
Other metabolites and synthetic molecules with hormonal activities.
Phytoregulators and herbicides in agriculture.
Photo-morphogenesis, Photoperiod and flowering.
Development and ripening of seed and fruit. Synthesis and storage of storing molecules.
Influence of the environmental factors on the physiology and yield of plants of agronomic interest.

Metodi didattici

Lessons (ex cathedra and interactive).

Seminars on hot topics given by experts.
Laboratory experiences.

Modalità di verifica dell'apprendimento

The evaluation of the student's learning will be made by a written text consisting of 30 multiple choice questions and an oral examination: The students are allowed to participate to the oral examination if the rating of the written text is at least 17/30. Ratings of the written text higher than 18/30 do not automatically imply that the exams has been passed. In the oral examination the student must answer to the evaluation committee's questions on the content of the course (both theoretical and practical parts).
The students will have the possibility to participate to a non-compulsory test of auto-evaluation during the course. This test will be composed to quiz to multiple or open answers.
The evaluation procedure ends with a final grade expressed out of 30. The examination is passed when the grade is at least18.
The evaluation will take into account knowledge of the program, properties of languages, logical reasoning and capability to connect different topics.

Testi di riferimento

Rascio e al. Elementi di Fisiologia Vegetale EdiSES
Other reference materials:
Taiz e Zeiger, Fisiologia vegetale, Piccin Editore (or English version); articles and video suggested during the course.

Altre informazioni

Knowledge and understanding skills
- the mechanisms of plant physiology and biochemistry making plants the key component of trophic nets;
- the processes responsible for plant development and productivity,
- the impact of environmental conditions (pedo-climatic conditions, climate changes, presence of contaminants on plant grown, chemical composition and as a consequence, food safety and security,
- the main metabolic pathways responsible for the synthesis and storage of primary metabolites interesting for nutrition.

Ability to apply knowledge and understanding
The student will acquire capabilities and competence for transferring the theoretical knowledge and abilities she/he acquired to the specific and technological contexts typical of food and nutrition. She/he will be able to organize and plan the study with adequate autonomy and effectiveness as well as to work with sufficient level of autonomy in a laboratory interested in analyzing plant tissues/matrixes

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell'Alimentazione e della Nutrizione Umana (2021)	comune	8	BIO/04, BIO/04

Stampa del 02/07/2025

Fundamentals of chemistry [1301116]

Offerta didattica a.a. 2024/2025

Docenti: CHIARA FANALI

Periodo: Primo Ciclo Semestrale

Obiettivi formativi
The aim of the course is to provide the basic concepts of inorganic general chemistry as the foundations of all courses focused on specific chemistry topics.
Sustainable Development Goals (SDGs – Agenda 2030):
Goal 2. Zero hunger
Goal 3. Ensure healthy lives and promote well-being for all at all ages.

Prerequisiti
None

Basic knowledge of mathematics.

Contenuti del corso
Theoretical part (Chiara Fanali)
Introduction: the scientific method, measuring methods, units of measurement, scientific notation, density, temperature, matter and energy, physical and chemical transformations.
Atom structure: electronic configuration of the atom. Form and energy of atomic orbitals. Periodic table of the elements. Periodicity of chemical properties.
The chemical bond: Ionic bond. Covalent bond. Hybridization. Structural formulas and geometry of molecules. Metallic bond. Bond energy. Electronegativity. Weak bonds: dipolar interactions, hydrogen bond, Van der Waals forces.
Chemical reactions: mole, stoichiometry, types of reactions, oxidation number and redox reactions. The solutions: concentrations % w / w,% w / v,% v / v, molarity, molality, normality, solubility, the colligative properties.
The state of matter: the laws of gases, intermolecular forces, liquids, solids, state changes and energy. Chemical thermodynamics: first principle. Enthalpy. Hess's law.
The chemical equilibrium: the law of chemical equilibrium, Kp, Kc and Kx, effect on the equilibrium of pressure, temperature, concentrations, the Le Chatellier principle, phase diagrams with one component. Redox reactions.
Solubility equilibria: solubility of compounds, ionic equations, Kps, applications.
Acids and bases: Arrhenius, Brönsted-Lowry and Lewis theories. Strength of acids and bases. Amphoteric electrolytes. Ionic product of water, pH. pH indicators. Saline hydrolysis. Buffer solutions. Acid-base titration.
Chemical kinetics: speed, order and reaction molecularity. Reaction mechanism. 1st order reactions. Energy profile, activation energy, catalysis, Arrhenius equation. Catalysis.
Electrochemistry: Redox reactions and their balance. Chemical energy vs. electricity: batteries and electrolytic processes. The potential reduction standards and their use. Nernst's law and the calculation of the f.e.m. in standard and non-standard conditions.
Stoichiometric problems (Giovanni D'Orazio)
Stoichiometry exercises on all the theoretical topics covered.

Metodi didattici
6 CFU (48 hours) of lectures, in which the course topics are presented and stoichiometry exercises are carried out which show their application to specific problems. 2 CFU (24 hours) of practical exercises carried out in the Chemistry Laboratory for the preparation of solutions and the measurement of pH and in the classroom through simulation software.
The lectures' blackboard will be uploaded on the course page in the e-learning platform eleraning.unicampus.it.

Modalità di verifica dell'apprendimento
The knowledge and skills related to general and inorganic chemistry are verified through a written and an oral test.
Written test: Consists of 5 of stoichiometry problems to be solved in a maximum of 2 hours, on the arguments developed during the course, aimed at testing the student's familiarity with chemical quantities and skills acquired in using them. The mark, expressed in thirtieths, is valid for the exam session. The positive result (≥18 / 30) of this test allows access to the oral test.
Oral exam: It will focus mainly on the theoretical aspects of the course, in order to evaluate both the understanding

of the fundamental principles of chemistry and the student's ability to apply these principles to real contexts.

Criteria for measuring learning and defining the final grade:
The exam will be passed if the student is able to answer at least sufficiently to all the questions. The final score will depend on the level of the acquired knowledge, the appropriateness of the scientific language and the acquired logical capability in the experimental context.
In particular:
18-23 basic knowledge, poor/modest language skills, poor/medium logical capability
24-27 basic/good knowledge, moderate/good language skills, moderate/good logical capability
28-30 optimal/excellent knowledge, optimal/excellent language skills, optimal/excellent logical capability
30L excellent knowledge, excellent language skills, excellent logical capability

Testi di riferimento

Any text of General Chemistry at university level, like:
Nivaldo J. Tro. Chimica. Un approccio molecolare, II Ed, EdiSES.
K.G. Whitten, R.E. Davis, M.L. Peck, G.G. Stanley CHIMICA GENERALE, IX Ed, Piccin Nuova Libraria.
Stoichiometry exercises:
P. M. Lausarot, G. A. Vaglio, Stechiometria per la Chimica Generale, Piccin

Altre informazioni

Knowledge and understanding
The course aims to provide knowledge: on the atomic bases of chemistry for the construction of the periodic table of elements and for a reasonable prediction on how and why atoms react; on the chemical bond and its correlation with the properties of matter; on the spontaneity or balance of chemical reactions. The main knowledge acquired during the course concern the fundamentals of atomic and molecular theory; the phenomenological theory of ideal gases; the description of solids; of liquids and solutions; the fundamentals of classical thermodynamics, and the elementary thermodynamic description of chemical reactions; acid-base, oxide-reduction and precipitation reactions, the foundations of electrochemistry, the elementary description of the periodic properties of the most important elements for biology; the simple experimental operations of the chemistry laboratory.

Applying knowledge and understanding
The student will be able to interpret the fundamental properties of the elements according to its position in the periodic table, the structure and properties of molecules, the properties of gases and solutions, as well as the basic principles of chemical reactivity. The student will apply knowledgeto solve stoichiometric problems of practical utility (calculation of moles, balance of reactions, limiting reagent, yield, definition of concentration and ways of expressing it, preparation of diluted solutions, electrochemical potentials).

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell'Alimentazione e della Nutrizione Umana (2024)	comune	8	CHIM/01, CHIM/01

Stampa del 02/07/2025

General Pathology and Genetics [1301313]

Offerta didattica a.a. 2024/2025

Docenti: CARLA LINTAS, EMANUELA SIGNORI

Periodo: Secondo Ciclo Semestrale

Obiettivi formativi

Identification of the dynamic interactions between the environment, intended as exogenous chemical-physical-biological pathways and nutrition, and the organism as a whole, intended as an integrated system between genetic and epigenetic inheritance and the dynamic functioning over time of the different organs and tissues, in the context of the biological laws that regulate the initiation, the evolution and effects of pathological processes. Analysis and organization of the causes (etiology) and the genetic and multifactorial mechanisms of onset and development (pathogenesis) of the fundamental pathological processes. Solid knowledge of the molecular mechanisms regulating genetics characters and metabolism. Deep knowledge of mechanisms underlying hereditability. Genetic basis of disease transmission and population genetics. Specific knowledge on fundamentals of pathological mechanisms with particular focus in those related to food and nutrition.

Sustainable Development Goals (SDGs - Agenda 2030):
Goal 3. Ensure healthy lives and promote well-being for all at all ages.

Prerequisiti

Appropriate knowledge gained in the second year courses of molecular biology, biochemistry and biochemistry of nutrition, anatomy and physiology. Mandatory: all exams of the first year passed.

Contenuti del corso

GENETICS
Flow of genetic information: from DNA to proteins; gene expression regulation; chromosomal, genetic and genomic mutations; gene polymorphisms; spontaneous and induced mutations; DNA repair systems. Human chromosomes, structural and numerical anomalies. Mendelian genetics: Mendel's laws and its exceptions; monogenic diseases and multifactorial diseases with particular reference to nutritional disorders. Hardy-Weinberg equilibrium and its deviations. Molecular genetics techniques; pangenomic techniques and functional genomics; main genetic databases: comparative genomics. Epigenetics: histone modifications and DNA methylation; the non-coding RNAs; epigenetic enzymes; role of DNA methylation: transcriptional repression, protection from genomic transposition, genomic imprinting, tissue specific expression, embryonic development. Inactivation of the X chromosome. Epigenetic dysregulation and disease: mutations in methylation enzymes, imprinting defects, defects of promoter methylation; methylation and cancer. Epigenetics, genetics and nutrition. Cancer genetics.

GENERAL PATHOLOGY

Knowledge of the relevance of homeostatic mechanisms and their perturbation in disease states, leading to the three fundamental pathogenetic mechanisms: degenerative, reactive-inflammation and neoplastic. From the definition of health, its homeostatic balance and mechanisms, to disease development, progression and healing. Cellular responses to stress and toxic insults (adaptation, injury, and death). Immune System (innate and adaptive immune response; hypersensitivity reactions, food allergies). Infectious Diseases. Acute and Chronic Inflammation. Tissue renewal, repair, and regeneration. Atherosclerosis, obesity and metabolic disorders. Environmental and nutritional diseases. Aging and senescence. Tumors: epidemiology; classification; from stem cells to carcinogenesis; genetic and epigenetic make-up of tumors cells; mechanisms of cancerogenesis; classification of carcinogens; tumors microenvironment and tumor development; hallmarks of cancer; invasion and metastatization.

Metodi didattici

Lectures (48 hours of Genetics and 48 hours of General Pathology) with slide projection, available for the students at the end of the course; exercises and self-verification tests; stimulation of a discussion on a scientific basis in the aim to develop skills for autonomous and wise judgment capabilities, critical thinking about the information conveyed by a variety of sources, scientific or otherwise, including media and social media, great consideration of the social and ethical responsibilities associated with the one's knowledge in etiopathology. Practical sessions of genetics will be held for a total of 12 hours: the practical work involves practice problems on Mendelian genetics and population genetics.

Modalità di verifica dell'apprendimento

Periodic verification of the level of learning during the semester of lessons, by summarizing, discussing and deepening the topics covered. Final exam with written test with 31 questions of genetics and 31 questions of general pathology, with multiple answers to be chosen among four, and at least 20% open-ended.

Criteria for measuring learning and defining the final grade:
The assessment of learning involves the assignment of a final grade expressed out of thirty and possible honors. To pass the exam, the student must answer at least 18 questions on genetics and 18 questions on general pathology. The exam can be validated only if the student will pass both modules.
Final exam with written test with 31 questions of genetics and 31 questions of general pathology, with multiple answers to be chosen among four, and at least 20% open-ended.

Testi di riferimento

GM PONTIERI. "Elements of General Pathology". IV Edition Ed Piccin, Padua, 2018.
F. MAINIERO, R. MISASI, M. SORICE, G.M. PONTIERI, M.A. RUSSO, L. FRATI, E. Patologia Generale e Fisiopatologia Generale. Tomo I. VI Edizione a cura di F.Mainiero, R.Misasi, M.Sorice Ed Piccin, Padua, 2018
V. DEL GOBBO. "Immunology for health degrees". IV Edition Ed Piccin, Padua, 2013.
QUAGLINO, HORSE, FORNI “Immune defenses”, Piccin Ed., Padua, 2010.

RUSELL PETER J. Genetics: a molecular approach V Ediz. Ed Pearson, Milan, 2019

Altre informazioni

Knowledge and understanding of interactions among nutrition, health and diseases. Development of skills for analysis and application of the scientific knowledge acquired in human etiopathology field, with particular focus in nutrition. Ability to pass from the study of individual reductionist molecular/cellular events, to the integration of the different pathogenetic processes. Skill synthesis and appropriate use of scientific terms and language for communication management of the different levels of knowledge acquired.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell’Alimentazione e della Nutrizione Umana (2021)	comune	13	BIO/18, BIO/18, MED/04

Stampa del 02/07/2025

Geography of Agriculture and Food Market [1301113]

Offerta didattica a.a. 2024/2025

Docenti: ALESSANDRA PESCE

Periodo: Secondo Ciclo Semestrale

Obiettivi formativi
The course aims to provide students with adequate knowledge of the mechanisms that regulate the Food-Agriculture-Environment relationship, to interpret it in the different production and commercial patterns of the different political-social frameworks of the world.

Prerequisiti
Prerequisites: no specific

Contenuti del corso
The analysis of the economic and structural production contexts constitutes the framework within which to present development options and economic policy initiatives to support agriculture and agri-food systems. For these reasons, the differences will be highlighted, also in terms of macroeconomic indicators, between agricultural production systems, capable of representing the geographical contexts of reference.
At the same time, students are provided with a key to the agro-ecological interpretation of the primary production sector, analyzing all the cornerstones that support the diversity and quality of agricultural production.
Agro-ecological issues linked to both the more pragmatic aspects (types of crops, production models, etc.) and theoretical aspects of the food-agriculture-environment relationship will be addressed. A particular focus is dedicated to the analysis of the Community Agricultural Policy (CAP), which determined the development processes of European agri-food systems.
For an accurate understanding of the landscape and the relationship between agriculture and the environment, during the course the elements necessary for the recognition of agricultural production choices, cultivation and breeding techniques and typical quality productions are provided. In this regard, particular attention is given to the sustainability of production processes and consumption patterns, in order to combat food waste and limit the use of natural resources.
Furthermore, the concept of biodiversity and diversity of global production systems is explored in depth.
The richness of Made in Italy, the Mediterranean Diet and the regulations governing the labeling of agri-food products provide further elements for further investigation.

Metodi didattici
Theoretical lessons in the classroom with the help of projections and case study examples.
The course also delves into aspects related to topography and maps, Geographic Information Systems and databases.
Furthermore, exercises on land use and ecosystem services will be developed.

Modalità di verifica dell'apprendimento
The exam consists of an oral test based on the topics covered during the lessons.
During the exam, the presentation of a group work carried out using the tools and notions learned in the course will be required. The presentation will be carried out in groups of students, who can present it independently in the various sessions.
The score of the exam is attributed by means of a vote expressed out of thirty.
Criteria for measuring learning and defining the final grade:
To achieve a minimum mark of 18/30, the student must demonstrate a basic knowledge of all course topics.
In order to achieve a mark of 27/30 or higher, the student must demonstrate that he/she has an excellent knowledge

of all the topics, has participated in the didactic-scientific activities proposed durg the course and has prepared a paper on the theme of food-agriculture-environment

Testi di riferimento
Handouts and in-depth bibliographical material will be distributed during the lessons.
We recommend: M.G. Grillotti Di Giacomo, Nutrire l’uomo, vestire il pianeta. Alimentazione-Agricoltura-Ambiente tra imperialismo e cosmopolitismo, Milano, Angeli, 2018. Further texts will be recommended during the lessons.

Altre informazioni

• Knowledge and understanding of the relationship between food, agriculture and the environment in the different types of rural landscapes, with the identification of their structural, social and economic characteristics through a professional approach and adequate skills both for designing and supporting to solving problems in the delicate relationship between food and agriculture.
• The student will be able to evaluate and understand the dynamics that make landscapes, incomes, and food and wine, making use of a broad and complete vision of the reality linked to agricultural production.
• Ability to collect and analyze data relating to the structural, economic and social characteristics of Italian agricultural systems useful for building autonomous judgments, included the reflection on related social, scientific or ethical issues. Judgment autonomy will be verified through oral or written tests.
• Knowledge of agricultural production patterns capable of strengthening the sustainability of production.
• Ability to possess adequate knowledge of food supply chains and their evolution over time, also thanks to the understanding of the development policies implemented.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell’Alimentazione e della Nutrizione Umana (2024)	comune	5	M-GGR/01

Stampa del 02/07/2025

Gestione e Alimentazione nella ristorazione collettiva [1301007]

Offerta didattica a.a. 2024/2025

Docenti: ALESSANDRO MARINI

Periodo: Secondo Ciclo Semestrale

Obiettivi formativi

The course provides basic knowledge regarding the meaning and fundamental aspects of collective catering. Starting from the fundamental aspects of merchandising, the topics dealing with the new orientations of food consumption, catering management and sustainable nutrition in relation to food waste are examined.

Prerequisiti

Course participants must have basic knowledge of food hygiene regulations and the application of the self-control method (HACCP).

Contenuti del corso

Programme:
1. Community Catering
Definition, evolution and current situation. History, market and legal aspects of the food service areas.
Management models: self-management and outsourcing service.
2. Definition and product design
Consumer identikit . Study of the needs, perceptions and expectations.
Design of a catering service; fundamentals, the basic functions.
The marketing plan.
Planning a community catering menu: nutritional, food and economic aspects.
The concept of "standard portion". Food properties related to the cooking method: an overview of functions.
3. Human Resources Management (HRM)
Organization chart; compensation, hiring, performance management, organization development, safety, wellness, benefits, employee motivation, communication, administration, and training.
Management of human resources and interpersonal conflicts.
The role of the nutritionist in collective catering: possible professional outlets within companies and in the public sector (designer for tenders; contract execution management; canteen team leader).
Training of food handlers
Basic principles of safety at work. Occupational hazards in the catering sector
Basic principles of Work Health and Safety. Work risks in the mass catering.
4. Quality Management System: design and development of "self-control" system
Application of food hygiene standards: analysis of the HACCP manual; the seven principles and their applications, developing flowcharts.
Work Organization in the Mass Catering.
5. Raw Materials Management
Supply management.
Supplier selection criteria.
Reception of goods and warehouse management.
Food Traceability.
Initiatives to prevent food waste?
6. The Food Production and Distribution Chain- Community Catering Operations
Production systems: Temperature Danger Zone, Hot Food Zone, Frozen Food Zone, Vacuum.
Distribution systems: direct and deferred catering.
7. General specifications for all food stuffs
Food assessment
Characteristics of different types of community nutrition
Product specifications
Commodity requirements of foodstuffs as set out in the Special Tender Specifications (SCA)
Controls to be implemented for conformity assessment
8. Tender specifications and service management
The role of the designer for tenders.
How to prepare a technical project
The designer for tenders - exercise: test of elaboration of a technical project and food education with scoring to win the tender.

Metodi didattici

The course includes frontal lessons. Practical activity, such as the drafting of flow charts for HACCP and a draft of tender specifications, indicating the product requirements of food supplies, assuming a tender for the service.
The programme also includes visits to catering establishments chosen by the teacher.
Each student will have to examine a choose catering establishment, analysing the management model and the type of service offered. Through observation, the re-elaboration of the data collected, and the drafting of a thesis, the student will have the opportunity to assimilate the theoretical contents explained in the lessons.

Modalità di verifica dell'apprendimento

The verification of the achievement of the training objectives is based on an oral exam and the level achieved is provided with an evaluation.
The elements taken into consideration for the attribution of the final grade are the following:
1. the student's ability in solving the proposed question: 25%;
2. the correctness of the procedure identified for the solution of the question: 25%;
3. the appropriateness of the proposed solution in relation to the skills acquired: 25%;
4. the interconnection between the various aspects inherent in the subjects dealt with: 25%.

Testi di riferimento

Teaching materials used and recommended teaching materials:
Alimentazione nella ristorazione collettiva Gestione, qualità e sicurezza. Grazia Dalla Torre, Lucia Maddaloni, Roberto Ruggieri, Giuliana Vinci - Edizioni Nuova Cultura 2021

Altre informazioni

Acquisition of a methodological approach appropriate for highly qualified activities in the field of Catering Management.
Knowledge of the possible professional outlets for a nutritionist in collective catering: designing tenders; contract execution management; plant manager.
Students must be able to apply the knowledge acquired as part of the degree course through the study of a commercial, institutional, health, etc. organization in the catering sector, in order to demonstrate a professional approach to their work.
Knowledge of how to draw up a technical project for a tender in the catering sector.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell’Alimentazione e della Nutrizione Umana (2021)	comune	3	SECS-P/13, SECS-P/13

Stampa del 02/07/2025

Hygiene and Food Hygiene [1301111]

Offerta didattica a.a. 2024/2025

Docenti: TOMMASANGELO PETITTI

Periodo: Ciclo Annuale Unico

Obiettivi formativi
The student is expected, in this course, to achieve an adequate level of knowledge of the fundamental elements of the discipline of hygiene and its applications in public health and food production.
The main objective is the achievement of a thorough knowledge and understanding of: epidemiological method and different study models (and risk measurement); methods of proven effectiveness in the prevention and control of risks to human health and populations (biological, chemical and physical risk), with particular focus on the prophylaxis of infectious diseases, those with food transmission (infections, poisoning and food poisoning) and multi-factorial diseases (secondary prevention methods and models); methods of managing food safety and quality and risk prevention, with particular reference to techniques for the conservation and prevention of food contamination (microbiological, chemical and physical); regulatory sources on food safety and quality, together with the ability to understand the most relevant indications deriving from it, for the training and correct management of personnel, in addition to the different types of official controls (and methods applied). Furthermore, he must possess solid knowledge of the hygiene-sanitary controls of food processing and storage environments, as well as on the correct hygiene-sanitary procedures for food conservation and transformation. Finally, he will possess methodological basis for evaluating food safety of innovative systems for the production of food matrices (for example proteins) which allow to guarantee all people, especially the poor and the most vulnerable people, including infants, safe access to nutritious and sufficient food throughout the year.

Sustainable Development Goals (SDGs - Agenda 2030):
Goal 2. Zero Hunger

Prerequisiti
Prerequisites: none.
The Food Hygiene and Hygiene Course recognizes pre-requisites: for a complete and correct understanding of the principles of hygiene, preventive medicine and food hygiene, the basic elements relating to admission to a first year of Degree Course, starting from basic knowledge (relating to the previous school cycle) for the disciplines of biology and chemistry.
In any case, during the course it is expected to be able to provide the student with all the elements necessary for a gradual introduction to the specialized topics of the course itself.

Contenuti del corso
The Food Hygiene and Hygiene Course has the following program:
• definition and methods of hygiene and applications in public health;
• elements of epidemiological methodology: the health / disease continuum; the natural history of the disease and the methods of investigation. Objectives of descriptive, constructive and experimental epidemiology. Types of epidemiological studies and models. Epidemiological indicators. Frequency measurements in epidemiology. Risk measures;
• prevention: times and methods. Primary, secondary and tertiary prevention tools;
• definition of epidemic: the study of epidemic events. Investigation methods applied to the epidemic. Epidemiological surveillance;
• epidemiology and prophylaxis of infectious diseases. Methods of prevention: mandatory notification of infectious diseases; diagnostic assessment and epidemiological investigation; isolation and default; cleaning and sanitizing; disinfection and sterilization; disinfestation. Active and passive immune prophylaxis: vaccinations and vaccines. Deepening of some main pictures of infectious diseases (of greater epidemiological importance, for the populations);
• epidemiology and prevention of the main multi-factorial diseases;
• types of risks (physical, chemical, and biological) in the health environment, for the health professions and other professions. Methods of prevention.
• environmental hygiene: main sources of pollution and prevention methods. The water. Waste management;
• principles of health organization: the National Health Service (SSN); hints of comparison with the international organization. Evaluation of the quality and performance of health services;
• territorial organization: the Prevention Department of ASL Companies, the Food Hygiene and Human Nutrition Service (SIAN);
• Evidence-based Prevention and Public Health (EBPH) prevention (and health promotion) practices. Health

education, with particular reference to the human nutrition sector;
• hygiene and safety of food production, also of atypical or innovative productions;
• foodborne infectious diseases: food poisoning and toxic infections;
• microbial growth factors and food spoilage control mechanisms; conservation techniques;
• chemical contamination and physical contamination of food;
• specific risk assessment for the main food categories;
• controls for food safety and quality: quality management systems. The system of self-control of food hygiene (HACCP);
• health and hygiene assessment of water intended for human consumption;
• hygiene of work and production environments: technical-structural requirements; the cleaning and sanitizing program. The other methods of prevention applied to the environment. Staff hygiene; training;
• national and international legislation and technical regulations on food hygiene and health safety (including the biotechnology sector); traceability, certification and food safety;
• official food controls. Notes on the application of the main laboratory methods;
• food technology: applications to the issue of safety and hygiene of food production;
• nutrition hygiene: nutrients and balanced diet; notes on the epidemiology of obesity and related health risks in populations. Nutritional surveillance and prevention methodologies based on evidence of efficacy.

Metodi didattici

Types of educational activities envisaged and related methods of carrying out:
For this Course, frontal didactic activities are provided, with classroom lessons, accompanied by seminars and any theoretical-practical insights, which will be evaluated based on the progress of the activities in comparison with the group-students. These moments will not, under any circumstances, exceed 5% of the compressive teaching load. The University's eLearning platform will also be used for the insertion of teaching material, supplementary material, and the eventual experimentation of forms of learning on the web platform itself. Finally, visits to external structures (or seminars - also in Webinar mode - in the presence of Experts from external structures) that operate in the field of collective catering, primary production or food processing can be organized during the Course.

Modalità di verifica dell'apprendimento

Learning evaluation methods and criteria:
The assessment of learning will take place through a questionnaire consisting of 30 multiple choice questions (15 for the general hygiene part and 15 for food hygiene) completed online on the university's eLearning platform. The duration of the test will be 30 minutes. Questions are randomly sampled from a large database of questions spanning all course topics. The questionnaire aims to evaluate the knowledge possessed by the student with respect to all topics from the course program; it also has the objective of evaluating the ability to apply knowledge in real contexts, by formulating problems to be solved or situations to be interpreted.
There is an "intermediate self-evaluation test" to be organized upon completion of the first part of the educational program, which aims to evaluate, with the help of the teacher, the learning outcomes achieved.

Criteria for measuring learning and defining the final grade:
The written exam using multiple-choice quiz tests is specially prepared in such a way as to be able to verify the level of learning on the various topics covered by the Integrated Course, with the number of questions proportionate to each part of the educational program (15 for General Hygiene and 15 for food hygiene). A point is assigned to each correct answer and a bonus point is assigned, in order to have a grade of 30 and honours with 30 correct answers; grade 30 with 29 correct answers and so on, up to grade 18 with 17 correct answers. With fewer than 17 correct answers, the exam is deemed not to have been passed.

Testi di riferimento

• Ricciardi G. et al. “Igiene per le lauree triennali e magistrali”. (Manuale di Igiene) Idelson-Gnocchi Ed., Napoli, II Ed. 2020
• Ricciardi G. et al. “Igiene - Medicina Preventiva - Sanità Pubblica”. (Trattato di Igiene) Idelson-Gnocchi Ed., Napoli, III Ed. 2021
• Ricciardi G. et al. “Igiene per le Professioni Sanitarie”. (Manuale di Igiene) Casa Ed. Sorbona - Idelson-Gnocchi, Napoli, I Ed. 2014
• Comodo N., Maciocco G. “Igiene e sanità pubblica - Manuale per le professioni sanitarie”. Carocci Ed., Roma 2011
• Kramer J., Cantoni C. “Alimenti, microbiologia e igiene”. Casa Ed. Tecniche Nuove, 2011
• Roggi C., Turconi G. “Igiene degli alimenti e nutrizione umana. La sicurezza alimentare.” EMSI Ed., Roma 2009
• Bertoldi A., Galli A., Franzetti L. Igiene degli alimenti e HACCP. Aggiornato alle più recenti disposizioni legislative. Modelli applicativi. EPC Ed., Roma 2017

Altre informazioni

In general, regarding learning capacity, the following is assessed: development of the ability to learn the working method of epidemiology and hygiene, applied to public health, in the analysis of health-disease phenomena and risk prevention, together with methods for the management of safety for the preparation, storage, handling and administration of food
In the specific of the ability to apply the acquired knowledge and understanding, for the student it is expected that the theoretical and practical knowledge are applied to the main types of health risks.

In acquiring the tools of descriptive, analytical, and evaluative epidemiology and measures of disease frequency and risk, as well as on protective factors and positive determinants of health - in order to provide practical application - it will be possible to prepare, with a guided method, simple schemes of epidemiological investigation concerning some of the most relevant risk and risk factors for food and proceed with the analysis of scientific reports (and articles) on the subject.
The knowledge concerning the methods of proven effectiveness will be applied through the guided analysis of real or simulated risk situations. The knowledge acquired on the methods of food safety management and on the principles of hygiene and safety in the workplace and the training of personnel (food preparation workers) will be applied through the guided drafting and reading of risk analysis schemes and point classification control critics (flowcharts) and the analysis of self-control plans.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell'Alimentazione e della Nutrizione Umana (2024)	comune	6	MED/42, MED/42

Stampa del 02/07/2025

General English [13012C5]

Offerta didattica a.a. 2024/2025

Docenti: ROBERTA ARONICA

Periodo: Primo Ciclo Semestrale

Obiettivi formativi
The course is aimed at strengthening knowledge of the foreign language. The aim is to go into depth in grammatical structures and syntax in preparation for the B2 CEFR level. The teaching activities are taught by native speakers who collaborate with the University Language Centre.

Prerequisiti
Each student must have passed the first year General English test in order to take the second year exam. Students with language certifications – issued no longer than three years previously by one of the following Exam Certifiers: Cambridge Assessment English; LinguaSkill; City and Guilds, Pitman; Edexcel / Pearson Ltd; IELTS; TCL Trinity College London; TOEFL ET – of level B2 or higher can obtain exemption by submitting an application to the attention of the University Language Center (cla@unicampus.it).

Contenuti del corso
In the 1 CFU, one semester curricular course, logical-grammatical structures and English vocabulary are studied in depth in order to allow to achieve the goals associated with this course.

Metodi didattici
The course is delivered through lectures and classroom exercises according to English language level.

Modalità di verifica dell'apprendimento
Final exam.
Learning assesment is carried out via a written test consisting of grammar exercises, text comprehension, writing and listening.

Lexical and grammatical knowledge and skills related to comprehension and written production are evaluated through a written test and a listening test with a respective open-ended comprehension questions at course level. Communication skills (speaking) are assessed by the teacher during the course through interactive activities. The test is evaluated on a pass or fail basis. To be awarded a pass grade, the student must obtain a total score equal to or greater than 60%.

Testi di riferimento
The teacher will provide the teaching material during the course.

Altre informazioni
At the end of the course, each student must demonstrate that they have progressed by at least one micro-level in preparation for the B2 CEFR.

Knowledge and understanding
At the end of the course, the student should be able to:
- read and understand texts in English and answer comprehension questions;
- understand conversations and answer questions about what has been heard;
- produce a written text on a general topic of at least 100 words.

Ability to apply knowledge and understanding
The student will be encouraged to develop a critical approach in their comprehension capabilities by listening to English audios and in written production through teaching methods gradually introduced during the course. Students will be urged to independently self-correct their own papers while verifying the level of understanding of other texts analyzed during the frontal lessons.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell'Alimentazione e della Nutrizione Umana (2021)	comune	1	L-LIN/12

Stampa del 02/07/2025

General English [13011C6]

Offerta didattica a.a. 2024/2025

Docenti: ROBERTA ARONICA

Periodo: Ciclo Annuale Unico

Obiettivi formativi
The course is aimed at enhancing knowledge of the foreign language. The object of the course is to go in depth in grammatical and syntactic structures associated with English level B1 CEFR, assigned as the minimum educational, course objective. The teaching activities are taught by native speakers who collaborate with the University Language Centre.

Prerequisiti
Each student is required to take a placement test to identify their initial level of English language. Students with language certifications – issued no longer than three years previously by one of the following Exam Certifiers: Cambridge Assessment English; LinguaSkill; City and Guilds, Pitman; Edexcel / Pearson Ltd; IELTS; TCL Trinity College London; TOEFL ET – of level B1 or higher can obtain exemption by submitting an application to the attention of the University Language Center (cla@unicampus.it).

Contenuti del corso
In the 2 CFU, annual, curricular course, logical-grammatical structures and English vocabulary are studied in depth in order to achieve the goals associated with this course.

Metodi didattici
The course is offered in the classroom through lectures and exercises.

Modalità di verifica dell'apprendimento
Final exam
Learning assessment is conducted via a written test consisting of grammar exercises, text comprehension, writing and listening.

Lexical and grammatical knowledge and skills related to comprehension and written production are evaluated through a written test and a listening test with a respective open-ended comprehension questions at course level. Communication skills (speaking) are assessed by the teacher during the course through interactive activities. The test is evaluated on a pass or fail basis. To be awarded a pass grade, the student must obtain a total score equal to or greater than 60%.

Testi di riferimento
The teacher will provide the teaching material during the course.

Altre informazioni
By the end of the course, the student must have acquired a minimum level of English B1 CEFR.

Knowledge and understanding
At the end of the course, the student should be able to:
- read and understand texts in English and answer comprehension questions;
- understand conversations and answer questions about what has been heard;
- produce a written text on a general topic of at least 100 words.

Ability to apply knowledge and understanding
The student will be encouraged to develop a critical approach in their comprehension capabilities by listening to English audios and in written production through teaching methods gradually introduced during the course. Students will be urged to independently self-correct their own papers while verifying the level of understanding of other texts analyzed during the frontal lessons.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell'Alimentazione e della Nutrizione Umana (2024)	comune	2	L-LIN/12

Stampa del 02/07/2025

Inglese tecnico scientifico [13013C2]

Offerta didattica a.a. 2024/2025

Docenti: ROBERTA ARONICA

Periodo: Secondo Ciclo Semestrale

Obiettivi formativi
The course is aimed at the use of the English language in the context of topics relating to food and human nutrition.

Sustainable Development Goals (SDGs - Agenda 2030):
Goal 3: Ensure health and well-being for everybody at all ages.

Prerequisiti
Each student must have passed the first and second year General English tests in order to take the final exam.

Contenuti del corso
In the 1 CFU annual, curricular course, some issues relating to human health and nutrition are addressed in order to acquire a good level of technical language.

Metodi didattici
The course is delivered through lectures and group exercises.

Modalità di verifica dell'apprendimento
Methods and criteria of learning evaluation:
Final exam
Learning assessment is carried out through the production of a written text based on technical questions. Each student can take, at the end of each semester, a similar intermediate test aimed at verifying the achievement of their first learning objective.

Criteria for learning assessment and awarding the final mark
Lexical and grammatical knowledge and skills related to comprehension and written production are evaluated through a written test and a listening test with a respective open-ended comprehension questions at course level. Communication skills (speaking) are assessed by the teacher during the course through interactive activities. The test is evaluated on a pass or fail basis. To be awarded a pass grade, the student must obtain a total score equal to or greater than 60%.

Testi di riferimento
The teacher will provide the teaching material during the course.

Altre informazioni
At the end of the course, the student must have acquired the ability to report on issues relating to health and nutrition in English.

Knowledge and understanding
By the end of the course, the student should be able to:
- read and understand scientific texts in English and answer comprehension questions;
- interact with the teacher and with the class on topics related to health and nutrition.

Ability to apply knowledge and understanding
The student will be encouraged to develop a critical approach in understanding scientific texts.

Independent judgement making
The student will have to choose between various topics related to health and human nutrition and go into depth in their fundamental aspects

Communication skills

The student will need to develop the ability to relate on their chosen topic with an appropriate technical language.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell'Alimentazione e della Nutrizione Umana (2021)	comune	1	L-LIN/12

Stampa del 02/07/2025

Laboratorio di Analisi degli Alimenti [1301222]

Offerta didattica a.a. 2024/2025

Docenti: GIOVANNI D'ORAZIO

Periodo: Secondo Ciclo Semestrale

Obiettivi formativi
The course aims to provide experimental skills through the use of chemical and analytical techniques for food analysis.

Prerequisiti
Prerequisites: basic knowledge of general chemistry and analytical chemistry.

Contenuti del corso
Part I:
Application of extraction techniques for the recovery of bioactive molecules from food samples.
Part II:
Application of spectrophotometric assays to determine the concentration of analytes in the extracts obtained.
Application of spectrophotometric assays to determine the antioxidant power of extracts.
Part III:
Application of separation techniques for the determination of analytes in the extracts obtained.

Metodi didattici
The course is organised in practical laboratory tests preceded by brief theoretical explanations. The exercises will be carried out in a laboratory equipped with the necessary instruments.

Modalità di verifica dell'apprendimento
The exam consists of an oral test during which reports on the activities carried out, requested by the lecturer at the end of the course, will be discussed. The theoretical and practical skills acquired will be assessed.

Testi di riferimento
Teaching materials will be made available to students during the course.

Altre informazioni
Acquisition of theoretical and practical knowledge about the use of analytical techniques for qualitative and quantitative analysis of compounds in food matrices.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell’Alimentazione e della Nutrizione Umana (2021)	comune	3	CHIM/01

Stampa del 02/07/2025

Mathematics and Computer Science [1301107]

Offerta didattica a.a. 2024/2025

Docenti: CHRISTIAN CHERUBINI, SIMONE GRASSO

Periodo: Primo Ciclo Semestrale

Obiettivi formativi

The specific objectives of the integrated course regard the acquisition of knowledge and operational and methodological fundamental aspects of Mathematics and Computer science to understand, interpret, describe and solve problems of food sciences and human nutrition, paying particular attention to biological processes and food technologies.

Sustainable Development Goals (SDGs - Agenda 2030):
Goal 4. Quality Education;
Goal 12. Ensure sustainable consumption and production patterns.

Prerequisiti

Prerequisites: none but for the part of Mathematics, knowledge of basic topics generally carried out in higher schools is required. If there are additional educational obligations (OFA) in Mathematics, one must refer to the respective regulations.

Contenuti del corso

Mathematics (Cherubini)

Functions. Domain and range. Plot of a function. Increasing and decreasing functions. Injective functions. Odd and even functions. Invertible functions. Construction of the inverse function. Transformations of a function’s plot. Linear, quadratic and general power laws. Exponential and Logarithm. Elementary exponential and logarithmic equations. Trigonometric functions: sine, cosine and tangent with plots and main properties. Logarithm as inverse of the exponential law. Inverse trigonometric functions. Solution of elementary trigonometric equations. Applications of the previous functions to physical, chemical and biological phenomena. Limits and their properties. Definition of the derivative of a function. Mathematical, geometrical and physical interpretations. Derivative rules. Applications of the derivative to the study of functions. Short outlines on ordinary differential equations and Taylor series. Definition of the integral of a function. Definite and indefinite integrals. Integration rules. Basic concepts of probability and statistics. Events. Relative frequency. Independent events and conditional probability. Random variables and Probability Distributions: Binomial and normal distributions. Data representation. Histograms. Mean value, Median and Mode, variance and standard deviation, Least squares method and regression line (40 hours).

Exercises (12 hours)

Computer Science (Grasso)

Introduction to computer science: definition of information, information processing, algorithm, binary code. Information processing system: history and architecture of computer, operating system architecture, word processing programs and spreadsheets. The networks: structured networks, the Internet, the search for information, the HTML language. Introduction to programming: programming languages, data structures, binary logic, iterators, functions, classes, pseudo-code (8 hours).

Exercises integrated with theoretical and practical activities (12 hours)

Metodi didattici

Concerning the part of Mathematics, the course consists in lectures (around 75%) and frontal exercises (around 25%). For the Computer Science part, the course consists in lectures (around 40%) and frontal exercises integrated with theoretical and practical activities for the module (around 60%). The course also includes the analysis of case studies regarding specific issues, as a moment of deepening and applying the knowledge previously acquired, in line with the previously indicated specific learning objectives.

Modalità di verifica dell'apprendimento

The single exam, taking totally 2 hours, consists for the mathematics part in solving in 75 minutes 2 structured problems on paper, also requiring, if necessary, the use of theoretical arguments. The Computer Science part consists in answering in 45 minutes on paper 1 question of a practical nature and some questions of theoretical nature. Students shall show to know and use the methods and fundamental techniques of Mathematics, with particular attention to differential and integral calculus for functions of one real variable and theoretical notions and the knowledge of computer science skills necessary to use at higher level a computer.

Criteria for measuring learning and defining the final grade:

The part of Mathematics receives a score out of thirty as well as the Computer Science one. A sufficient result is obtained if a score of 18/30 or higher is obtained for both the two parts and in this case these scores are confirmed or modified during the compulsory vision and comment of the examiners with the student during the exam of the test. Also those ones who did not reach a sufficient result can view their exam in this phase. The exam is passed if a score of 18/30 or higher is obtained for both the two parts after such a vision and discussion phase. In such a case, the exam grade, out of thirty, is obtained by average weighting the number of university credits (CFU) respectively assigned to the two modules of the course of the two scores previously discussed. Laude is given if the exam has been performed in an overall exemplary manner. The exam grade, if accepted by the student, is recorded electronically and in a paper booklet. On the other hand, if the score of only one of the two parts of the previously discussed written test is below 18/30, the exam is considered overall not sufficient. In this case, as well as in the one in which both parts of the exam have obtained a score lower than 18/30, the student does not keep any score and must try another exam session.

Testi di riferimento

Mathematics
- D. Benedetto, M. Degli Esposti, C. Maffei. Matematica per le Scienze della Vita, Terza Edizione. Casa Editrice Ambrosiana, 2015.
-Material available on the University e-learning course webpage.

Computer Science

- Additional bibliography: Stefano Ceri, Dino Mandrioli, Licia Sbattella, Informatica: arte e mestiere, McGraw-Hill,Milano, 2004

- Lecturers' material and user manuals of the software used during the lectures.

Upon request by English speaking students, additional texts and material in English can be suggested by the lecturers.

Altre informazioni

-Knowledge and understanding
The course aims to give students methods and fundamental techniques of Mathematics, with particular attention to differential and integral calculus for functions of one real variable and to elements of Probability and Statistics and data representation. An additional target of the course is to prepare students for applying these analytical techniques to other scientific contexts. The course moreover aims to increase the theoretical knowledge and to consolidate the computer science skills necessary to use at higher level a computer (computing, research and information communication). A test is represented by the final exam.

-Applying knowledge and understanding
The student must acquire skills oriented in translating theoretical information and skills acquired in the contexts of Mathematics and Computer Science to various scientific and technological contexts. Student must be able to approach actively typical problems of Mathematics and Computer Science. The ability to apply knowledge and understanding will be achieved by means of theoretical and practical activities in the classroom. Specific examples in line with SDG goals will be addressed. A test is represented by the final exam.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell'Alimentazione e della Nutrizione Umana (2024)	comune	8	MAT/07, ING-INF/05, MAT/07, ING-INF/05

Communication and teaching Methodologies for Foos science [1301117]

Offerta didattica a.a. 2024/2025

Docenti: MARIA CINQUE

Periodo: Secondo Ciclo Semestrale

Syllabus non pubblicato dal Docente.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell'Alimentazione e della Nutrizione Umana (2024)	comune	3	M-PED/03, M-PED/03

Stampa del 02/07/2025

General Microbiology and Food Microbiology [1301312]

Offerta didattica a.a. 2024/2025

Docenti: MARTA GIOVANETTI, GIANFRANCO PANNELLA

Periodo: Ciclo Annuale Unico

Obiettivi formativi

Students will acquire theoretical knowledge related to the biology of microorganisms through a comprehensive and up-to-date understanding of General Microbiology. This includes fundamental topics in systematics, structure, physiology, biochemistry, metabolism, genetics, and molecular biology of the main groups of microorganisms (bacteria, viruses, and fungi), as well as diversity, ecology, general immunology, and virulence of prokaryotic and eukaryotic microorganisms. These basic microbiological concepts will be closely integrated with food microbiology, enabling students to understand the topics covered in the second semester during the Food Microbiology course. In Food Microbiology, students will acquire knowledge about fermentation processes necessary for the production of specific foods and the issues related to microbiological contamination of foods. They will understand the role of microorganisms in food safety and quality, in transformation processes, and in technologies for the prevention and control of microbiological risk. Additionally, they will gain methodological skills in food microbiology, including sampling methods, inspection design, laboratory techniques, contaminant species analysis, and report writing.

Relevant Sustainable Development Goals (SDGs – Agenda 2030):
Goal 3: Ensure health and well-being for all at all ages.
Goal 4: Provide inclusive and equitable quality education and promote lifelong learning opportunities for all.
Goal 6: Ensure availability and sustainable management of water and sanitation for all.

Prerequisiti

To fully and correctly understand the principles of General Microbiology and Food Microbiology, a fundamental prerequisite is the knowledge of basic elements of molecular and cellular biology, genetics, and biochemistry. This is essential for a better understanding of the structural, biological, genetic, and metabolic characteristics of microorganisms.

Contenuti del corso

The course covers the study of the biology of microorganisms and its application in the food sector. It is conducted over the two semesters of the third year, with the first semester providing basic notions of General Microbiology, and the second semester covering basic notions of Food Microbiology. The topics are organized logically and sequentially.

General Microbiology (Dr. Marta Giovanetti, GM): General notions on the classification of microorganisms, their structure, physiology, biochemistry, and metabolism, as well as microbial growth, bacterial genetics and molecular biology, and metabolic regulation mechanisms of bacteria, viruses, and fungi. Methods of microbial growth control and antimicrobial and antiviral agents will be covered; human-microorganism interactions, virulence factors, and host immune response (and host-microorganism interactions) will also be discussed. Additionally, the structure, composition, and classification of animal, plant, and bacterial viruses, their genome, capsid, and viral envelope, various mechanisms of virus penetration into host cells (bacteriophages, plant and animal viruses), viral replication cycle phases, virus-cell interaction, infection outcomes, and virus cultivation and quantification will be studied.

Exercises (GM): Culture media, seeding, serial dilution techniques; Gram staining and microscopic observation; methods for performing antibiograms and determining MIC; methods for identifying bacterial and viral species; basic molecular biology techniques related to microorganisms.
Food Microbiology (Dr. Gianfranco Pannella): The role of microorganisms in food (altering, pathogenic, pro-technological), food safety, eco-physiological factors and the metabolism of the main microbial groups of food interest will be covered. The control techniques of microorganisms in food and the adaptive response to the main stress factors will also be covered. Sampling, numbering, isolation and microbial identification techniques will be studied. Aspects concerning the technological relevance of the main microbial groups of food interest will be explored. The main food-borne diseases will be studied.
Exercises (GP): food sampling techniques; water analysis; research and identification of the main micro-organisms of food interest; traditional culture techniques applied to food microbiology; research of indicator micro-organisms; investigation protocols and biochemical characterisation of some main micro-organisms of food interest; method of reading and writing a laboratory investigation report on food microbiology.

Metodi didattici
The course is based on 40 hours of lectures, supplemented by 12 hours of laboratory exercises for each semester.

Modalità di verifica dell'apprendimento
Assessment Methods: Oral exam. At the end of the second semester, the final exam will take place, consisting of questions from General Microbiology and Food Microbiology (typically 3 questions for each course) to cover the main topics discussed. The evaluation assesses the level of preparation, the ability to apply knowledge, and the communication skills developed. The final grade is expressed in thirtieths, with honors where applicable. Exams are held between June and September, according to the schedule set by the Course and Faculty Administration. In the first semester, the assessment of knowledge and skills is conducted through ongoing tests, held on three dates between January and February. These consist of oral exams on a reduced portion of the General Microbiology program, with questions requiring articulated responses and connections between the various course topics. Each module includes at least 3 oral questions. Students must demonstrate knowledge and application of theoretical and practical skills in scientific and technological contexts, research laboratories, and quality control in general and food microbiology.

Criteria for Assessing Learning and Assigning Final Grades: Students must correctly answer at least two of the three oral questions to obtain a passing grade (18/30). All topics covered have equal value in the assessment. The final grade will reflect the student's knowledge of General Microbiology and Food Microbiology topics and the ability to integrate this knowledge.

Grades will be assigned according to the following levels:
Essential knowledge: 18-21
Good knowledge: 22-24
Distinct knowledge: 25-26
Excellent knowledge: 27-28
Outstanding knowledge: 29-30 with honors

Testi di riferimento
General Microbiology:
- Teaching materials provided in class;
- MT Madigan, JM Martinko, KS Bender, DH Buckley, DA Stahl. Brock, Biology of Microorganisms. General Microbiology, Pearson, 2016, 14th edition;
- G. Deho, E. Galli. Biology of Microorganisms. Ambrosiana Publishing House, 2018, third edition;
- Wessner DR, Dupont C, Charles TC. Microbiology. Ambrosiana Publishing House, 2016.

Food Microbiology:
- Teaching materials provided in class;
- L. Cocolin, M. Gobbetti, E. Neviani. Applied Food Microbiology, Ambrosian Publishing House, 2022;
- J.M. Jay, M.J. Loessner, D.A. Golden. Food Microbiology. Springer-Verlag Italia Publishing, Milan, 2009;
- Galli Volonterio. "Food Microbiology." Ambrosiana Publishing House, Milan, 2005.

Altre informazioni
Theoretical and practical skills in general and food microbiology, applicable in scientific and technological contexts, research laboratories, and food quality control, related to microbiological issues.
Knowledge of basic concepts of general microbiology and food microbiology.
Ability to apply theoretical knowledge in General Microbiology and Food Microbiology through theoretical-practical exercises on main laboratory techniques, applied to food analysis.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell'Alimentazione e della Nutrizione Umana (2021)	comune	12	BIO/19, AGR/16, BIO/19, AGR/16

Stampa del 02/07/2025

Molecole per la salute dell'uomo [1301320]

Offerta didattica a.a. 2024/2025

Docenti: PIERANTONIO MENNA

Periodo: Secondo Ciclo Semestrale

Obiettivi formativi
1. Knowledge of therapeutic appropriateness and adherence to therapy
2. Knowledge of research and development of new drugs
3. Knowledge of drug-drug interactions
4. Knowledge of difference between generics, biosimilars, and over-the-counter drugs
5. Knowledge of food supplements

Prerequisiti
Physiology and General Biochemistry

Contenuti del corso
1. Introduction to Pharmacology

2. Therapeutic appropriateness and adherence to therapy

3. Research and Development of new drugs

4. Pharmacosurveillance

5. Pharmacokinetics and Drug-drug interactions

6. Biotechnology

7. Pharmacogenetics

Metodi didattici
Lectures

Modalità di verifica dell'apprendimento
Final test will take place at the end of the course with a written test consisting of 30 multiple-choice statements. It will cover all issuess covered during the course for verifying the knowledge and skills acquired by students.
It is also provided an optional oral interview for whom students that have obtained a minimum score of 18/30 in the written test. The oral interview consists of a minimum of three questions useful for an overall assessment of the student.
Criteria for measuring learning and awarding the final grade:
A. Written test:
- 1 point for each correct answer
- 0 points for each wrong or not given answer
- Students will pass the written test if they reach at least the minimum score of 18/30
B. Optional oral interview:
The score obtained in the written test provides the starting score for the oral interview; based on the performance of the oral interview (minimum of three questions) students get an overall score.

Testi di riferimento
Farmacologia, CEA publishing house, 2nd edition

Altre informazioni
Students should achieve adequate knowledge and ability to connect topics of general pharmacology; they should be able to recognize the different stages of drug development and have specific knowledge on regulatory aspects of food supplements and nutraceuticals.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell'Alimentazione e della Nutrizione Umana (2021)	comune	3	BIO/14

Stampa del 02/07/2025

Food Packaging [1301006]

Offerta didattica a.a. 2024/2025

Docenti: SARA MARIA GIANNITELLI

Periodo: Primo Ciclo Semestrale

Obiettivi formativi

The course aims to provide knowledge and understanding of the properties of packaging materials for use with food products, proper selection of packaging material for the stability and safety of food, as well as the manufacture of these materials and consequent packages. Upon successful completion of this course, the students will have the ability to select the proper packaging able to ensure the best protection and durability during the product's shelf life, with a view to environmental sustainability.

Sustainable Development Goals (SDGs – Agenda 2030):
Goal 3. Ensure healthy lives and promote well-being for all at all ages;
Goal 4. Quality education;
Goal 12. Ensure sustainable consumption and production patterns.
Goal 13. Take urgent action to combat climate change and its impacts.

Prerequisiti

Basic notions of inorganic and organic chemistry.

Contenuti del corso

Packaging functions and definitions. The physical and chemical properties of the packaging materials used for foods. Packaging materials, composition, properties and use of: glasses and ceramics containers, paper and paperboard cartons, polymers and plastics, composite materials, metal containers (aluminum, stainless steel, tinplate, cans construction). Bioplastics in packaging production. Overall and specific migration testing for food contact materials. Food packaging laws and regulations both National and European. Compliance of food contact materials and (inter)national regulations. Rigid and semi-rigid containers for food, closures, flexible packaging and laminates. Food storage and Shelf Life. Active, intelligent and smart food contact materials. Packaging of I, II, III, IV and V range, dairy, meats and bakery products, water and beverages.

Metodi didattici

Face-to-face lectures explaining the contents of the course and exercises carried out to show their applications on specific problems: 24 hours.

Modalità di verifica dell'apprendimento

The knowledge and skills will be verified by means of a test with multiple choice questions to be carried out on the University's elearning platform.
In the test, the Student will have to answer 10 multiple choice questions in 13 minutes in which to demonstrate that they have acquired the following specific learning outcomes:
1) to write the molecular formula, the structural formula, the recycling code and the properties as primary packaging of one of the materials subjects of the contents of the course
2) to know and to describe the food packaging laws and regulations at National level
3) to know and to describe the food packaging laws and regulations at European level
4) to identify and to describe an application of the materials used as primary packaging
5) to describe and apply the migration testing needed to evaluate the compliance of the materials used as primary packaging.
The 10 multiple choice questions are equally divided between the 5 points of the specific learning outcomes.
The test will be carried out in the classroom, on Student' PC or tablet.
The Student will receive the result of his test as a score expressed in thirtieths only when the latest Student of his group have completed the test.

Criteria for measuring learning and defining the final grade:
In the test, the Student will have to answer 10 multiple choice questions in 13 minutes, of which:
- each question will have 4 answers (A, B, C, D) of which only one is corrected;
- only one answer can be selected for each question;

- points are assigned as follows: 3 (three) points for each correct answer; 0 (zero) points for each incorrect or not given answer.
Each test will be different from the other and assigned randomly by the system. The score, i.e. maximum mark achievable in the test is 30/30. The correction of the test and, therefore, the score achieved corresponding to the final grade, is made by the elearning system for comparison with the correct answers loaded on the platform itself. Each Student will receive only his results and, therefore, the score he has achieved. Each Student will not receive the score of the other Students belonging to his group. In addition to the score obtained, the Student can re-evaluate his test by checking which questions he answered correctly and which not, knowing, in this case, the correct answer. At the end of the test, the Commission will be available to the Students to review together the incorrect answers.
The exam is deemed to be passed successfully if the grade is equal to or higher than 18/30 and it will coincide with the final grade if this is less than the maximum score achievable with the test equal to 30/30. In the event of a full grade (30/30), the student will have the opportunity to try to grant honors (cum laude) through an oral test. The oral test will be carried out immediately after the test result. In the oral test, 1 question will be asked to the Student. This question aims to evaluating the logic followed by the Student in problem solving, the use of an appropriate language in the answer to the question and, also, the adequacy of the proposed solution in relation to the skills that the Student it is assumed that he has acquired at the end of the course. The oral test is worth 3 points. The final grade is calculated adding or subtracting the 3 points of the oral test to the score 30/30 gained by the test.
The final grade of the exam is registered on both the Student's university booklet and on an electronic record-book.

Testi di riferimento

Face-to-face lectures are carried out on an electronic whiteboard that allows to save the writings. These saved whiteboards will be uploaded on the course page on the e-learning platform https://elearning.unicampus.it/. These saved whiteboards allow the student to review and deepen the topics covered and transform into knowledge what has been learned in class and into skills and competences what has been done during the exercises. On the course page in the University e-learning platform, all the teaching material necessary for the Student will be loaded: handouts and laws.

Altre informazioni

- Ability to make predictions on the reactivity of the material used as a primary food packaging according to the type of food
- Knowledge and understanding of the issue of shelf life of the food
- Ability to know how to define and use a functional packaging
- Knowledge and understanding of the main national and European food packaging laws and regulations.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell'Alimentazione e della Nutrizione Umana (2021)	comune	3	CHIM/07

Stampa del 02/07/2025

Psychology and Anthropology [13011C3]

Offerta didattica a.a. 2024/2025

Docenti: VITTORADOLFO TAMBONE, PAOLO PELLEGRINO, LAURA LEONDINA CAMPANOZZI

Periodo: Primo Ciclo Semestrale

Obiettivi formativi
Psychology and Antropology part, into the integrated course of Human Sciences (along 3 years), aims to develop in students a correct view of human being, his characteristics and peculiarities, together with his pgychological aspects and dynamics.

Prerequisiti
None

Contenuti del corso
- Psychological approaches
- Human psychology and its implications in interpersonal relationships and in the relationship with food. Needs and motivations.
- The relational dimensions: empathy, communication (difficulty and effectiveness). Phenomenology of emotional states: importance of recognizing and managing one's own and others' physiological emotions,
- Problematic nature of some emotional states: seizures and emotional blocks; the search for strong emotions. Defense mechanisms and coping mechanisms.
- Notes on the importance of personal identity.
- Man as a person and as a complex, limited being
- The hermeneutic-anthropological circle: the order of intellect, will, and sensibility.
- Body and corporeity
- The relational nature of the person

Metodi didattici
Lectures, Simulations and Clinical Cases
16 hours of frontal teaching

Modalità di verifica dell'apprendimento
For the Anthropology and Psychology Module, the examination (at the end of the first year) consists of a written multiple-choice test (16 questions of two marks each, with a maximum mark expressed in 32nds, corresponding to 30 cum laude) designed to test the module contents (8 questions on the Anthropology Course and Psychology Course contents respectively). The answers will give you the opportunity to evaluate the actual degree of knowledge, comprehension and learning of all the topics of the indicated program.

Testi di riferimento
The mandatory textbook for Psychology is: P. Pellegrino, M. Gilio - PRENDERSI CURA. Elementi di psicologia per le professioni sanitarie, AMAZON KDP.
Class materials will be uploaded on the e-learning platform (Antropology).
Some chapters of: Tambone V., Ghilardi G., La Mucca Pazza e il dottor Watson, SEU Roma, 2015.

Altre informazioni
The course of Psychology & Anthropology provides basic knowledge that allows student to acquire:
- knowledge and understanding skills on anthropological and psychological issues inherent in Human Nutrition, patient relations and professional collaboration;
- applied knowledge and understanding skills to be able in building meaningful and effective relationships to develop the ability to understand human personality, particularly in the caring professions;
- autonomy of judgment: exercise of critical through reflective thinking to improve judgment, through knowledge and management of affective-emotional states, some basic knowledge of human personality, awareness of personal consciousness. Also central will be the recognition that philosophical reflection on man is important in order to adequately understand his behaviors including eating. Similarly, recognition of the central role that freedom takes on in the various experiences of human existence will be valued. Thus one should come to the understanding that all decision-making processes have an underlying philosophy and psychology that directs consequent professional

action in such a way as to acquire the tools for free judgment of one's acts and the situations in which one finds oneself operating;
- communication skills, through development of communication skills and competencies.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell’Alimentazione e della Nutrizione Umana (2024)	comune	2	M-PSI/08, M-DEA/01

Stampa del 02/07/2025

Food Science [1301315]

Offerta didattica a.a. 2024/2025

Docenti: YEGANEH MANON KHAZRAI, CLAUDIO PENSIERI, ROSA BRUNI

Periodo: Primo Ciclo Semestrale

Obiettivi formativi

The course aims to train the human nutrition expert to assess energy-nutritional needs and possible deficiencies for healthy individuals and/or communities in the various phases of life: pregnancy, puerperium, early childhood, school age, adolescence, adulthood, sport and senescence. The course also aims to provide methodologies, techniques and tools to design food education interventions for different targets, taking into account different eating habits and lifestyles, in order to promote informed consumption and choices, with a view to environmental sustainability and physical and psychological wellbeing, also taking into account cultural and social aspects (media influence, institutional policies, etc.).

Prerequisiti

All the exams of the first year

Contenuti del corso

DIETETICS:
- assessment of nutritional status
- italian guidelines for healthy eating
- calculation of energy, protein, carbohydrate and lipid requirements
- nutrition in childhood
- nutrition in adolescence
- nutrition of the athlete
- nutrition in adulthood
- nutrition in pregnancy
- nutrition of the nurse
- nutrition in senescence
- anthropometric measurements, indirect calorimetry, bioimpedance analysis

FOOD LAW
-- the national and EU regulatory sources of food law;
- the European Food Safety Authority and the rapid alert system;
- the regulatory framework on labeling and claims.

NUTRITION EDUCATION
- introduction to nutrition education: definition, goals, areas of intervention
- the “challenges” of nutrition education:
  - changing knowledge and influencing behavior
  - psycho-pedagogical implication of nutrition
  - learning styles and accompanying styles
  - age-related learning differences
- design elements:
  - training needs analysis
  - educational objectives, expected learning outcomes and assessment tools
  - methodologies, teaching activities and professional figures in nutrition education
  - the construction of teaching tools and materials: games, quizzes, tests and questionnaires
- the MIUR guidelines

EATING BEHAVIOR PSYCHOLOGY:
- Eating behavior from a bio-psycho-social perspective
- Psychological basis of feeding behavior: mother-child relationship as a context for the construction of attachment bonds and food-related meanings
- Nutrition, emotions and development
- Feeding the various stages of life: childhood, adolescence, adulthood, old age.
- Feeding and pregnancy: psychological issues, emotion management, body image change and nutrition
- Psychological aspects of childhood and adult obesity: stigma and prevention

- Introduction to major eating disorders: anorexia nervosa, bulimia, binge eating disorder
- Psychological aspects of obesity
- Multidisciplinary treatment of nutrition and eating disorders and obesity

Metodi didattici

The course consists of face-to-face lectures (70 percent) and small group lectures (15 percent) supported by PowerPoint presentations. Practical activities are planned for the dietetics course to learn how to draft dietary protocols appropriate to the topics covered in the lectures.
Seminar and practical activities will also be carried out (15%)

Modalità di verifica dell'apprendimento

The examination will be written and oral, aimed at assessing the actual degree of learning and the ability to independently rework the knowledge and skills described in the training objectives. The written dietetics test will consist of the development of a dietary protocol for a healthy person to assess the student's ability to apply the correct calculations for energy, nutrient and micronutrient requirements according to the subject's age group. In addition, he or she should be able to know how to choose the right foods that carry nutrients and micronutrients to meet the principles of healthy eating.
A group paper is planned, consisting of the writing of a nutrition education project-complete in all its parts, indicating educational objectives, teaching methodologies, macro- and micro-planning, evaluation tools-to assess the student's ability to know and know how to use different teaching and evaluation methodologies.
Criteria for measuring learning and awarding the final grade:
The verification of learning will be developed in a unified and integrated manner by all teachers through an oral examination with a grade expressed in thirtieths. The lecturers will average the results acquired by the students. The grade of the written test will be added to this average to assess the student's ability in developing a dietary protocol for the healthy person. The grade of the written dietetics paper is 25% of the final grade.
- 18-24 Mediocre. Superficial and incomplete knowledge of the subject.
- 25-26 Sufficient. Sufficient but shallow knowledge.
- 27-28 Good. Knowledge thorough and used in a relevant way.
- 29-30 L Excellent. Rich, thorough and detailed knowledge, shows mastery of subject matter

Testi di riferimento

Dietetics:
• Società Italiana di Nutrizione Umana - SINU - LARN. Livelli di Assunzione di Riferimento di Nutrienti ed Energia per la Popolazione Italiana - IV Revisione. SICS
• L. De Gara (a cura di), Le sfide dell'educazione alimentare. Prospettive nutrizionali, comunicative e didattiche, Roma, Armano, 2015.
• MIUR, Linee guida per l'educazione alimentare nella scuola italiana, 2011

Eating behavior psychology:
• Carlo Prugnetti, disturbi alimentari: fisiologia e patologia del comportamento alimentare dal sovrappeso al sottopeso, Società Editrice Esculapio, 2019

Nutrition education:
• G. Manca, G. Nuvoli, A. Uccula, Cibo, corpo e relazioni sociali: prospettive educative nel ciclo di vita
N.B. Students should constantly keep up to date by consulting recent scientific papers on sites such as Pubmed

Altre informazioni

Knowledge and understanding skills
The student should be able to make anthropometric assessments, calculate basal metabolic rate with predictive formulas and through the use of indirect calorimetry, assess a person's energy needs based on the degree of physical activity, and be able to draft dietary protocols.
The student will need to know the appropriate modes of nutrition education in different contexts. In addition, the student will have to demonstrate knowledge of the psychological and socio-cultural factors that contribute to proper food consumption and promote educational and cultural attitudes open to the latest knowledge in the field of psychology of eating behavior.
Ability to apply knowledge and understanding
Specifically, he/she will need to: a) know how to take a dietary history to assess the frequencies of intake of various foods, tastes, traditions, religious beliefs, and socioeconomic status of the individuals for whom the nutritional intervention is intended; b) know how to develop a proper dietary protocol; c) be able to conduct nutritional counseling for the healthy person independently.
The student should be able to develop nutrition education projects adapted to different contexts
socio-cultural and to different targets (adults, children, the elderly, etc.). At the end of the course, the student will in particular: a) know how to develop a learning needs analysis, know how to define educational objectives and expected learning outcomes, c) know and know how to use teaching and assessment methodologies.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell'Alimentazione e della Nutrizione Umana (2021)	comune	11	M-PED/03, MED/49, M-PSI/08, MED/49

Stampa del 02/07/2025

Human Sciences [1301316]

Offerta didattica a.a. 2024/2025

Docenti: VITTORADOLFO TAMBONE

Periodo: Primo Ciclo Semestrale

Syllabus non pubblicato dal Docente.

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell'Alimentazione e della Nutrizione Umana (2021)	comune	2	MED/43

Stampa del 02/07/2025

Food Technology [1301311]

Offerta didattica a.a. 2024/2025

Docenti: ELISA DE ARCANGELIS

Periodo: Primo Ciclo Semestrale

Obiettivi formativi
The course aims to provide students with the basic knowledge of the main processes used in the field of food technologies applied both for the preservation of food and for the transformation of raw materials into finished products, in relation to the main food supply chains (e.g. cereal, dairy, wine). The student will have to know the fundamental aspects of the single technologies and how they can modify the qualitative characteristics of the raw material, influencing the quality of the finished products.

Prerequisiti
first year exams.
Basic knowledge of Organic Chemistry and of Food Chemistry

Contenuti del corso
☐ Conservative technologies based on the use of low temperatures (refrigeration, freezing and deep freezing) and high temperatures (pasteurization, sterilization, blanching) Conservative technologies based on water reduction: evaporation, drying, freeze-drying, membrane filtration.
☐ Cereals sector: grinding, pasta making, bread making, dehulling, parbolization.
☐ Wine sector and alcoholic beverages: winemaking techniques, technologies in use for the production of wine, champagne, vinegar, spirits, malt and beer.
☐ Dairy sector: production processes of milk derivatives, fermented milk, cheese.
Other sectors of food interest will also be considered:
☐ vegetable-fruit
☐ nervine drinks (coffee, cocoa)
☐ Processed meat

Metodi didattici
Theoretical lectures with slide support, seminars on specific topics of particular interest can be provided, as well as external visits to companies and research facilities.

Modalità di verifica dell'apprendimento
The exam will be passed if the student is able to answer at least sufficiently to all the questions. The final score will depend on the level of the acquired knowledge, the appropriateness of the scientific language and the acquired logical capability in the experimental context.
In particular:
18-23 basic knowledge, modest language skills, poor/medium logical capability
24-27 good knowledge, moderate/good language skills, moderate/good logical capability
28-30 optimal/excellent knowledge, optimal/excellent language skills, optimal/excellent logical capability
30L excellent knowledge, excellent language skills, excellent logical capability

Testi di riferimento
☐ Cappelli P, Vannucchi V. Principi di chimica degli alimenti – Conservazione e trasformazione degli alimenti, Zanichelli, Bologna, 2016.
☐ Mucchetti G., Neviani E. Tecnologia casearia, Dall’empirismo all’industria.CEA 2022
☐ Gobbetti M., Rizzello C.G. Biotecnologia dei prodotti lievitati da forno. Casa Editrice Ambrosiana, 2023
☐ Cabras, A., Martelli, Chimica degli alimenti, Piccin Nuova Libraria, Padova 2004
Teaching materials through the university’s sharing platform e-learning

Altre informazioni
☐ Knowledge of the main processes for food preservation
☐ Ability to apply knowledge of specific food processes that transform raw material in final products, also considering any innovations

☐ Ability to communicate effectively and with correct terminology

L'attività didattica è offerta in:

Facoltà Dipartimentale di Scienze e Tecnologie per lo Sviluppo Sostenibile e One Health

Tipo corso	Corso di studio (Ordinamento)	Percorso	Crediti	S.S.D.
Degree course	Corso di Laurea in Scienze dell’Alimentazione e della Nutrizione Umana (2021)	comune	7	AGR/15

Stampa del 02/07/2025