Master's Degree Course in Human Nutrition Sciences

Integrated Teaching: **Food allergies, immunity and medications**
SSD: **MED/04, BIO/14**
CFU number: **11**
Integrated Teaching Head: **Prof. Cristina Capuano**
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Module: PHYSIOPATHOLOGY
SSD: MED/04
CFU number: 4
Teacher name: Prof. Cristina Capuano (1 CFU)
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Teacher name: Prof. **Monica Benvenuto** (3CFU)

Module: PHARMACOLOGY
SSD: BIO/14
CFU numbers: 7
Teacher name: Prof. **Mario Bigioni** (5 CFU)
e-mail: mario.bigioni@unicamillus.org
Teacher name: Prof. **Maria Sorrentino** (2 CFU)
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ATTENDANCE MODE
Distance learning

PREREQUISITES
Although there are no preparatory courses, basic knowledge of cell biology, histology, biochemistry, chemistry, anatomy, and physiology is required.

LEARNING OBJECTIVES
The integrated teaching aims to provide students with basic knowledge of cellular pathology, general pathology, immunology, and physiopathology related to human nutrition. The student must learn the pathogenesis of diseases at the cellular and tissue levels, the mechanisms of the cell and organism response to damage, the mechanisms of innate and acquired immune response underlying the pathogenesis of adverse reactions to food.
Furthermore, the student must understand the principles of pharmacology, pharmacodynamics, and pharmacokinetics. Understand the role of pharmacotherapy and diet in the prevention and treatment of non-communicable chronic degenerative diseases and COVID-19. Understand the interactions between drugs, supplements, and foods. Understand the role of drugs and supplements on the intestinal microbiota.

LEARNING OUTCOMES
The expected learning outcomes are consistent with the general provisions of the Bologna Process and the specific provisions of Directive 2005/36/EC. They are found within the European Qualifications Framework (Dublin descriptors) as follows:

Knowledge and Understanding

At the end of the teaching, the student must be able to:

- Independently understand and explain the molecular mechanisms of cellular damage.
- Independently understand and explain the mechanisms of cell response (cellular stress, necrosis, apoptosis) and organism response to damage (inflammation).
- Understand and explain the basic concepts of immunology and the molecular mechanisms of immune response activation, which underlie the pathogenesis of adverse reactions to food (food allergies and intolerances).
- Understand and explain the structure and properties of nutrients and their involvement in metabolic processes for maintaining health.
- Understand and explain drug/nutrient interactions for formulating a correct dietary plan.

Applying knowledge and understanding

At the end of the teaching, the student must be able to:

- Use the acquired knowledge for in-depth study of several aspects related to the specific field to which the student will dedicate himself as part of his professional activity.
- Apply the acquired knowledge to analyse and understand alterations in cellular, immunological, and genetic mechanisms underlying human pathologies, as well as drug/nutrient interactions, with a view to a correct methodological approach aimed at formulating a proper dietary plan.

Communication skills

At the end of the teaching, the student should demonstrate the capability to:

- Clearly and unambiguously communicate information, ideas, problems, and solutions, related to the molecular mechanisms of immune response activation, the main immunological mechanisms of pathogenetic relevance, and drug/nutrient interactions to both expert and non-expert recipients.
- Use the specific scientific terminology as appropriate.

Making judgments

At the end of the teaching, the student must be able to:

- Independently make general assessments related to the topics covered.
- Independently use the acquired knowledge to identify and explain the molecular, immunological, and pathophysiological mechanisms that lead to a disease.
- Independently use the acquired knowledge to deal with problems related to drug/nutrient interactions with a view to a correct methodological approach aimed at formulating a correct dietary plan.

Learning skills

At the end of the teaching, the student must be able to:

- Acquire learning methods suitable for study and updating.
- Improve skills in the fields of immunology, pathology, and pharmacology by consulting texts, scientific literature, and databases.

COURSE SYLLABUS

MED/04

- Cellular pathology: cellular stress, necrosis, apoptosis. Cellular adaptations.
- Innate immunity: acute inflammation. cells and chemical mediators of inflammation.

Exudation: different types of exudates. Chemotaxis and phagocytosis. Chronic inflammation.

- Adaptive immunity: immune tolerance. Oral tolerance. Antigens and antibodies. Antigen recognition and lymphocyte activation. Major histocompatibility complex. Antigen processing and presentation to T lymphocytes. Regulation of the immune response. Effector mechanisms of the immune response. Hypersensitivity reactions. Intestinal barrier.
- Adverse reactions to foods: pathogenetic aspects.
- Food allergies: pathogenesis, classification of food allergens.
- Pathogenesis of anaphylactic shock. Celiac disease.
- Food intolerances: pathogenesis. Pseudoallergic food reactions. Reactions from enzymatic deficiency.
- Overview of diabetes pathophysiology.

BIO/14

- General principles of pharmacology
- Principles of pharmacodynamics: mechanisms of drug action and concentration-effect relationship. Modulation of the receptor response.
- Principles of pharmacokinetics applied to therapy: dynamics of drug absorption, their distribution, and their elimination. Routes of administration, absorption and distribution, metabolism, enzymatic induction and inhibition, elimination of drugs. Pharmacological interactions: pharmaceutical, pharmacodynamics, pharmacokinetics.
- Incompatibility between drugs.
- Pharmacology of nutrients: Principles on the pharmacology of food supplements; Botanical and nutritional supplements; Fat-soluble and water-soluble vitamins: trace elements and polyphenols.
- Drug-food interactions.
- Effect of drugs on nutritional status: Influence of drugs on the absorption of nutrients; Drugs that modulate hunger and satiety; Drugs that interfere with taste perception; drugs that induce malabsorption.
- Drugs active on the Gastrointestinal System: classification and mechanism of action of drugs. Drug therapy of acid-peptic-gastrointestinal disorders; laxatives.
- Pharmacology of the metabolic endocrine system.
- Drugs to control glucose metabolism.
- Intestinal microbiota: drug, prebiotic, probiotic, postbiotic and polyphenol interactions on the microbiota
- Anti-cancer drugs: classification and mechanism of action; interaction of oncological drugs and nutrients; immuno-nutrition and cancer.
- Antiviral drugs.
- COVID19: drug therapy and immuno-nutrition.

COURSE STRUCTURE

The teaching will be structured as follows:

MED/04

4 CFU: (Prof. Monica Benvenuto) (16 hours of lectures)

- 12 hours of didactic teaching equivalent to 48 video lectures *
- 4 hours of interactive teaching

BIO/14

5 CFU (Prof. Bigioni) (20 hours of lectures)

- 15 hours of didactic teaching equivalent to 60 video lectures *
- 5 hours of interactive teaching

2 CFU (Prof. Sorrentino) (8 hours of lectures)

- 6 hours of didactic teaching equivalent to 24 video lectures *
- 2 hours of interactive teaching

* Each video lecture is 15 minutes.

The didactic material will be organized into PowerPoint slides with explanatory and illustrative images of the topics covered, as well as handouts that will enable students to achieve the educational objectives. During interactive teaching hours, discussions with students will be encouraged to promote active learning.

COURSE GRADE DETERMINATION

The knowledge acquired by the student will be evaluated through a written exam: 31 multiple-choice questions. One point will be awarded for each correct answer.
The final assessment will consider the results obtained in the tests of each module of the teaching and will be expressed as a weighted average based on the CFU assigned to each module, on a scale of thirty.
The exam will be assessed overall according to the following criteria:
Not suitable: Poor or lacking knowledge and understanding of the topics; limited capacity for analysis and synthesis, frequent generalizations of the requested contents; inability to use technical language.
18-20: Just enough knowledge and understanding of the topics, with obvious imperfections; just sufficient capacity for analysis, synthesis, and autonomy of judgment; poor ability to use technical language.
21-23: Sufficient knowledge and understanding of the topics; sufficient ability to analyze and synthesize with the ability to reason with logic and coherence the required contents; sufficient ability to use technical language.
24-26: Fair knowledge and understanding of the topics; discrete ability to analyze and synthesize with the ability to rigorously argue the required contents; good ability to use technical language.
27-29: Good knowledge and understanding of the required contents; good ability to analyze and synthesize with the ability to rigorously argue the required contents; good ability to use technical language.
30-30L: Excellent level of knowledge and understanding of the required content with excellent ability to analyze and synthesize with the ability to argue the required content in a rigorous, innovative and original way; excellent ability to use technical language.

READING MATERIALS

MED/04

Learning materials delivered by the teacher on the WebApp.
Textbooks:

Pontieri GM; Elementi di Patologia Generale e Fisiopatologia Generale; 4 edizione; Piccin Ed; ISBN: 9788829929122; 2018

Abbas AK, Lichtman AH, Pillai S; Le basi dell'immunologia; 5 edizione; Edra.; ISBN: 9788821442551; 2017

Kumar V, Abbass AK, Aster JC; Robbins, Fondamenti di Patologia e di Fisiopatologia; 9 edizione; Edra; ISBN: 9788821440458; 2013.

BIO/14:

Learning materials delivered by the teacher on the WebApp.

Textbooks:

Galli C., Gatti E., Tomassi G., Visioli F. Farmacologia e nutrizione. UTET

F Clementi, G Fumagalli. Farmacologia Generale e Molecolare. UTET

Goodman & Gilman. Le Basi Farmacologiche della Terapia. Zanichelli 2019

Richard D. Howland, Mary J. Mycek. Le Basi della Farmacologia, nuova edizione. Zanichelli 2007

COORDINATOR AVAILABILITY

Office hours by appointment, by e-mail

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