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**COURSE:NUTRITIONAL BIOCHEMISTRY**

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ACADEMIC YEAR:**2019-2020**

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TYPE OF EDUCATIONAL ACTIVITY: **free choice**

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TEACHER: **Prof. Rocco Rossano Ph.D**

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Language:**Italian**

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ECTS: **6(lessons)**n. of hours: **48**Campus:**Potenza**Dept./School:**Dept. of****SciencesProgram:Biotechnology**

Semester:II

from: March 2, 2020

to: June, 20 2020

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**EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES**

**Knowledge and understanding:**At the end of the course and for passing the exam, the student must demonstrate that he has acquired knowledge related to:

- basic elements on the biochemical and nutritional role of macro, micronutrients and nutraceutical components contained in foods commonly used in human nutrition,
- relationship between nutrition, nutrition and health, based on the understanding of the specific metabolic role of the different classes of nutrients and bioactive compounds present in food,
- ability to manage food education programs and to communicate guidelines for proper nutrition.

**Applying knowledge and understanding:**The student must demonstrate the understanding of the concepts and principles expected by the course.

**Making judgements:**Ability to assess and translate the basic concepts acquired in the context of nutrition biochemistry to scientific contexts, in order to obtain useful goods and services. Furthermore, the student must be able to assess the molecular mechanisms underlying the metabolism of biomolecules.

Ability to evaluate the factors underlying diseases related to deficiency or excess of some biomolecules. Ability to evaluate the functional aspects of the diet.

**Communication skills:**Ability to communicate and illustrate, in scientific and / or informative contexts, the biochemical and nutritional role of macro, micronutrients and nutraceutical components contained in foods commonly used. Ability to communicate the impact of nutrition on health and human wellness.

**Learning skill:**ability to access and understand the scientific literature of the sector, in order to be able to use them in the field of research and to successfully follow any specialization courses, seminars and masters.

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**PRE-REQUIREMENTS**

In order to have a satisfactory understanding of the course topics, a good basic knowledge of the main molecular components of the cell and of the related biochemical processes is required, during the course various concepts of general biochemistry are recalled.

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**SYLLABUS**

**The group is divided in 9 teaching blocks.**

**Block 1 (8 h, lectures):**

**Nutrition.** Nutritional standards and food guidelines. LARN, correct food intake and food pyramid. Definition of food and food classes. Macronutrients and micronutrients. Anti-nutrient molecules and toxic molecules in natural foods. The gastrointestinal tract and gut microbiota.

**Block 2 (6 h, lectures)**

**Proteins.** Nutritional meaning and energetic value. Amino acids: functional, nutritional and metabolic classification. Glucogenic andketogenicamino acids. Protein turnover. Nutritional value of proteins and regulation of nitrogen balance. Complementation of food proteins. Protein requirement. Phenylketonuria. Celiac disease. Protein-energy malnutrition: Kwashiorkor and Marasma as models of biochemical injury.

**Block 3 (6 h, lectures)**

**Carbohydrates.** Biochemical and nutritional definition of carbohydrates; main carbohydrates introduced with the diet and their energetic value. Glycemic Index and its biochemical meaning. Dietary fiber. Solubility, viscosity and

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fermentability of food fibers. Beneficial and negative effects of the fibers. Recommended intake levels. Food sources. Dietary fibers and health.

**Block 4 (6 h, lectures)**

Lipids. Classification and chemical composition. Main lipids introduced with diet and energy value. Fatty acids of nutritional interest: saturated, unsaturated, essential fatty acids, trans fatty acids. Lipid requirements. Mobilization of triacylglycerol reserves. Food cholesterol and endogenous cholesterol: cholesterol balance in the body. Transport of cholesterol and other lipids by plasma lipoproteins. Polyunsaturated fatty acids, Eicosanoids, Endocannabinoids.

**Block 5 (6 h, lectures)**

Vitamins. Nutritional meaning and relationships with metabolism. Fat-soluble vitamins: A, D, E, K, their biochemical action and deficiency, recommended intake, food sources and toxicity. Water-soluble vitamins: group B and ascorbic acid, their biochemical action and deficiency, recommended intake, food sources.

Mineral salts. Macro minerals: sodium, potassium and chloride; calcium, phosphorus and magnesium. Trace elements: iron, copper, zinc, iodine, fluorine, chromium and selenium. Food sources and bioavailability, recommended intake and deficiencies, toxicity.

**Block 6 (4 h, lectures)**

Water. Exogenous and endogenous water. Water requirement. Total water content of the organism. Water loss of the organism. Alterations of water balance. Water as a food.

Alcoholic beverages. Absorption and distribution and of ethanol. Alcohol dehydrogenase, aldehyde dehydrogenase, microsomal system. Metabolic alterations induced by ethanol on glucose and lipid metabolism. Nervine foods: coffee, tea and cocoa.

**Block 7 (4 h, lectures)**

Metabolic regulation. Distribution of energy reserves. Metabolic adaptations in caloric restriction and fasting.

**Block 8 (4 h, lectures)**

The concept of functional food and nutraceutical component. Plant antioxidants, isothiocyanates / glucosinolates, phytosterols, omega-3/6.

**Block 9 (4 h, lectures)**

Chemical composition of the main foods of the Mediterranean diet.

Examples of formulation of low-calorie and anti-inflammatory diets.

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**TEACHING METHODS**

Lectures (48 hours)

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**EVALUATION METHODS**

Oral examination. Evaluation: score on 30 points

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**TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL**

- G. ARIENTI. Le Basi Molecolari della Nutrizione (4<sup>th</sup> ed). Piccin Ed.
- U. LEUZZI, E. BELLOCCO, D. BARRECA. Biochimica della Nutrizione. Zanichelli Ed.
- I. COZZANI, E. DAINESE. Biochimica degli Alimenti e della Nutrizione. Piccin Ed.

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**INTERACTION WITH STUDENTS**

Office hours (3<sup>rd</sup> floor-3ANord building): Wednesday from 9:00 to 11:00 and Friday from 9:00 to 11:00. In addition, the teacher is available at all times for a contact with the students through e-mail.

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**EXAMINATION SESSIONS (FORECAST)<sup>1</sup>**

3 february 2020

6 march 2020

15 may2020

26 june 2020

14 july 2020

2 october 2020

11 december 2020

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<sup>1</sup>Subject to possible changes: check the web site of the Teacher or the Department/School for updates.

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SEMINARS BY EXTERNAL EXPERTS    YES    **X**NO

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FURTHER INFORMATION

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