

<b>General Information</b>	<b>Studies in BIOMEDICAL SCIENCES - NUTRITIONAL CURRICULUM</b>
Title of the subject	<b>Physiology of human nutrition</b>
Degree Course (class)	<b>Master degree in Biomedical Sciences Nutritional curriculum (LM/6)</b>
ECTS credits	4
Compulsory attendance	yes
Language	italian
Academic year	2020-21

<b>Subject Teacher</b>		
Name and Surname	<b>Lucantonio Debellis</b>	
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Place and time of reception	Campus di Via E. Orabona, 4 - Palazzo Dipartimenti Biologic department building basement -- Room 26 – From Monday to Friday by appointment	
<b>ECTS credits details</b>	Discipline sector (SSD)	Area
	<b>BIO/09</b>	<b>integrative activity</b>

<b>Study plan schedule</b>	Year of study plan		Semester	
	II		I	
<b>Time management</b>	Lessons	Laboratory	Exercises	Total
CFU	<b>4</b>			<b>4</b>
Total hours	<b>32</b>			<b>32</b>
In-class study hours				
Out-of-class study hours	<b>68</b>			<b>68</b>

<b>Syllabus</b>	
Prerequisites / Requirements	Basic knowledge of Physics, General and Organic Chemistry, Biochemistry, Human Anatomy and Physiology.
<b>Expected learning outcomes (according to Dublin descriptors)</b>	
Knowledge and understanding	Knowledge of the physiological and functional aspects of the sensory and digestive systems and of the processes that make it possible to identify and evaluate the characteristics of food and subsequently modify and use the food material through the digestion and absorption of food. Knowledge of the physiological and body elements related to energy and nutritional needs and of the characteristics of foods and nutrients that adequately satisfy these needs. Understanding of the relationships between the humoral, sensory, cognitive, motivational, and psychic aspects capable of influencing eating behavior and therefore the state of health. Knowledge of the most common problems that link nutrition and health.
Applying knowledge	Understanding of the role and functional significance of systems and apparatuses in relation to the need for specific nutrients for maintaining homeostasis and health.

Making informed judgments and choices	Being able to assess the need for specific nutrients for maintaining homeostasis and health, the nutritional qualities of foods and the impact on health of particular eating behaviors. Be able to understand, analyze and evaluate the scientific and popular literature concerning the physiology of nutrition.
Communicating knowledge	Ability to describe with simplicity and effectiveness the knowledge relating to the nutritional needs of the individual, and to the systems and systems of the human body related to nutrition and the maintenance of health.
Capacities to continue learning	Ability to learn from highly complex technical-scientific texts, monographs, scientific periodicals and databases in the physiological and nutritional fields.

### Study Program

Content	<ul style="list-style-type: none"> <li>• <b>Living Beings and Nutrition</b></li> <li>• Primary biological needs of living beings; nutrition; autotrophic and heterotrophic organisms; food and nutrition; foods and nutrients; replacement; homeostasis and stages of life; matter-energy-nutrition relationship; biological work; energy expenditure and needs; body composition; methods for determining the fat and lean mass (plicometry, hydrostatic weighing, impedancemetry, adipometry, DEXA, K40); body weight; body mass index; body constitution; analytical determination of metabolism and energy requirements; energy content of food.</li> <li>• <b>Food and Nutrients</b></li> <li>• Food groups and nutritional characteristics: Water; characteristics of low-mineral and mineral waters; residue; hardness; saline content. Foods providing carbohydrates; need for simple and complex carbohydrates; glycemic index, dietary fiber. Lipid-carrying foods, references to the characteristics and functions of lipids in the body. Foods providing proteins, essential amino acids, biological value and chemical score; complementarity; digestibility: states of protein deficiency. Vitamin, water-soluble and fat-soluble foods. Mineral salt-bearing foods. Nerve foods. • Nutraceutical or functional foods: characteristics, claims, safety. Active components of functional foods; supplemented, fortified, dietary foods; food supplements. GMO characteristics and problems. • Notes on INRAN guidelines for nutrition and recommended intake levels of nutrients, frequency, quantity and quality of daily meals; nutrition in particular physiological conditions: childhood, adolescence, sports, senescence, pregnancy, breastfeeding. • Sensory perception related to nutrition • Eating behavior and nervous system; man-food relationship; role of sensory perception.</li> <li>• Taste system: taste sensations, gustatory indices; receptors and translation of stimuli; perception of bitterness and correlation; sweeteners; lipid receptor. • Olfactory system: osmophoric substances; olfactory epithelium; translation of odorous stimuli; relationship between the perception of smells and the emotional system; relationship with mood.</li> <li>• Motivation and regulation of eating behavior: Hunger, appetite, satiety. Systems of regulation of the state of nutrition. Alterations in eating behavior.</li> <li>• <b>Physiology of the digestive system</b></li> <li>• Components and roles of the digestive system.</li> <li>• Outline of functional anatomy, splanchnic circulation, structure and innervation of the gastrointestinal wall, nervous control of motility; basic electric rhythm. • Mouth: teeth; chewing and swallowing, esophageal motility, salivary secretion, functions and composition of saliva, nervous control of salivary secretion. • Stomach: characteristics and functions; gastric motility and its control; gastric emptying; gastric acid and peptic secretion (cellular mechanisms), neuro-hormonal control of gastric secretion; mucosal barrier and gastric protection; gag reflex; gastric ulcer; Helicobacter pylori. • Exocrine pancreas: characteristics and functions; saline and enzymatic exocrine secretion;</li> </ul>
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	<p>enzymatic activation; neuro-hormonal regulation of pancreatic secretion. • Liver: characteristics and functions; liver detoxification; bilirubin; biliary secretion, enterohepatic circulation • Gallbladder, structure and functions; concentration of cystic bile; cholelithiasis; regulation of bile release. • Small intestine; motility of the small intestine (segmentation and peristalsis); structure of the intestinal wall and villi; absorbent surface; secretion of the small intestine, NaCl, water, enzymes; principles of intestinal absorption. • Duodenum, Fasting, Ileus: characteristics and functions. • Carbohydrates: digestion, absorption. • Proteins: digestion, absorption. • Lipids: digestion, absorption; characteristics and roles of lipoproteins; endothelial damage. • Vitamins: absorption of water-soluble and fat-soluble vitamins and B12 • Absorption of water, sodium potassium, chlorine, calcium, phosphates, magnesium, iron, copper, zinc, vitamins. • Large intestine: cecum and colon: structure, functions and alterations; secretory and absorbent function. • Intestinal microflora and lymphoid tissue associated with the digestive system: characteristics and functions, relations with the functions of the immune system, defense against exogenous bacteria, digestion of some indigestible nutrients; probiotic and prebiotic foods. • Colorectal motility; composition of feces; mechanism of defecation; alve frequency and pharmacological aids for regulation. • Transport of nutrients from the blood to the cells: Starling's forces. • Notes on the main digestive pathologies: Reflux, Esophagitis, Gastritis, Hepatitis, Cholelithiasis, Intestinal inflammation, Diabetes, Colitis.</p> <p>• <b>Adverse reactions to food</b></p> <p>• Characteristics and classification of adverse reactions to food. • Toxic reactions to food; Characteristics and sources of xenobiotics in food; liver detoxification; bioavailability of toxic residues in food; risk assessment (DL50, DGA, NOAEL SF); Maximum residual limit and related problems; Examples of toxins of bacterial, plant, animal and anthropogenic origin. • Notes on food fraud (adulteration; counterfeiting; sophistication; alteration). • Non-toxic reactions to food; Food allergies: gastrointestinal and systemic symptoms; conventional diagnostics and treatment; Notes on celiac disease; Food intolerances: characteristics and conventional diagnostics. Problems of unconventional diagnostics.</p>
Bibliography and textbooks	<p>a) "ALIMENTAZIONE, NUTRIZIONE E SALUTE" di L. Debellis et al. - Ed. EdiSES.</p> <p>b) "FISIOLOGIA - dalle molecole ai sistemi integrati" di E. Carbone et al. - Ed. EdiSES</p>
Notes to textbooks	"a" is the reference text.
Teaching methods	Frontal lessons with PowerPoint presentations
Assessment methods (oral, written, ongoing assessment)	
Evaluation criteria (describe criteria for each of the above expected outcomes)	<p>- Level of knowledge and understanding relating to: Role of food and nutrition in humans will be assessed; Nutritional needs and their evaluation; Characteristics of nutrients and their role in the body; food classes; Aspects of sensory interaction with food; Characteristics of the digestive system and processes that make it possible to modify the food material and use nutrients; Factors capable of influencing eating behavior and health status</p> <p>- Ability to report the course contents in a clear way, using an adequate vocabulary, and to argue on specific problems proposed will be evaluated.</p>
Further information	