

**DESCRIPTION OF COURSE UNIT FOR DOCTORAL STUDIES
AT VILNIUS UNIVERSITY
(Interdisciplinary Course)**

Scientific Area/eas, Field/ds of Science	Medicine and Health sciences (M 000): Medicine (M 001), Odontology (M 002)			
	Natural Sciences (N 001): Biochemistry (N 004); Biology (N 010)			
Faculty, Institute, Department/Clinic	Faculty of Medicine. Biomedical Institute: Dept. of Physiology, Biochemistry, Microbiology and Laboratory Medicine			
Course unit title (ECTS credits, hours)	Physiology of Nutrition, Metabolism and Energy Balance 8 credits (216 hours)			
Study method	Lectures	Seminars	Consultations	Self-study
Number of ECTS credits	0.6	-	1.4	6
Method of the assessment (in 10 point system)	<p>Presentation of the report: the report is presented on a chosen topic, which is coordinated with the coordinating lecturers. The doctoral student must analyze, review and present the newest scientific publications related to the relevant topic.</p> <p>Evaluation criteria:</p> <ul style="list-style-type: none"> - novelty and relevance of the submitted material (2 points); - general structure and scope of the report, clear presentation of the knowledge, argumentation, conciseness and specificity (2 points); - summary, problematic issues, presentation and justification of conclusions (2 points); - presentation of the application of the reviewed knowledge in the dissertation (2 points); - organization of visual aids, ability to participate in discussion, control of questions, oratory skills (2 points). <p>The minimal positive score is 5.</p>			
PURPOSE OF THE COURSE UNIT				
The main objective of this course is to teach PhD students about the present knowledge in nutrition, metabolism and energy balance. PhD students will achieve a good theoretical basis for further practical and research studies.				
THE MAIN TOPICS OF COURSE UNIT				
<p><u><i>The Digestive system and its Impact on Human metabolism:</i></u> Functions of the gastrointestinal system. Digestion in the mouth. Functions of saliva. Digestion in the stomach and small intestine. Composition and functions of bile. Regulation of bile secretion. Absorption of fat, carbohydrates, proteins, vitamins, water, and electrolytes. Regulation of gastrointestinal secretion and motility. Functions of large intestine. Defecation. Functions of the liver.</p> <p><u><i>Systems Biology Approaches to Nutrition:</i></u> Human nutrition from the point of view of nutritional genomics, proteomics and metabolomics.</p> <p><u><i>Energy metabolism:</i></u></p>				

Metabolism and energy balance. Measurement of the whole body metabolic rate. Energy storage and control. Food intake control. Body composition evaluation. Physical activity energy expenditure.

Essential energy nutrients:

Protein and amino acids, carbohydrates, fats, ethanol: metabolism and its impact on the human health.

Fat soluble compounds:

Vitamin A, carotenoids, vitamin D, vitamin E, vitamin K: metabolism and its impact on the human health.

Water soluble compounds:

Vitamin C, thiamin, riboflavin, niacin, vitamin B₆, biotin: metabolism and its impact on the human health.

Minerals:

Calcium, phosphorus, magnesium, sodium, chloride, potassium, iron, zinc, copper, iodine and iodine deficiency disorders, selenium, chromium, boron, manganese, molybdenum: metabolism and its impact on the human health.

Endocrinology and reproduction (mechanisms of actions):

Pituitary hormones and their control by hypothalamus; adrenocortical hormones; insulin, glucagon and diabetes mellitus; parathyroid hormone, calcium and phosphate metabolism, bone and teeth; thyroid metabolic hormones; reproductive and hormonal functions of the male, female hormones.

Nutrition and aging:

Maternal nutrient metabolism and requirements in pregnancy and lactation, infant nutrition, adolescence, nutrition in adult and the older population.

Nutrition and immunity:

Immune response and nutrition. Nutrient regulation of the Food allergies and intolerance.

Nutrition and chronic non-infectious diseases and health risk:

Atherosclerotic cardiovascular disease, obesity, osteoporosis, diabetes, cancer, nutrition and gastrointestinal illness, hypertension, kidney diseases, liver disease.

Nutrition monitoring:

Food composition tables. Nutrition monitoring in Lithuania and the world.

Strategies for changing eating and exercise behavior to promote weight loss and maintenance:

Various plans of action prepared by Lithuanian Ministry of Health, FAO, WHO and other national and international institutions.

Dietary standards and guidelines:

Lithuanian Food and Nutrition Recommendations, approved by Lithuanian Ministry of Health in 2016 (order No. V 836). European dietary standards.

The actual issues in food and nutrition:

Foodborne infections and food safety; food biofortification; bioactive components in foods and supplements for health promotion; functional food; genetically modified food.

RECOMMENDED LITERATURE SOURCES

1. Janice L Raymond, Kelly Morrow. Krause and Mahan's Food & the Nutrition Care Process, 15th Edition. Publisher: Elsevier UK, 2020.
2. Holli, Betsy B.; Beto, Judith A. Nutrition Counseling and Education Skills: A Guide for Professionals: A Guide for Professionals. Publisher: Jones & Bartlett Learning, 2017.
3. Gropper, Sareen S.; Smith, Jack L. Carr, Timothy P. Advanced Nutrition and Human Metabolism. Publisher: Cengage Learning, 2017.

4. Theodore Tulchinsky, Elena Varavikova, Joel Matan Cohen. The New Public Health, 4th Edition. 2022
5. Devlin T. Textbook of Biochemistry With Clinical Correlations. 8th edition. 2013, Wiley-Liss, Inc
6. Nelson D.L., Cox M.M. Lehninger Principles of Biochemistry 8th edition. 2021, Worth Cummings
7. Bernadette Marriott, Diane Birt, Virginia Stalling, Allison Yates. Present Knowledge in Nutrition, 11th edition, ILSI publication, 2020, Washington
8. Guyton A.C., Hall J.E. Textbook of Medical Physiology. Elsevier sounders, 14th edition, 2020
9. Rekomenduojamos paros maistinių medžiagų ir energijos normos (Lietuvos Respublikos SAM 2016 06 23d. įsakymas Nr. V-836).
<https://www.e-tar.lt/portal/lt/legalAct/4bd890f0428011e6a8ae9e1795984391>
10. Gregoire, Mary. Foodservice Organizations: A Managerial and Systems Approach. Publisher: Pearson, 2016.

CONSULTING LECTURERS

1. Coordinating lecturer: Jonas Algis Abaravičius (Prof. dr. HP)
2. Arvydas Kaminskas (Prof. dr. HP)
3. Rimantas Stukas (Prof. dr. HP)

APPROVED:

By Council of Doctoral School of Medicine and Health Sciences at Vilnius University
15th of June, 2022

Chairperson of the Board: Prof. Janina Tutkuvienė