



Table 2

### 3.2. Course description

Basic description		
Course coordinator	Professor Jadranka Varljen, PhD	
Course title	Food Biochemistry	
Study programme	Clinical nutrition	
Course status	Compulsory	
Year	2 <sup>nd</sup>	
ECTS credits and teaching	ECTS student 's workload coefficient	3
	Number of hours (L+E+S)	25+0+10

#### 1. COURSE DESCRIPTION

##### 1.1. Course objectives

The course Food Biochemistry aims to encourage students to acquire a critical approach at the issue of nutrition, whose influence on the health of an individual is manifested throughout his life. Food and nutritional components represent a source of energy needed for growth, physical activity, building of the body and preservation of life, but also represent a potential risk for the development of a number of contemporary diseases. This course introduces students to the structure and function of biological macromolecules, main metabolic pathways, their causal connection and regulation, essential nutrients necessary to maintain metabolism and specific metabolic functions of organs.

##### 1.2. Course enrolment requirements:

##### 1.3. Expected course learning outcomes

Following this course and passing the exam, students acquire basic knowledge of the molecular organization of macro and micronutrients. This knowledge is necessary to understand molecular basis of metabolic processes related to food digestion and pathological changes that can develop in the human organism.

##### 1.4. Course content

**Food basic components:** macromolecules: proteins, carbohydrates, lipids.  
**Proteins:** Basic structure – aminoacids (essential and non-essential aminoacids. Glucogenic and ketogenic aminoacids. Peptide formation principles. Peptide antibiotics, peptide hormones and peptides with other functions). Structural levels in proteins architecture. Biological functions of proteins.  
**Enzymes and coenzymes:** classification and metabolic role. Kinetics and mechanism of enzyme reactions.  
**Nucleic acids:** structure and biological role. Replication, transcription and translation.  
**Protein digestion:** Enzymatic degradation of proteins in the digestive tract. Classification of proteins regarding to protease specificity and site of action. Metabolic pathways of degradation of amino acids: decarboxylation, transamination, oxidative deamination of amino acids, urea cycle.  
**The citric acid cycle.** Reactions in the citric acid cycle, control mechanisms, causal connection between the cycle and metabolism of proteins and lipids. Citric acid cycle as metabolic central point.  
**Respiratory chain.** Organization and function of the respiratory chain. Oxidative phosphorylation.  
**Carbohydrates and their functions.** Nomenclature, structure and function of biologically important monosaccharides, disaccharides, polysaccharides and complex carbohydrates.  
**Digestion of carbohydrates:** Enzymatic digestion of carbohydrates in the tract. How glucose enters the cell. Metabolic



pathways: glycolysis under aerobic and anaerobic conditions. Regulation and energy balance of glycolysis. Gluconeogenesis. Pentose phosphate pathways: oxidative and non-oxidative pathway. Glycogen metabolism: gluconeogenesis and glycogenolysis. Regulation of glycogen metabolism. Disorders in the metabolism of carbohydrates.

**Lipids.** Classification and biological role of lipids.

**Digestion of lipids:** Lipolytic degradation of triacylglycerols (fats or oils) in the gastrointestinal tract. Lipoproteins and their role in the transport of exogenous and endogenous lipids. Metabolic Pathways:  $\beta$  - oxidation. Biosynthesis of fatty acids and role of the multienzymatic complex in this process. Biosynthesis of fats and phospholipids. Sphingolipids: structure and metabolism. Biosynthesis of ketone bodies (ketogenesis). Biosynthesis of cholesterol, vitamin D, bile acids and steroid hormones. The biochemical properties of hormones. Principles of hormonal regulation.

**Regulation of metabolism.** General principles of regulation. Regulatory mechanisms and interrelationships in the intermediary metabolism.

**Nutrition.** Essential food components, vitamins and trace elements.

1.5. <i>Teaching methods</i>	<input checked="" type="checkbox"/> <b>lectures</b> <input checked="" type="checkbox"/> <b>seminars and workshops</b> <input type="checkbox"/> exercises <input type="checkbox"/> long distance education <input type="checkbox"/> fieldwork	<input checked="" type="checkbox"/> <b>individual assignment</b> <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratories <input checked="" type="checkbox"/> <b>mentorship</b> <input type="checkbox"/> other
1.6. <i>Comments</i>	Students' activity during the course will be monitored. Preparation and presentation of seminary works will be evaluated, as well as the approach to given topics. Discussions on given topics in the field of biochemistry food will be encouraged.	

### 1.7. *Student's obligations*

Students are required to regularly attend and actively participate in all forms of teaching. For successful performance of seminars, previous preparation is needed. Classes are held in the stipulated time and it is not possible to enter after the teacher. It is not allowed to bring food and drink in the class as well as unnecessarily getting in/out of the classroom. The use of cell phones during class time as well as during the exams is not allowed.

### 1.8. *Evaluation of student's work*

Course attendance	X	Activity/Participation	X	Seminar paper	X	Experimental work	
Written exam	X	Oral exam	X	Essay		Research	
Project		Sustained knowledge check		Report		Practice	
Portfolio							

### 1.9. *Assessment and evaluation of student's work during classes and on final exam*

Student's work will be evaluated during classes and at the final exam. Students are evaluated according the ECTS (A-E) and numerical (1-5) system. During the trimester, students can obtain maximally 100 grade points (maximally 70 grade points during classes and 30 on the final exam). The final grade represents count of grade points accomplished during classes and on the final exam.

Students are allowed to attend the final exam if they acquire a minimum of 40 grade points during the course.

Students who achieved a total of 30 to 39.99 points are graded in the assessment category FX and can access the correctional test. Students who meet the minimum criteria at the correctional test get a grade sufficient (E), regardless of the achievement at the test.

Students who achieved a total of 29.99 points or less during the course did not meet the minimum requirements of the course, are marked with the grade insufficient (F) and must re-enroll the course.

### 1.10. *Main and optional / additional reading (at the time of proposing study programme)*

1.R. Murray: Harperova ilustrirana biokemija, Medicinska naklada, Zagreb 2011. (main literature)

2. L. Stryer: Biokemija, Školska knjiga, Zagreb, 2012. (optional/additional reading)

### 1.11. *Number of assigned reading copies with regard to the number of students currently attending the course*

Title	Number of copies	Number of students
R. Murray: Harperova ilustrirana biokemija, Medicinska naklada, Zagreb 2011.	10	
L. Stryer: Biokemija, Školska knjiga, Zagreb, 2012.	5	



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<i>1.12. Quality monitoring methods which ensure acquirement of output knowledge, skills and competences</i>		
The success of the course and its quality will be monitored via anonymous questionnaires.		