



# Pomeranian Medical University in Szczecin

## SYLLABUS of the MODULE (SUBJECT) General Information

Module title: Biochemistry	
Module type	Obligatory
Faculty PMU	Faculty of Medicine and Dentistry
Major	Dentistry
Level of study	long-cycle (S2J)
Mode of study	full-time studies
Year of studies, semester	Year 2, semester III and IV
ECTS credits (incl. semester breakdown)	9
Type/s of training	lectures (18h) /seminars (30h)/ practical (60)
Form of assessment*	<input checked="" type="checkbox"/> graded assessment: <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> descriptive</li> <li><input checked="" type="checkbox"/> test</li> <li><input type="checkbox"/> practical</li> <li><input type="checkbox"/> oral</li> </ul> <input type="checkbox"/> non-graded assessment  <input checked="" type="checkbox"/> final examination <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> descriptive</li> <li><input checked="" type="checkbox"/> test</li> <li><input type="checkbox"/> practical</li> <li><input checked="" type="checkbox"/> oral</li> </ul>
Head of the Department/ Clinic, Unit	Prof. dr hab. n. med. Dariusz Chlubek
Tutor responsible for the module	dr n. med. Janina Zawierta; janina.zawierta@pum.edu.pl
Department's/ Clinic's/ Unit's website	<a href="https://www.pum.edu.pl/wydzialy/wydzial-medycyny-i-stomatologii/zaklad-biochemii">https://www.pum.edu.pl/wydzialy/wydzial-medycyny-i-stomatologii/zaklad-biochemii</a>
Language	English

\* replace ☐ into ☒ where applicable

## Detailed information

<b>Module objectives</b>		The attainment target of biochemistry is analyzing vital processes at the molecular level and explaining connections between the structure and the function of biomolecules in the living organism . This knowledge is a base of understanding action of individual tissues and organs, and in consequence functioning of the entire organism in health and illness. It lets also consciously react to the appearance of pathological processes by implementing the effective treatment. It enables the tooth decay to take preventive action with reference to diseases associated with the progress of civilization . It also preparing students for studying of clinical objects is an attainment target of biochemistry.
Prerequisite /essential requirements	Knowledge	Student knows patterns of basic substances. Explains concepts: of atom, molecule, substance, a chemical reaction, the functional group. Recognizes and defines organic compounds: hydrocarbons, alcohols, aldehydes, ketones, acids, esters, ethers, amides, amines. Knows and classifies chemical bonds. Defines notions: of solubility, diffusion, osmosis, osmotic pressure, molarity. Knows notions: of solution, molar concentration, percentage concentration, normal setting, electrolytic dissociation, ion, anion, cation.
	Skills	Student is able to use the basic laboratory equipment ( use the speedy pipette, measure appropriate volumes of solutions out, prepare solutions according to the recommended concentration, titrate). Performs chemical calculations based on knowledge of chemistry and mathematic. Knows principles of operation in a chemical laboratory. He is able to react actually in emergencies in a chemical laboratory (functioning of gobbling, flammable, poisoning associations, action of the highest temperature and e.c.).
	Competences	Student is able to work in a team and actually to perform tasks requiring the precision, acting according to the closely established procedure. He is able to behave responsibly in emergencies. A habit has self-educations.

## Description of the learning outcomes for the subject /module

No. of learning outcome	Student, who has passed the (subject) knows /is able to /can:	SYMBOL (referring the standards)	Method of verification of learning outcomes*
W01	knows and understands importance of main and trace elements in processes within human body with regard to intake, absorption and transport	B.W01	S, RZC, W, ET, EP, EU
W02	knows and understands importance of electrolytes, buffer systems and chemical reactions in biological systems	B.W02	S, RZC, W, ET, EP, EU
W03	knows and understands biochemical bases of human body integrity	B.W03	S, RZC, W, ET, EP, EU
W04	knows and understands structure and functions of significant chemical compounds found in human body. In particular properties , functions, metabolism and energy aspects of proteins, nucleic acids, carbohydrates, lipids, enzymes and hormones reactions.	B.W04	S, RZC, W, ET, EP, EU
W05	knows and understands principles of calcium-phosphate metabolism	B.W05	S, RZC, W, ET, EP, EU
W06	knows and understands role and importance of body fluids including saliva	B.W06	S, RZC, W, ET, EP, EU

U01	is able to associate chemical phenomena with processes occurring in oral cavity	B.U01	S, RZC, W, ET, EP, EU
K05	is ready to notice and recognize own limitations, make self-assessment of educational deficits and needs	K05	S, RZC, W
K07	is ready to use reliable sources of information	K07	S, RZC, W
K08	is ready to draw conclusions from own measurements or observations	K08	S, RZC, W

Table presenting LEARNING OUTCOMES in relation to the form of classes

No. of learning outcome	Learning outcomes	Type of training						
		Lecture	Seminar	Practical	Clinical classes	Simulations	E-learning	Other...
W01	B.W01	X	X	X				
W02	B.W02	X	X	X				
W03	B.W03	X	X	X				
W04	B.W04	X	X	X				
W05	B.W05	X	X	X				
W06	B.W06	X	X	X				
U01	B.U01	X	X	X				
K05	K05	X	X	X				
K07	K07	X	X	X				
K08	K08	X	X	X				

Table presenting TEACHING PROGRAMME

No. of a teaching programme	Teaching programme	No. of hours	References to learning outcomes
<b>Winter semester</b>			
<b>Lectures</b>			
TK01	Proteins - structure and functions	2	W02,03,04, K05,07,08
TK02	Enzymes	2	W02,03,04, K05,07,08
TK03	Protein digestion	2	W02,03,04, K05,07,08
TK04	Amino acid nitrogen catabolism	2	W02,03,04, K05,07,08
TK05	Krebs cycle	1	W02,03,04, K05,07,08
TK06	Carbohydrate metabolism	2	W02,03,04, K05,07,08
TK07	Lipoprotein metabolism	2	W02,03,04, K05,07,08
TK08	Iron and bilirubin metabolism	2	W01,W02,03,04, K05,07,08
TK09	Magnesium metabolism	2	W01,02,03,04, K05,07,08
TK10	Fluoride metabolism	1	W01,02,03,04, K05,07,08

<b>Seminars</b>			
TK01	Amino acids and peptides - classification, properties, functions. Proteins: molecular structure, properties, functions.	2	W02,03,04, K05,07,08
TK02	Nucleotides. Nucleic acids. Protein biosynthesis.	2	W02,03,04, K05,07,08
TK03	Enzymes - general properties, kinetic of enzymatic reactions, mechanisms of action, regulation of the activity.	2	W02,03,04, K05,07,08
TK04	Enzymes – regulation mechanisms of enzyme activity. Regulation on the gene level.	1	W02,03,04, K05,07,08
TK05	Nutritional proteins. Biological value of the proteins. Nitrogen balance. Protein digestion. Amino acids absorption.	1	W02,W03,04, K05,07,08
TK06	Catabolism of amino groups of amino acids. Urea cycle.	2	W02,W03,04, K05,07,08
TK07	Getting the energy in the cell. Citric acid cycle. Mitochondrial respiratory chain.	2	W02,03,04, K05,07,08
TK08	Nutritional sugars. Sugars digestion and absorption. Metabolism of glycogen.	2	W02,03,04, K05,07,08
<b>Practical classes</b>			
TK01	Amino acids, peptides, proteins. Investigation of properties, determination of the isoelectric point.	4	W02,03,04, K05,07,08
TK02	Nucleotides. Nucleic acids. Protein biosynthesis. Determination of protein concentration	3,5	W02,03,04, K05,07,08
TK03	Enzymes - general properties, kinetics of enzymatic reactions, mechanisms of action. Determination of amylase activity in serum and urine	3,5	W02,03,04, K05,07,08
TK04	Enzymes - mechanisms of activity regulation. Regulation at the gene level. Determination of serum transaminases activity.	3,5	W02,03,04, K05,07,08
TK05	Nutritional proteins. Biological value of the proteins. Nitrogen balance. Protein digestion. Amino acids absorption. Kay's test	3,5	W02,03,04, K05,07,08
TK06	Catabolism of amino groups of amino acids. Urea cycle. Determination of urea in serum and urine	3,5	W02,03,04, K05,07,08
TK07	Getting the energy in the cell. Citric acid cycle. Mitochondrial respiratory chain. Determination of cytochrome oxidase activity	3,5	W02,03,04, K05,07,08
TK08	Nutritional sugars. Sugars digestion and absorption. Metabolism of glycogen. Testing the content of sugars in food products	3,5	W02,03,04, K05,07,08
<b>Simulation</b>			
<b>E-learning</b>			
TK06	Carbohydrate metabolism	2	W02,03,04, K05,07,08
TK08	Iron and bilirubin metabolism	2	W01,W02,03,04, K05,07,08
TK10	Fluoride metabolism	1	W01,02,03,04, K05,07,08

Summer semester			
Lectures			
TK01	-		
TK02	-		
Seminars			
TK09	Glucose metabolism. Glycolysis. Gluconeogenesis.	2	W02,03,04, K05,07,08
TK10	Pentose cycle. The metabolism of the fructose and galactose. Uronic acid pathway.	1	W02,03,04, K05,07,08
TK11	Nutritional lipids. Lipids digestion and absorption.	1	W02,03,04, K05,07,08
TK12	Lipids transport and storage. Lipoproteins.	2	W02,03,04, K05,07,08
TK13	Metabolism of fatty acids: lipogenesis, $\beta$ -oxidation, ketogenesis. Triacylglycerol metabolism: synthesis and lipolysis.	2	W02,03,04, K05,07,08
TK14	Cholesterol and bile acids metabolism.	2	W02,03,04, K05,07,08
TK15	Iron and porphyrins metabolism. The synthesis and the catabolism of the hem. Metabolism of bilirubin.	2	W01,02,03,04, K05,07,08
TK16	Macro- and microelements. Calcium-phosphate metabolism.	2	W01,03,05, K05,07,08
TK17	Biochemistry of the oral cavity. Saliva. Chemical composition of tissues of the tooth. Processes of the demineralization and the remineralization. Biochemical aspects of tooth decay and periodontal diseases.	2	W01,03,06, U01, K05,07,08
Practical classes			
TK09	Glucose metabolism. Glycolysis. Gluconeogenesis. Carrying out the synthesis of starch	3,5	W02,03,04, K05,07,08
TK10	Pentose cycle. The metabolism of the fructose and galactose. Uronic acid pathway. Perform a sucrose loading test	3,5	W02,03,04, K05,07,08
TK11	Nutritional lipids. Lipids digestion and absorption. Study of the properties of fats	3,5	W02,03,04, K05,07,08
TK12	Lipids transport and storage. Lipoproteins. Determination of the concentration of $\beta$ -lipoproteins in the serum	3,5	W02,03,04, K05,07,08
TK13	Metabolism of fatty acids: lipogenesis, $\beta$ -oxidation, ketogenesis. Triacylglycerol metabolism: synthesis and lipolysis. Lipase activity test	3,5	W02,03,04, K05,07,08
TK14	Cholesterol and bile acids metabolism. Reactions to detect steroid compounds.	3,5	W02,03,04, K05,07,08
TK15	Iron and porphyrins metabolism. The synthesis and the catabolism of the hem. Metabolism of bilirubin. Determination of iron and TIBC concentration in the serum	3,5	W01,02,03,04, K05,07,08
TK16	Macro- and microelements. Calcium-phosphate metabolism. Examination of mineral and organic components of the tooth, determination of serum phosphate concentration.	3,5	W01,03,05, K05,07,08
TK17	Biochemistry of the oral cavity. Saliva. Chemical composition of tissues of the tooth. Processes of the demineralization and the remineralization. Biochemical aspects of tooth decay and periodontal diseases. Determination of amylase activity in saliva.	3,5	W01,03,06, U01, K05,07,08

<b>Simulation</b>			
<b>E-learning</b>			

<b>Booklist</b>
Obligatory literature:
1. Biochemistry. Denise R. Ferrier. Seventh edition
2.
Supplementary literature:
1.
2.

<b>Student's workload</b>	
Form of student's activity (in-class participation; activeness, produce a report, etc.)	Student's workload [h]
	Tutor
Contact hours with the tutor	108
Time spent on preparation to seminars/ practical classess	70
Time spent on reading recommended literature	
Time spent on writing report/making project	
Time spent on preparing to colloquium/ entry test	17
Time spent on preparing to exam	80
Other .....	
Student's workload in total	269
<b>ECTS credits for the subject (in total)</b>	9
<b>Remarks</b>	

\* Selected examples of methods of assessment:

EP – written examination

EU – oral examination

ET – test examination

EPR – practical examination

K – colloquium

R – report

S – practical skills assessment

RZC – practical classes report, incl. discussion on results

O – student's active participation and attitude assessment

SL – lab report

SP – case study

PS - assessment of student's ability to work independently

W – entry test

PM – multimedial presentation

other...