SYLLABUS of the MODULE (SUBJECT)
General Information

Module title: Biochemistry	
Module type	Obligatory
Faculty PMU	Międzywydziałowe Centrum Kształcenia w Języku Angielskim
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)	8
Type/s of training	lectures (18h) /seminars (30h)/ practical (60)
Form of assessment*	☒graded assessment: ☒descriptive ☒test ☐practical ☐oral ☐non-graded assessment ☒final examination ☒descriptive ☒test ☐practical ☒oral
Head of the Department/ Clinic, Unit	Prof. dr hab. n. med. Prof. dr hab. Violetta Dziedziejko
Tutor responsible for the module	dr n. med. Patrycja Kupnicka; patrycja.kupnicka@pum.edu.pl
Department's/ Clinic's/ Unit's website	https://www.pum.edu.pl/studenci/informacje_z_jednostek/wm/katedra_biochemii_i_chemii_medycznej/zaklad_biochemii/
Language	English

* replace ☐ into ☒ where applicable

Detailed information

Module objectives		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				
K05	K05			X				
K07	K07			X				
K08	K08			X				

Table presenting TEACHING PROGRAMME

No. of a teaching programme	Teaching programme	No. of hours	References to learning outcomes
Winter semester			
	Lectures		
TK01	Proteins - structure and functions	2	W02,03,04,
TK02	Enzymes	2	W02,03,04,
TK03	Protein digestion	1	W02,03,04,
TK05	Krebs cycle	1	W02,03,04,
TK06	Carbohydrate metabolism	2	W02,03,04,
TK07	Lipoprotein metabolism	2	W02,03,04,
TK09	Magnesium metabolism	1	W01,02,03,04,
	Seminars		
TK01	Amino acids and peptides - classification, properties, functions. Proteins: molecular structure, properties, functions.	2	W02,03,04,
TK02	Enzymes - general properties, kinetic of enzymatic reactions, mechanisms of action, regulation of the activity.	2	W02,03,04,

TK03	Enzymes – regulation mechanisms of enzyme activity. Regulation on the gene level.	2	W02,03,04,
TK04	Nutritional proteins. Biological value of the proteins. Nitrogen balance. Protein digestion. Amino acids absorption.	2	W02,W03,04,
TK05	Catabolism of amino groups of amino acids. Urea cycle.	2	W02,W03,04,
TK06	Getting the energy in the cell. Citric acid cycle. Mitochondrial respiratory chain.	2	W02,03,04,
TK07	Nutritional sugars. Sugars digestion and absorption. Metabolism of glycogen.	2	W02,03,04,
Practical classes			
TK01	Amino acids, peptides, proteins. Investigation of properties, determination of the isoelectric point.	4	U01, K05,07,08
TK02	Enzymes - general properties, kinetics of enzymatic reactions, mechanisms of action. Determination of amylase activity in serum and urine	4	K05,07,08
TK03	Enzymes - mechanisms of activity regulation. Regulation at the gene level. Determination of serum transaminases activity.	4	K05,07,08
TK04	Nutritional proteins. Biological value of the proteins. Nitrogen balance. Protein digestion. Amino acids absorption. Kay's test	4	K05,07,08
TK05	Catabolism of amino groups of amino acids. Urea cycle. Determination of urea in serum and urine	4	K05,07,08
TK06	Getting the energy in the cell. Citric acid cycle. Mitochondrial respiratory chain. Determination of cytochrome oxidase activity	4	K05,07,08
TK07	Nutritional sugars. Sugars digestion and absorption. Metabolism of glycogen. Testing the content of sugars in food products	4	U01 K05,07,08
Simulation			
E-learning			
TK01	Carbohydrate metabolism	2	W02,03,04,
TK02	Iron and bilirubin metabolism	2	W01,W02,03,04,
TK03	Fluoride metabolism	1	W01,02,03,04,
Summer semester			
Lectures			
Seminars			
TK08	Glucose metabolism. Glycolysis. Gluconeogenesis.	2	W02,03,04,
TK09	Pentose cycle. The metabolism of the fructose and galactose. Uronic acid pathway.	1	W02,03,04,
TK10	Nutritional lipids. Lipids digestion and absorption.	1	W02,03,04,
TK11	Lipids transport and storage. Lipoproteins.	1	W02,03,04,
TK12	Metabolism of fatty acids: lipogenesis, β-oxidation, ketogenesis. Triacylglycerol metabolism: synthesis and lipolysis.	2	W02,03,04,
TK13	Cholesterol and bile acids metabolism.	2	W02,03,04,

TK14	Iron and porphyrins metabolism. The synthesis and the catabolism of the hem. Metabolism of bilirubin.	2	W01,02,03,04,
TK15	Macro- and microelements. Calcium-phosphate metabolism.	2	W01,03,05,
TK16	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,
Practical classes			
TK08	Glucose metabolism. Glycolysis. Gluconeogenesis. Carrying out the synthesis of starch	4	U01, K05,07,08
TK09	Pentose cycle. The metabolism of the fructose and galactose. Uronic acid pathway. Perform a sucrose loading test	4	K05,07,08
TK10	Nutritional lipids. Lipids digestion and absorption. Study of the properties of fats	3	U01, K05,07,08
TK11	Lipids transport and storage. Lipoproteins. Determination of the concentration of β-lipoproteins in the serum	4	K05,07,08
TK12	Metabolism of fatty acids: lipogenesis, β-oxidation, ketogenesis. Triacylglycerol metabolism: synthesis and lipolysis. Lipase activity test	4	K05,07,08
TK13	Cholesterol and bile acids metabolism. Reactions to detect steroid compounds.	3	K05,07,08
TK14	Iron and porphyrins metabolism. The synthesis and the catabolism of the hem. Metabolism of bilirubin. Determination of iron and TIBC concentration in the serum	4	K05,07,08
TK15	Macro- and microelements. Calcium-phosphate metabolism. Examination of mineral and organic components of the tooth, determination of serum phosphate concentration.	3	K05,07,08
TK16	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	U01, K05,07,08
Simulation			
E-learning			

Booklist
Obligatory literature:
1. Biochemistry. Denise R. Ferrier. Seventh eddition
2.
Supplementary literature:
1.

2.

Student's workload	
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	40
Time spent on reading recommended literature	
Time spent on writing report/making project	
Time spent on preparing to colloqium/ entry test	17
Time spent on preparing to exam	45
Other …..	
Student's workload in total	210
ECTS credits for the subject (in total)	8
Remarks	

* Selected examples of methods of assessment:
EP – written examination
EU – oral examination
ET – test examination
EPR – practical examination
K – colloqium
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…