



# Pomeranian Medical University in Szczecin

## SYLLABUS of the MODULE (SUBJECT)

### General Information

Code		Title	Laboratory diagnostics
Module type			<i>Obligatory</i>
Faculty			<i>Faculty of Medicine</i>
Field of study			<i>medicine</i>
Major			<i>Not applicable</i>
Level of study			<i>II level/ long-cycle (S2J)</i>
Mode of study			<i>intramural</i>
Year of study			<i>III</i>
Semester			<i>5 and 6</i>
ECTS points			<i>3</i>
Types of training			<i>Classes (45h)</i>
Tutor responsible for the module			<i>Prof. dr hab. Andrzej Ciechanowicz (aciech@pum.edu.pl)</i>
Tutors conducting the subject			<i>dr hab.n.med. Jeremy Clark (jeremyclarkbio@gmail.com), dr Mariusz Kaczmarczyk (mariusz@pum.edu.pl)</i>
WWW			<i>www.pum.edu.pl</i>
Language			<i>English</i>

### Detailed information

Module objectives		<p>The main purpose of teaching the subject is to develop the skills for proper selection of laboratory tests and their proper use (interpretation) for further diagnostic and therapeutic procedures.</p> <p>To familiarize students with the basic concepts used in laboratory clinical diagnosis and how to use the results of laboratory testing in clinical practice. To acquire knowledge about the principles of proper collection, storage and transport of biological material. Familiarization with manual and automatic methods of analysis of blood, urine. Acquire the skills of proper selection of laboratory tests and their evaluation in the diagnosis and treatment of medical conditions. To familiarize with the methodology of routine and selected specialist laboratory tests.</p> <p>Understanding the principles of a good doctor's cooperation with the laboratory</p>
Prerequisite /essential requirements	Knowledge	Obtain basic knowledge in laboratory diagnostics
	Skills	Ability to correctly select laboratory tests and their correct use (interpretation)
	Competences	Self learning and teamwork skills

Description of the learning outcomes for the subject /module			
Number of learning outcome	Student, who has passed the (subject) Knows /is able to /can:	SYMBOL (referring the standards) EKK	Method of verification of learning outcomes
KL2JPW01	knows the symptoms and causes of selected disorders and lesions and the methods of their evaluation and interpretation	K_E.W01	Cycle tests, final examination
KL2JPW02	<p>knows and understands the causes, symptoms, principles of diagnosis and interpretation of results:</p> <p>a) analytical basics of laboratory diagnostics. Standardization. Range of correct (reference) values, pre-laboratory error, laboratory, interpretation. Precision error and systematic error. Sensitivity and specificity of diagnostic tests.</p> <p>b) plasma proteins. Functions of protein fractions. Constellations of blood protein changes. Acute phase proteins. Monoclonal protein, protein separation methods.</p> <p>c) enzymatic diagnosis: division and occurrence (plasma, cellular enzymes). The clinical relevance of enzyme research.</p> <p>d) water-electrolyte and acid-base</p>	K_E.W07	

	<p>disorders: dehydration and overhydration states, electrolyte disturbances, acidosis and alkalosis</p> <p>e) basics of hematological diagnosis. Structure and function of erythrocytes, abnormalities in the structure and function of erythrocytes. Basic laboratory tests characterizing the function of the red blood cell system and their interpretation Red blood cell diseases - diagnostic procedures (normal metabolism of iron, b12, folic acid).</p> <p>f) basics of hematological diagnosis.</p> <p>- white blood cell system, white blood cell and lymph system characteristics, morphological characteristics of granulocytes, monocytes, lymphocytes and their function. Studies evaluating the action of white blood cells. Quantitative changes of white blood cells in peripheral blood.</p> <p>g) diagnostics of lipid disorders, lipidogram: triglycerides, total cholesterol, LDL cholesterol, HDL cholesterol: normal profile, dyslipidemia. Homocysteine, LpA, fibrinogen in the development of atherosclerosis.</p> <p>h) laboratory diagnosis of coagulopathy: laboratory diagnostics of hemorrhagic haemorrhage, haemorrhagic febrile hemorrhage, screening and supplementation in hemorrhagic haemorrhage diagnosis, laboratory diagnostics of selected diseases: DIC, hypoprothrombinemia acquired, von Willebrand disease, differential diagnosis DIC and inherited fibrinolysis. Diagnostic laboratory thrombosis. Laboratory control of anticoagulant treatment.</p> <p>i) diagnosis of diabetes and laboratory diagnostics of intra- and exocrine pancreas. Methods of glucose determination: fasting glucose, oral glucose tolerance test (DTTG), glucose halfprogram, daily glucose profile - interpretation of results, diagnosis of diabetes mellitus. Laboratory tests for diagnosing and monitoring diabetes.</p> <p>j) biochemical diagnostics of</p>		
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	<p>tumors: gastric cancer markers (CEA, Ca19.9) breast cancer markers, prostate cancer markers, lung cancer, venous cancer, ectopic hormone production, ionic disorders.</p> <p>k) laboratory diagnostics of gastrointestinal diseases, including: diseases of the mouth, esophagus, stomach and duodenum, intestines, pancreas, liver, bile ducts</p> <p>l) laboratory diagnostics of endocrine disorders, including hypothalamic and pituitary diseases, thyroid, parathyroid, adrenal cortex, ovarian and testicular diseases, neuroendocrine tumors</p> <p>m) laboratory diagnostics of kidney and urinary tract diseases</p> <p>n) laboratory diagnostics in acute life-threatening conditions - urgent diagnostic laboratory: urgent haematological and coagulation studies, acute acid-alkaline emergency breakdown, urgent biochemical studies, acute "surgical conditions" in laboratory tests (differentiation)</p>		
KL2JPW03	knows the clinical aspects of metabolic disorders and the method of laboratory evaluation of metabolic processes in terms of mechanisms of development and disease course	K_E.W23	
KL2JPW04	knows the types of biological materials used in laboratory diagnostics and the rules for obtaining test material	K_E.W37	
KL2JPW05	knows the rules for interpreting the results of laboratory tests to differentiate physiological and pathological states	K_E.W38	
KL2JPW06	knows the theoretical and practical aspects of functional tests and biochemical assays, and their importance for diagnosis, differential diagnosis, disease monitoring, and assessment of treatment outcomes in various clinical conditions.	K_E.W39	
KL2JPW07	knows the principles of selection, execution and organization of screening for prevention and treatment.	K_E.W40	
KL2JPU01	can interpret the range of reference values (including age, sex, lifestyle,	K_E.U14	

	decision value) and evaluate the dynamics of changes in laboratory parameters.		
KL2JPU02	can assess the results of biochemical studies with respect to a specific pathology or disease unit	K_E.U28	
KL2JPU03	can predict the impact of disease progression and specific behavior on laboratory results	K_E.U37	
KL2JPU04	can communicate the results	K_E.U02	
K01	understands the need for lifelong learning, can inspire and organize the learning process of others	K_E. K01	
K02	demonstrates the skill and habit of self-education	K_E. K06	

**Matrix presenting the learning outcomes of the subject/module in relation to the form of classes**

Number of learning outcome	Student, who has passed the (subject) Knows /is able to /can:	Types of training							
		Lecture	Seminar	Laboratory classes	Project work	Clinical classes	Classes	Practical classes	Other
KL2JPW01	K_E.W01						X		
KL2JPW02	K_E.W07						X	X	
KL2JPW03	K_E.W23						X		
KL2JPW04	K_E.W37						X		
KL2JPW05	K_E.W38						X		
KL2JPW06	K_E.W39						X		
KL2JPW07	K_E.W40						X		
KL2JPU01	K_E.U14						X		
KL2JPU02	K_E.U28						X		
KL2JPU03	K_E.U37						X		
KL2JPU04	K_E.U02						X		
K01	K_E. K01						X		
K02	K_E. K06						X		

**Module (subject) contents**

Symbol of teaching programme	Content of teaching programme	References to learning outcomes
TK01	Analytical basics of laboratory diagnostics. Standardization	K_E.W01, K_E.W37, K_E.W38, K_E.W39
TK02	Disorders of plasma protein metabolism. Constellations of blood protein changes, acute phase proteins. Monoclonal gammopathy	K_W01, K_W07, K_W39, K_W23, K_U02, K_U28, K_U37, K_K01
TK03	Enzymatic diagnostics	K_W01, K_W07, K_W37, K_W38, K_W39, K_W23, K_U02, K_U28, K_U37, K_K01, K_K06
TK04	Basics of hematology diagnostics.	K_W01, K_W07, K_W37, K_W38, K_W39, K_W23,

		K_E U02, K_U14, K_U28, K_U37, K_K01, K_K06
TK05	Patobiochemistry of cardiovascular diseases	K_W01, K_W07, K_W37, K_W38, K_W39, K_W23, K_E U02, K_U14, K_U28, K_U37, K_K01, K_K06
TK06	Diagnosis of diabetes and laboratory diagnostics of intra- and exocrine pancreas	K_W01, K_W07, K_W37, K_W38, K_W39, K_W23, K_E U02, K_U14, K_U28, K_U37, K_K01, K_K06
TK07	Biochemical diagnostics of tumors: ectopic markers hormone production, ionic disorders.	K_W01, K_W07, K_W37, K_W38, K_W39, K_W23, K_E U02, K_U14, K_U28, K_U37, K_K01, K_K06
TK08	Laboratory diagnostics of gastrointestinal diseases	K_W01, K_W07, K_W37, K_W38, K_W39, K_W23, K_E U02, K_U14, K_U28, K_U37, K_K01, K_K06
TK09	Laboratory diagnostics of diseases of the endocrine system	K_W01, K_W07, K_W37, K_W38, K_W39, K_W23, K_E U02, K_U14, K_U28, K_U37, K_K01, K_K06
TK10	Laboratory diagnostics in acute conditions of life threat	K_W01, K_W07, K_W37, K_W38, K_W39, K_W23, K_E U02, K_U14, K_U28, K_U37, K_K01, K_K06
TK11	Diagnostics laboratory of kidney and urinary diseases	K_W01, K_W07, K_W37, K_W38, K_W39, K_W23, K_E U02, K_U14, K_U28, K_U37, K_K01, K_K06
TK12	Fundamentals of laboratory diagnostics of coagulation disorders	K_W01, K_W07, K_W37, K_W38, K_W39, K_W23, K_E U02, K_U14, K_U28, K_U37, K_K01, K_K06
TK13	Diagnosis of hypertension and ischemic heart disease	K_W01, K_W07, K_W37, K_W38, K_W39, K_W23, K_E U02, K_U14, K_U28, K_U37, K_K01, K_K06

#### References and educational resources

1. Allan Gaw, Michael J Murphy, Rajeev Srivastava, Robert A Cowan, Denis St J O'Reilly.  
Clinical Biochemistry


#### Student's workload (balance sheet of ECTS points)

Form of student's activity (in-class participation; activeness, produce a report, etc.)	Workload [h]		
	Tutor	Student	Average
activities that require direct participation of tutors	47		

Preparation for the classes	10		
Reading of the indicated/specified literature	5		
Report writing/project making			
Time spent to prepare for the exam	10		
Other			
Student's workload in total	72		
ECTS points for the subject	3		
Remarks at the end			

Methods of assessment, for example:

E – exam- problem resolving

S – verifying of practical skills

R – report

D – discussion

P – presentation

Others-