GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Introduction to Clinical Analytics, PG_00068101		
Field of study	Biomedical Engineering		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2027/2028
Education level	first-cycle studies	Subject group	Optional subject group Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	Polish
Semester of study	6	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Chemistry and Technology of Functional Materials -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Ewa Wagner-Wysiecka	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	15.0	0.0	0.0	30

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	30	3.0	42.0	75

Subject objectives

The aim of the course is to familiarize the student with the functioning of medical laboratories and the specificity and scope of determinations carried out in them.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U12] can analyze the operation of components, circuits and systems related to the field of study, as well as measure their parameters and examine technical specifications, and plan and conduct experiments related to the field of study, including computer simulations and measurements, and interpret obtained results and draw conclusions	- Student is able to carry out experiments related to the use of clinical analytics in biomedical engineering - Student is able to use and use analytical apparatus used in the determination in the field of biomedical engineering	[SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment
[K6_W02] knows and understands, to an advanced extent, selected laws of physics and physical phenomena as well as methods and theories explaining the complex relationships between them, constituting the basic general knowledge in the field of technical sciences related to the field of study	- Student knows and understands the principles of the human body - Student knows and understands the specificity of analytical determinations related to clinical analyst - Student understands the role of modern clinical analytics in biomedical engineering	[SW1] Assessment of factual knowledge

<table>
<tr><td>Subject contents</td><td>Course content – lecture
Lecture: Clinical analysis and its role in the contemporary medical diagnostics. The specificity of determinations in clinical analysis. Sampling, sample storage and its influence on the correct result of the analysis. Separation methods. Error sources. Spectroscopic methods in clinical analysis UV-Vis spectroscopy, spectrofluorimetry, emission and absorption atomic spectroscopy. Chromatographic methods in clinical analysis (gas chromatography, high performance liquid chromatography). Electrophoresis in clinical analysis. Electroanalytical methods in clinical analysis. Enzymes in clinical analysis. The examples of clinical determinations. The analysis of the metabolic processes water- electrolytes balance. The analysis of the metabolic processes trace elements. Lipids transformations. The drug level monitoring. Automatisaton and miniaturization in clinical analysis. The application of clinical analysis methods in pharmaceutical analysis and in pharmaceutical industry. The application of clinical analysis methods in criminology.

Laboratory: Selected methods for drug determination in body fluids (3h). Analyzers in clinical analytics examples of determinations (4h). Application of routine laboratory tests in clinical determinations (3h). Determination of glucose and ketone bodies in body fluids. Comparison of instrumental methods and commercial strip tests (3h). Field exercises visit to a laboratory (2h).</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>The student has a basic understanding of general, inorganic and organic chemistry, as well as of qualitative and quantitative analysis of chemical compounds. The student is familiar with basic laboratory techniques and is able to interpret the results of chemical determinations.</td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Written exam</td><td>51.0%</td><td>50.0%</td></tr>
<tr><td>Completion of all laboratory sessions, submission of reports, and passing of short written tests.</td><td>51.0%</td><td>50.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. Zarys biochemii klinicznej i analityki Praca zbiorowa pod red. S. Angielskiego I J. Rogulskiego, PZWL, W-wa, 1982 2. T. Badzio, J. Rogulski Analityczne podstawy diagnostyki laboratoryjnej, Gdańsk, AMG, 2000 3. Diagnostyka laboratoryjna z elementami biochemii klinicznej, pod red. A . Dembińskiej-Kieć, J. W. Naskalskego Wydawnictwo Urban&Partner, Wrocław, 2002 4. A. Przondo-Mordarska, Podstawowe procedury laboratoryjne w bakteriologii klinicznej, PZWL, W-wa, 2005 5. J. Minczewski, Z. Marczenko Chemia analityczna t.2 . PWN, W-wa, 2007 6. W. Szczepaniak Metody instrumentalne w analizie chemicznej. PWN, W-wa, 2007 6. Diagnostyka laboratoryjna, red. B. Solnica, PZWL, 2019 7. B. Solnica, K. Sztefko, Medyczne laboratorium diagnostyczne. Metodyka i aparatura., PZWL 2019</td></tr>
<tr><td>Supplementary literature</td><td>1. L. Hyla-Klekot, F. Kokot, S. Kokot Badania laboratoryjne zakres norm i interpretacja PZWL, W-wa, 2024 2. R. Caquet, 250 badań laboratoryjnych, PZWL, W-wa, 2017 3. T. Kędryna, M. Gałka-Walczak, B. Ostrowska, Wybrane zagadnienia z biochemii ogólnej z ćwiczeniami, Wydawnictwo Uniwersytetu Jagiellońskiego, Kraków, 2001 4. Miniaturyzacja w chemii analitycznej, praca zbiorowa pod red. Z. Brzózki. Oficyna Wydawnicza Politechniki Warszawskiej , W-wa 2005</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>1. Discuss the principle of reflectance UV-Vis spectrophotometry. Provide an example of how this technique can be applied in clinical analysis.
2. Application of spectrophotometric methods in point-of-care diagnostic systems. What is the concept behind this approach?
3. What are ion-selective electrodes and what are the advantages of their use in clinical analysis?
4. What is the anion gap and what is its diagnostic significance?</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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