Bialystok University of Technology

Doctoral School

COURSE DESCRIPTION CARD

Course name	**Biological fluids and their substitutes**				
Course type	**optional**	**Course code**	**SDPB0132**	**ECTS credits**	**2**
Forms and number of hours	**lecture: 10 h** **project: 10 h**	**Scientific discipline**	**biomedical engineering**		
Course objectives	Knowledge: Familiarizing PhD students with selected issues of biological fluids and their role in the human body. Deepening knowledge of the chemical composition and properties of body fluids. Familiarizing with modern methods of testing the rheological and physicochemical properties of biological fluids. Skills: Developing skills in selecting the chemical composition of artificial biological fluids depending on the target application. Social competences: Acquiring competences to improve professional qualifications in the field of biological fluids.				
Course content	Classification of biological fluids. Body fluids in the human body - general characteristics in terms of composition, properties, distribution, and tasks in the body. Intracellular, interstitial, and intravascular fluids. Composition and properties of saliva, blood, lymph, and urine. Transcellular fluids. Synovial and digestive fluids. Participation of fluids in homeostasis processes. Biological fluids as diagnostic material (including poisoning, inflammation, neoplastic diseases, endocrine disorders). Selected substitutes for biological fluids: plasma, synovial fluid, artificial saliva. Principles of selecting the chemical composition of substitutes for biological fluids and principles of using research equipment. Methods of testing the physical and chemical properties of biological fluids.				
Teaching methods	Informative and problem-based lecture enriched with discussion with the audience, multimedia presentation, project.				
Assessment method	Lecture: written test. Project: development of a selected substitute for biological fluid.				

Symbol of learning outcome	**Learning outcomes**	**Reference to the learning outcomes for the field of study for the 8th level of Polish Qualification Framework (PRK)**	**Methods of assessing the learning outcomes**
LO1	Knows the composition, properties, and function of natural biological fluids.	SD_W1	Test
LO2	Can explain the role of body fluids in homeostasis processes.	SD_W3	Test
LO3	Can design an artificial biological fluid depending on its final application.	SD_U1	Project
LO4	Knows research methods and is able to critically analyze the results of work on the physicochemical and rheological properties of biological fluids.	SD_K1	Project

Student workload (in hours)	
Lecture / classes / project / laboratory / seminar	10 /0 /10 / 0 / 0
Consultations	2
The unassisted student work	20
Implementation of project tasks and preparation for and participation in exams/tests	8
Total	**50**
ECTS credits	**2**

Basic references	1. Brunzel N.A., ed. K. Winsz-Szczotka, Laboratory diagnostics of urine and other body fluids, Edra Urban&Partner, Wrocław 2024. 2. Hamilton P., Laboratory tests of blood. It's simple, Edra Urban&Partner, Wrocław 2024. 3. Cygański A., Basics of electroanalytical methods, WNT, Warsaw 1999. 4. Kieć A., Naskalski J.W., Laboratory diagnostics with elements of clinical biochemistry, Urban & Partner, Wrocław 2009.
Supplementary references	1. Szczepaniak W., Instrumental methods in chemical analysis, PWN, Warsaw 2012. 2. Hyla-Klekot L., Kokot F., Kokot S. Laboratory tests. Range of standards and interpretation. PZWL, Warsaw, 2011. 3. Dembińska-Kieć A., Nastalski J. W. Laboratory diagnostics with elements of clinical biochemistry. Urban i Partner, Wrocław, 2005.
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