Course title:	Confocal microscopy in biomedicine and pharmacy
Course title in Polish:	Mikroskopia konfokalna w biomedycynie i farmacji
Course for discipline:	biology, veterinary science, agriculture and horticulture

Semester:	3	**Status of course:**	faculty	**Language:**	english
Academic year:		**Catalog number:**			

Coordinator of course:	dr hab. Katarzyna Wiktorska
Lecturer od course:	dr hab. Katarzyna Wiktorska
Executing unit:	Department of Physics and Biophysics
Ordering unit:	Doctoral School SGGW
Assumptions, goals and description of the course:	Purpose: To introduce students to advanced microscopic and experimental biology techniques and their latest and most current applications in the fields of pharmacy, medicine, biomedical and related research. Understanding the applications of confocal microscopy and pointing out its significance in the advances of biological, veterinary, agricultural and horticultural sciences. Course scope: A principle of confocal microscopy. History of confocal microscopy. The phenomenon of fluorescence. Dyes and antibodies used in research with confocal microscopy technique, fluorescent proteins. Methods of capturing and analysing microscopic images in 2D and 3D, advanced measurement techniques e.g.. FRET, FRAP, collocalisation. Application of confocal microscopy in biological, biomedical and pharmaceutical sciences: imaging of tissue cultures and spheroids (3D cell cultures), imaging of bacterial biofilms, application in preclinical drug research and development of new drug carriers and their mechanism of action: studies of the effects of drugs and xenobiotics on the functioning of normal and cancer cells: effects on the structure, localisation and function of intracellular organelles and proteins, analysis of cell death processes. Use in quality research of commercially available products.
Didactic form, number of hours:	Lecture and practical classes 10 hours
Teaching methods:	Multimedia presentations, demonstrations, simulations, case studies, analysis and interpretation of sample experimental data.
Limit of people in the group:	20

Learning outcomes

KNOWLEDGE - the graduate knows and understands:	**SKILLS - the graduate is able to:**	**COMPETENCES - the graduate is ready to:**
To the extent enabling to revise the existing pradigms in the field/discipline - the world achievments, gathering theoretical background as well as general and selected detailed issues	Carry out critical assessment of the scientific research findings and expert activities and their contribution to the knowledge development in the field/discipline	Critically evaluate the achievments in the field/discipline represented
Major general development trends in the field/discipline		Recognise knowledge in solving cognitive and practical problems characteristic for the area of research (field/discipline) and in an interdisciplinary aspect
		Support the ethos of scientific circles and conduct independent research

The method of verification of learning outcomes:	Project
Form of documentation of achieved learning outcomes:	Project in the form of a report including a case study
Elements and weights of the final grade:	Final evaluation: report on the completed project - 100%
Place of the course:	Teaching room 023 in the Department of Physics and Biophysics (building 34), and computer room P07 in building 37.

Basic and supplementary literature

Basic literature:
1. W. Jerome, RL. Price. Basic Confocal Microscopy, Springer Nature Switzerland AG 2018.
2. H. Kiziltoprak, D. Ozkoyuncu, K. Tekin, and M. Koc, 'Confocal Scanning Laser Microscopy in Medicine', Biomedical Signal and Image Processing. IntechOpen, 2021.
3. Recent scientific papers suggested by the lecturer.

Supplementary literature:
1. Confocal microscopy in pharmaceutical sciences. K.Wiktorska. Gazeta Farmaceutyczna.. 1230-9923. vol. 19, (2010), pp. 30-33
2. Biomedical optics. A collective work edited by Prof. Halina Podbielska. Oficyna Wydawnicza Politechniki Wrocławskiej Wrocław 2011.

Comments:	

Estimated number of hours of work of the doctoral student necessary to achieve the assumed learning outcomes:	40

Leraning outcomes reference to the second degree characteristics of the National Qualification Framework (level 8) covering doctoral competences:

Symbol:	**Learning outcomes:**	**8 level NQF**
SD1_KW01	To the extent enabling to revise the existing pradigms in the field/discipline - the world achievments, gathering theoretical background as well as general and selected detailed issues	P8S_WG
SD1_KW02	Major general development trends in the field/discipline	P8S_WG

SD1_KU05	Carry out critical assessment of the scientific research findings and expert activities and their contribution to the knowledge development in the field/discipline	P8S_UW
SD1_KK01	Critically evaluate the achievments in the field/discipline represented	P8S_KK
SD1_KK03	Recognise knowledge in solving cognitive and practical problems characteristic for the area of research (field/discipline) and in an interdisciplinary aspect	P8S_KK
SD1_KK08	Support the ethos of scientific circles and conduct independent research	P8S_KR