COURSE DESCRIPTION (SYLLABUS)

1.	Course: **Nanoparticles and their macrosecrets**
2.	Language of instruction: English
3.	Faculty **Faculty of Biotechnology**
4.	Course/module code:
5.	Course/module type (*mandatory* or *elective*) **elective**
6.	Programme: **Biotechnology**
7.	Study cycle: **1st cycle**
8.	Year: **2nd, 3rd**
9.	Semester *(autumn* or *spring):* **Spring**
10.	Form of tuition and number of hours: **lectures - 12 h** **seminar - 3 h**
11.	Name, Surname, academic title: **Joanna GRZYB, PhD**
12.	Initial requirements (knowledge, skills, social competences) regarding the course/module and its completion: **basic knowledge of biology and chemistry**
13.	Objectives: **To gain the knowledge about nanomaterials, their special features and their applications in medicine and life sciences.**
14.	Content: **The series of lectures will introduce students into the topics of nanomaterials. The main focus will be on abiotic nanomaterials, due to huge variations of them - quantum dots, carbon nanomaterials (carbon dots, carbon nanotubes, graphen) and several versions of metallic nanoparticles. The biological nanoparticles, which are usually known by biotechnology students (liposomes, apolipoproteins, huge protein complexes), however not considered under this term, will be introduced/reminded and compared with abiotic ones. The physical and chemical properties of nanoparticles will be described along with introduction to the**

	methodology useful to study these properties, mostly fluorescence and its derivative techniques. The special attention will be put on nanoparticles applications in biological studies, as biosensors, fluorescent labels and platforms for various cargo.	
15.	Learning outcomes: • **Student explains the characteristics of nanomaterials.** • **Student lists and explains examples of the use of nanomaterials in life sciences and medical research.** • **Student explains the methods useful in research with the applications of nanomaterials.** • **Student critically analyzes the current scientific literature.**	Outcome symbols: **K1_W03, K1_W04, K1_W05** **K1_W09** **K1_W08** **K1_U03, K1_U04**
16.	Recommended literature: • **Kelsall (Ed.) Nanoscale Science and Technology, Willey, 2005.** • **Ferrari, soloviev (Eds) Nanoparticles in Biology and Medicine, Springer, 2020.** • **Original and review journal papers, recommended during lectures.**	
17.	Methods of verification of the assumed learning outcomes **Students active participation in the discussions during seminar.**	
18.	Conditions of earning credits: • **essay preparation** • **active participation in the essay's discussion**	
19.	Student's workload:	
	Activity	Number of hours for the activity
	Hours of instruction (as stipulated in study programme) : • **lectures** • **seminar**	15 h
	Student's own work: • **literature reading** • **assay preparation** • **discussion preparation**	15 h
	Total number of hours:	**30 h**
	Number of ECTS:	**2 ECTS**