Module name	**Combinatorial biotechnology**
Module code	**B-BTM.054**
ISCED code	0511: Biology
Study cycle	II^{o}
Semester	summer
Responsible for this module	Małgorzata Cytryńska Department of Immunobiology email: malgorzata.cytrynska@mail.umcs.pl
Language of instruction	English
Website	
Prerequisites	knowledge of genetics, biochemistry, microbiology and molecular biology at the I^{o} level of studies
ECTS	5
ECTS points hour equivalents	Contact hours (work with an academic teacher) – 60 - lectures: 30 - labs: 30 Non-contact hours (students' own work) – 65 - preparation for the exam: 30 - preparation for labs: 10 - preparation of reports from laboratory exercises: 10 - literature study: 15 **Total number of ECTS points for the module - 5**
Learning outcomes verification methods	Lecture: final written exam Labs: continuous assessment
Course full description	Lecture: Combinatorial biotechnology versus combinatorial chemistry. Microbial resistance to defense peptides. Strategies to obtain peptides with desired characteristics: endogenous peptides as patterns for the development of new molecules with antimicrobial and anticancer activity, combinatorial libraries of peptides and antibodies. Peptidomimetics. Combinatorial oligonucleotide libraries: aptamers' selection by SELEX techniques (Systematic Evolution of Ligands by Exponential Enrichment), application of aptamers. Directed evolution of molecules - technologies: cell surface display, phage display, ribosome display, mRNA display, SNAP-tag display. Labs: Analysis of the interaction of proteins with other macromolecules on the example of the interaction of insect apolipophorin III (apoLp-III) with RNA and LPS (isolation of RNA, partial purification of apoLp-III, SDS-PAGE, Native-PAGE, immunodetection of apoLp-III). Determining the potential of proteins as a source of peptides with antimicrobial activity (bioautography).
Bibliography	Recommended review and original articles from current scientific literature.
Learning outcomes	**KNOWLEDGE** W1. The student characterizes and explains the mechanisms of selected biotechnological processes and products obtained with their help (creation of combinatorial libraries of peptides, peptidomimetics and aptamers; technologies of directed evolution: cell surface display, phage display, ribosome display, mRNA

	display, SNAP-tag display; selection of aptamers, isolation and purification of RNA and proteins from biological material). W2. The student describes the possibilities of using different organisms as sources of molecules used as patterns to obtain bioproducts with desired properties, e.g. peptides and proteins with antimicrobial and anticancer activity. W3. The student characterizes the biotechnological potential of peptides, peptidomimetics and aptamers in the development of medicine, industry and waste disposal. **SKILLS** U1. The student uses professional biotechnology terminology, describes and explains issues in the field of combinatorial biotechnology. U2. The student assesses the risk related to the development of microbial resistance to antimicrobial peptides. U3. The student prepares and conducts selected research tasks independently. U4. The student is able to carry out critical analyzes of and draws conclusions from the results obtained. **SOCIAL COMPETENCES** K1. The student is able to objectively assess his and other team members contribution to the work in solving specific tasks. K2. The student responsibly treats the entrusted biological material and performs the entrusted tasks responsibly. K3. The student is open to new trends in biotechnology.
Practice	-
Teaching methods	Lecture: information lecture, multimedia presentation, discussion Labs: experiment, measurement, direct observation, discussion