Module name	**Laboratory techniques**
Module code	B-BT.033E
ISCED code	0511: Biology
Study cycle	I°
Semester	winter
Responsible for this module	dr hab. Iwona Komaniecka Department of Genetics and Microbiology, e-mail: iwona.komaniecka@poczta.umcs.lublin.pl; dr Leszek Wawiorka Department of Molecular Biology email: leszek.wawiorka@poczta.umcs.lublin.pl
Language of instruction	English
Website	
Prerequisites	Completed course of organic chemistry and analytical chemistry
ECTS	6.5
ECTS points hour equivalents	Contact hours (work with an academic teacher) – 60 - laboratories: 60 Non-contact hours (students' own work) – 105 - preparation for labs: 25 - preparation of for tests: 35 - literature study: 45 **Total number of ECTS points for the module – 6.5**
Learning outcomes verification methods	Written final test (50% + 1 correct answer). Attendance and activity in class (min. 90% of presence). Submitted and credited reports on classes.
Course full description	Part I (Dept. Molecular Biology) 1. Preparation of buffer solutions 2. Quantitative determination of protein 3. Cell fractionation (cell disintegration, differential and density gradient centrifugation, salting out and protein dialysis) 4. Protein chromatography 5. Electrophoretic protein separation techniques 6. Immunodetection of proteins Part II (Dept. Genetics and Microbiology) 1. UV-Vis spectrophotometry and statistical evaluation of results. 2. Refractometry and polarimetry. 3. Chromatography - part 1. Qualitative analysis. 4. Chromatography - part 2. Quantitative analysis. 5. Mass spectrometry (part I and II) 6. Nuclear magnetic resonance spectroscopy (NMR).
Bibliography	Part I. Script for exercises in laboratory techniques

	Part II. Descriptions of practical part and materials from teacher (classes II 1-7).
Learning outcomes	**KNOWLEDGE** W1. The graduate knows and understands at an advanced level selected facts, concepts, objects, phenomena and the complex relationships between them and theories explaining them, constituting the basic general knowledge in the field of scientific disciplines, mainly exact and natural sciences, forming the theoretical basis of biology. W2. The graduate knows and understands the basic research and laboratory methods and techniques used in modern biology. W3. The graduate knows and understands at an advanced level the relationship between biology and other natural disciplines, enabling the interpretation and generalization of knowledge. W4. The graduate knows and understands at an advanced level biology-specific selected issues of advanced detailed knowledge, including basic processes occurring at the molecular and cellular level. W5. The graduate knows and understands the principles of mathematical description, IT techniques and statistical interpretation of results as well as their importance for the characteristics of phenomena and processes at various levels of the organization of the living world. **SKILLS** U1. The graduate is able to properly select and use appropriate research methods and tools, and present the results of experiments or observations and conclusions, including analysis of professional literature, in written and oral form, using advanced information and communication techniques. U2. The graduate is able to carry out experiments, observations and measurements using appropriate research and laboratory tools and methods, as well as interpret the results obtained and draw conclusions based on his knowledge. U3. The graduate is able to communicate with the environment using specialized terminology in the field of biology and related natural sciences. U4. The graduate is able to plan and organize individual and team work in order to efficiently solve problems and perform specific tasks. **SOCIAL COMPETENCES** K1. The graduate is ready to critically assess his knowledge and received content, and to recognize the

	importance of general and specialist knowledge in the field of biology in solving cognitive and practical problems, as well as to seek expert opinions in the event of difficulties in solving problems by himself. K2. The graduate is ready to take care of the achievements and traditions of the profession of biologist
Practice	-
Teaching methods	Laboratory experiments, scientific discussion, lecture