

Course title: MOLECULAR BIOLOGY LABORATORY I

ECTS credit allocation (and other scores): 4.5

Semester: autumn

Level of study: ISCED-6 - first-cycle programmes (EQF-6)

Branch of science: Natural sciences

Language: Polish

Number of hours per semester: 50 h.

Course coordinator/ Department and e-mail: Katarzyna Bilaska; Department of Botany and Evolutionary Ecology;  
katarzyna.bilaska@uwm.edu.pl

Type of classes: classes and lectures

---

#### Substantive content

**CLASSES:** Isolation of nucleic acids (RNA and DNA) using various methods. Determination of the quantity (via spectrophotometric measurement) and quality (using spectrophotometry and electrophoresis) of the isolated nucleic acids. Designing primers and probes for PCR and Real-Time PCR. Preparation of PCR and Real-Time PCR reactions. Analysis of target gene expression using the Real-Time PCR technique.

**LECTURES:** Methods for collecting biological material. Structure and function of nucleic acids. Techniques for nucleic acid isolation. Methods for the quantitative and qualitative analysis of nucleic acids. Electrophoresis and methods for recovering nucleic acids from gel. Components and stages of the polymerase chain reaction (PCR). Modifications of PCR. Characteristics of the real-time PCR reaction. Basic principles for designing primers and probes for PCR. Characteristics of molecular markers.

**LEARNING PURPOSE:** Knowledge of molecular biology research methods used in genetic studies. Ability to select and apply established molecular biology techniques and accurately interpret the results. Proficiency in using online databases and scientific literature to describe and address issues in molecular biology.

---

On completion of the study programme the graduate will gain:

**KNOWLEDGE:** The student understands the molecular basis of the functioning of eukaryotic organisms. The student knows and understands research methods used in molecular biology. The student knows and understands the principles of working with biological material and the related ethical issues.

**SKILLS:** The student is able to use research techniques and tools, as well as operate equipment used in molecular biology research. The student can utilize publicly available biological databases. The student is capable of planning and conducting a scientific experiment using molecular biology methods. The student can analyze the conducted experiments and draw conclusions.

**SOCIAL COMPETENCIES:** The student is prepared to adhere to ethical principles. The student is committed to expanding their knowledge.

---

**Basic literature:** 1) John C. Avise, "Molecular Markers, Natural History and Evolution", 2004, Springer New York  
2) Burton E. Tropp, "Molecular biology: Genes to proteins.", Jones & Bartlett Publishers, 2011

**Supplementary literature:** Lizabeth A. Allison, "Fundamental molecular biology", 2007, Blackwell Publishing Ltd

---

The allocated number of ECTS points consists of:

Contact hours with an academic teacher: 52 h.

Student's independent work: 60.5 h.