

Course Information Sheet (in the structure according to Decree No. 614/2002 Coll.)

University: University of Prešov in Prešov	
Faculty: Faculty of Humanities and Natural Sciences	
Code: 2BIO/JPRG/25	Title of Course: Genetics Laboratory
Type, scope and method of educational activities: Obligatory elective course	
Form of Study: block course	
Number of contact hours: 26 hours per semester	
Study method: combined	
Student load: 120 hours	
Direct education: 26 hours	
Indirect education (preparation, protocols, working according to instructions): 94 hours	
Number of credits: 4	
Semester: 2 nd	
Degree/Level: 2 nd	
Prerequisites:	
Grading Policy (Assessment/Evaluation): Continuous assessment	
The course will be taught in 4 blocks. Each block will last 6 hours and will include a theoretical lecture, explanation of the methodology and planning of the laboratory protocol and the laboratory exercise itself in the laboratory. At the end of the block exercise there will be a written test verifying the understanding of the methodology and mastery of working with databases and software. The condition for admission to the written examination will be active participation in all exercises and submission of the correct protocol from the laboratory exercise.	
Success criteria: A: 100.00 – 90.00%, B: 89.99 – 80.00%, C: 79.99% - 70.00%, D: 69.99 % - 60.00 %, E: 59.99 % - 50.00 %. FX: 49.99 % and less %.	
Aims and Objectives:	
Acquired knowledge:	
<ul style="list-style-type: none">• explain the principle and methodology of electrophoretic methods and clarify the meaning of the individual steps of the procedure,• describe the principle and methodology of polymerase chain reaction (PCR), including the purpose of the individual phases,• explain the principles and methodology of Sanger sequencing and understand the function of the individual steps of the process.	
Acquired skills:	
<ul style="list-style-type: none">• plan and perform a simple experiment involving the detection of mutations in a specific gene by Sanger sequencing• independently perform basic work in a molecular genetics laboratory,• operate simple laboratory equipment,• navigate genomic databases and search for information necessary for sequencing,• design primers based on sequence data,• practically perform the entire process of sample preparation for sequencing including preparation of PCR reaction, product control by gel electrophoresis, enzymatic purification of the product, preparation of sequencing reaction and washing of the product,• analyze sequencing results using software and identify genetic variants in the analyzed sequence.	
Acquired competencies:	

- applies acquired theoretical knowledge and practical skills in solving research tasks in the field of molecular genetics,
- independently and creatively solve professional problems and propose solutions,
- has the basics of professional laboratory work and is ready for further specialized education,
- is ready to apply the acquired knowledge and skills in practice and in continuing studies

Syllabus/Indicative Content:

The course will be taught in 4 blocks, each block will take place in one day and will include a theoretical lecture, explanation of the methodology and planning of the laboratory protocol and the laboratory exercise itself in the laboratory. Written examination will be taken on extra (fifth) day.

Day 1: Principle and methodology of sequencing. PCR reaction pipetting.

Day 2: Working with genome sequence databases - types of databases, searching for polymorphisms and mutations, downloading reference sequences. Students work on PC.

PCR product control by gel electrophoresis. Enzymatic purification of the product and preparation of the sequencing reaction.

Day 3: Primer design. Students work on PC. Principle of technology and work with genetic analyzer AB 3500. Washing of sequencing reaction product. Starting the genetic analyzer.

Day 4: Analysis of sequencing results. Working with sequencing software. Comparison of the resulting sequence with reference sequences. Students work on PC.

Day 5: Submission of protocol from laboratory exercise. Written examination.

Suggested readings:

1. Alberts, B., Johnson, A., Lewis, J., Raff, M., Roberts, K., & Walter, P. (2016). Molekulárníbiologieučebnice. Brno: Masarykova univerzita, NakladatelstvíScientia. ISBN 978-80-210-8348-7.(Český překlad originálu „MolecularBiology of theCell“, 6th edition.)
2. Šmarda a kol.: Metodymolekulárníbiologie. Brno: Masarykova univerzita, 2005. 194 s. 1. vyd. ISBN 80-210-3841-1.
3. Sangersequencingmethod. 2014 [online]. In: Lifetechnologies [cit. 2014-03-04]. Dostupné na internete: http://www.lifetechnologies.com/sk/en/home/life-science/sequencing/sanger-sequencing/sanger_sequencing_method.html

Language of Instruction: Slovak language

Other course information:

Grading history

A	B	C	D	E	FX

Lecturer/Instructor:

doc. RNDr. Dana Dojčáková, PhD. lecturer, examiner, laboratory exercise leader

Last update: 20. April 2026

Approved by: prof. RNDr. Jarmila Bernasovská, PhD., guarantor