KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI

Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego

UNIA EUROPEJSKA
EUROPEJSKI FUNDUSZ SPOŁECZNY

Course title	ECTS code
Molecular diagnostics	13.3.0502

Name of unit administrating study

null

Studies

faculty	field of study		
Wydział Chemii	Chemia	type	pierwszego stopnia
		form	stacjonarne
		specialty	analityka i diagnostyka chemiczna
		specialization	wszystkie

Teaching staff

prof. dr hab. Piotr Skowron; dr Daria Krefft; dr hab. Agnieszka Żylicz-Stachula, profesor uczelni

Forms of classes, the realization and number of hours

Forms of classes

Laboratory classes, Lecture

The realization of activities

classroom instruction

Number of hours

Lecture: 15 hours, Laboratory classes: 15 hours

ECTS credits

2
classes - 30 h
tutorial classes – 5 h
student's own work – 15 h

Total: 50 h - 2 ECTS

The academic cycle

2024/2025 winter semester

Type of course

obligatory

Language of instruction

polish

Teaching methods

- conducting experiments
- designing experiments
- group work
- multimedia-based lecture

Form and method of assessment and basic criteria for eveluation or examination requirements

Final evaluation

Graded credit

Assessment methods

- assignment work – project or presentation
- assignment work – completing a specific practical assignment

The basic criteria for evaluation

final written test consisting of test questions, covering issues mentioned in the lecture's program content
final grade according to the scale of grades given in the Study Regulations
supplementary oral or written evaluation for students who did not obtain the required 51% in the first term

Method of verifying required learning outcomes

Required courses and introductory requirements

A. Formal requirements
general chemistry, organic chemistry, biochemistry

B. Prerequisites
proper use of the chemical/biological terminology and nomenclature,
knowledge of nucleic acids and protein structure

Aims of education

acquainting students with all issues mentioned in the lecture's program content
acquainting students with modern methods used in molecular diagnostics
acquainting students with the current possibilities, limitations and the anticipated trends in modern molecular diagnostics

Course contents

A. Lecture: major issues
Techniques for isolation, separation and sequencing of nucleic acids. Methods for genome analysis. Screening methods for detection of point mutations. Immunological and molecular hybridization detection techniques. DNA microarrays. Molecular diagnostics of microorganisms. Molecular diagnostics of inherited diseases. Selected methods used in medical diagnostics and forensic medicine.
B. Laboratory classes: major issues
Molecular diagnostics of the variants of the human alcohol dehydrogenase gene. Isolation of nucleic acids from self-prepared swabs. Amplification of the gene using PCR technology. Separation of the obtained PCR products by agarose gel electrophoresis. The interpretation of the diagnostic test.

Bibliography of literature

Literature required to pass the course
A1. Literature used during the course
Czech E, Hartleb M, Polimorfizm genetyczny dehydrogenazy alkoholowej – znaczenie patofizjologiczne, Advances in Clinical and Experimental Medicine, 2003, 12, 801–809
Cichoż-Lach H, Partcka J, Nesina I, Celiński K, Słomka M, Wojcierowski J, Genetic polymorphism of alcohol dehydrogenase 3 in alcohol liver cirrhosis and in alcohol chronic pancreatitis. Alcohol and Alcoholism vol 41, no1 pp 14-17, 2006
Łaniewska-Dunaj M, Jelski W, Szmitkowski M, Dehydrogenaza alkoholowa-znaczenie fizjologiczne i diagnostyczne. Postępy Hig Med Dosw., 2013; 67:901-907
Pöschl G, Stickel F, Wang XD, Seitz H, Alcohol and cancer: genetic and nutritional aspects. Proceedings of the Nutrition Society (2004), 63, 65-71
Software for visualisation and manipulation of DNA sequences: SNAP GENE 3.1.4.
DNA sequence of the human alcohol dehydrogenase encoding gene (class I, gamma subunit (ADH3)):
http://www.ncbi.nlm.nih.gov/nuccore/M12272.1 .
A2. Literature studied individually
Positions 5 and 6.
Extracurricular readings
Diagnostyka molekularna z zastosowaniem techniki PCR: ćwiczenia laboratoryjne. Beata Krawczyk [et al.]. Wydawnictwo Politechniki Gdańskiej, 2012.
Buckingham, M.L., Flaws, L.: Molecular diagnostics: Fundamentals, Methods and Clinical Applications. 2007

The learning outcomes (for the field of study and specialization)

Knowledge

Student lists, characterizes and understands the methods used in molecular diagnostics, including PCR, qPCR, DNA sequencing techniques, genomic analysis methods, DNA polymorphism testing methods, hybridization and immunological techniques.
Student lists and describes exemplary applications of modern technologies used in medical diagnostics and forensic medicine.
Student lists and describes exemplary applications of modern techniques used for detection and identification of microorganisms.
Student lists and describes examples of commercially available diagnostic tests

Skills

1. Designs DNA primers and PCR reaction conditions.
2. Reads and analyzes DNA sequences.
3. Provides the possibilities of practical application of the techniques learned.
4. Proposes the use of specific techniques to solve the problem.
5. Interprets the results of selected diagnostic tests.
6. Purifies DNA from swabs and detects a variant of the gene, using the PCR method. Analyzes the results using agarose gel electrophoresis.

Social competence

1. Understands the need for further education,
2. Being cautious and critical when expressing opinions,
3. Obtains an awareness of the relationship between human genetic material and human health and life span,
4. Realizes and appreciates the possibilities created by modern molecular diagnostics,
5. Appreciates the importance of screening tests,
6. Discuss the importance of medical prophylaxis,
7. Works in groups and individually.

Contact

piotr.skowron@ug.edu.pl