

<b>MOLECULAR GENETICS AND MOLECULAR MECHANISMS</b>	
<b>GENERAL INFORMATION</b>	
Course teacher	Prof. Dragan Primorac, PhD
Associates	Prof. Ljubica Glavaš-Obrovac, MBiotech, PhD Prof. Marija Heffer, MD, PhD Prof. Martina Smolić, MD, PhD Assoc. Prof. Jasenka Wagner Kostadinović, MMedBiochem, PhD Asst.Prof. Teuta Opačak-Bernardi, MBiolMol, PhD Marta Balog, MBiol, PhD Tea Omanović Kolarić, MD, PhD Hrvoje Roguljić, MD, PhD Ana Petrović, MD Aurora Antolović Amidžić, MPharm
Study programme	Graduate University Study of Medical Laboratory Diagnostics
Course status	mandatory
Year of study, semester	1 <sup>st</sup> year, 2 <sup>nd</sup> semester
ECTS credits	<b>5</b>
Form of teaching (number of classes)	Lectures: 30; Seminars: 30
Expected number of students attending the course	20
<b>COURSE DESCRIPTION</b>	
<b>Course objectives</b>	
To bring new knowledge from molecular genetics to students, to increase their ability to independently read and understand scientific articles, and to teach them the simple way to apply standard molecular and laboratory techniques in clinical practice. By attending this course, students will come to fully understand genetic and molecular basis of diseases, as well as their accompanying molecular, cellular, and development processes.	
<b>Course entry requirements and competencies needed for the course</b>	
Completed courses at the Undergraduate Study Programme of Medical Laboratory Diagnostics or equivalent bachelor's degree (baccalaureate)	
<b>Learning outcomes at study programme level</b>	
<b>1.1, 2.1, 2.2, 2.4, 2.5, 2.7, 3.1, 3.2</b>	
<b>Expected learning outcomes at course level</b>	
After attending lectures, seminars, independent study , and passing the exam students will be able to:	
<ol style="list-style-type: none"> <li>1. explain the mechanisms of programmed cell death and methods for its confirmation.</li> <li>2. explain the development and causes of cancer, cancer epigenetics, and molecular approaches in cancer treatment .</li> <li>3. describe the role of stem cells and their differentiation</li> <li>4. valorize the role of pharmacogenetics and pharmacogenomics in treatment of diseases.</li> <li>5. integrate basic genetic principles of forensic DNA analysis.</li> <li>6. apply statistical, population, and medical studies in forensic genetics; ethical, legal, and social aspects of DNA testing and creating a national database .</li> <li>7. explain the fundamentals of personalised medicine and specify examples of clinical application of this concep.t</li> </ol>	

**Course content**

**Lectures:** Contemporary molecular diagnostics. Glycomics. Animal models for understanding human genetic diseases. Integration of epigenetic and genetic approaches to the pathogenesis of human diseases. Pharmacogenetics - a personalized approach to treatment. Infectious diseases and genetic resistance. Genetics and evolution. Infectious diseases and genetic resistance. Tissue engineering. Cell and gene therapy. Molecular basis of the development of the disease. OMICS approach in understanding the basis of pain. Forensic genetics.

**Seminars:** Contemporary molecular diagnostics. Glycomics. Animal models for understanding human genetic diseases. Integration of epigenetic and genetic approaches to the pathogenesis of human diseases. Pharmacogenetics - a personalized approach to treatment. Infectious diseases and genetic resistance. Genetics and evolution. Infectious diseases and genetic resistance. Tissue engineering. Cell and gene therapy. Biological variation of biochemical and hematological components of blood/ Influence of various factors on the result of laboratory tests. Molecular autopsy. Obesity and metabolic syndrome. Bone diseases. Genetic causes of infertility. Pediatric medicine. The most common hereditary diseases. Forensic DNA analysis.

**Forms of teaching**

Lectures; seminars; independent assignments; multimedia and network

**Students' responsibilities**

Attendance is obligatory throughout all course forms, and the student has to attend all the exams. Student absence of up to 30% (full-time students) or 50% (part-time students) is considered acceptable in each teaching form. Practical work and seminars that were not completed have to be taken in the form of colloquiums.

**Monitoring students' work (Connecting learning outcomes, teaching methods and evaluation)**

Teaching activity	ECTS	Learning outcome	Student activity	Evaluation methods	Grade points	
					Min.	Max.
Attending classes (lectures, seminars)	1.5	1-7	Attendance, Seminar paper	Attendance records	1	5
				Writing and presenting seminar paper	15	35
Final exam	3.5	1-7	Studying for final exam	Written exam	24	40
				Oral exam	10	20
<b>Total</b>	<b>5</b>				<b>50</b>	<b>100</b>

*Evaluation of written part of final exam*

Percentage of correct answers (%)	Grade points
60.00-64.99	24
65.00-69.99	26
70.00-74.99	28
75.00-79.99	30
80.00-84.99	32
85.00-89.99	34
90.00-94.99	36
95.00-100	40

*Evaluation of oral part of final exam:*

<b>Answear</b>	<b>Grade points</b>
average answer with clearly identifiable errors	10-13
very good answer with minor errors	14-16
excellent answer	17-20

*Formulating the final grade:* \_Grade points achieved in classes are combined with points achieved in the final exam. Grading system involves absolute grading and represents one's final achievement. Grades are numerically expressed as follows:

A – excellent (5): 80-100 grade points; B – very good (4): 70-79.99 grade points; C – good (3): 60-69.99 grade points; D – sufficient (2): 50-59.99 grade points

#### **Assigned reading (available in the library and in other media)**

Title	Number of copies in the library	Availability in other media
Stanica, molekularni pristup, 5 <sup>th</sup> edition (Cooper: The Cell: A Molecular Approach, 5 <sup>th</sup> Edition)	11	
Primorac D, et. al. Analiza DNA u sudskoj medicini i pravosuđu, Medicinska naklada, Zagreb, 2008	12	
Scientific and professional papers for seminars selected by teacher		On line

#### **Further reading**

1. *Forensic DNA Applications: An Interdisciplinary Perspective*. Editors: Dragan Primorac and Moses Schanfield. Boca Raton (USA): CRC Press Taylor and Francis Group 2014 Croat Med J. 2011; 52: 225.-34.
2. Coleman WB, Tsongalis GJ. *Molecular Pathology: The Molecular Basis of Human Disease*. 2009, Academic Press.

#### **Quality assurance methods that ensure the acquisition of exit competencies**

Anonymous, quantitative, standardised students' opinion survey on the course and teacher's work, carried out by the Quality Assurance Office of the Faculty of Medicine in Osijek.