

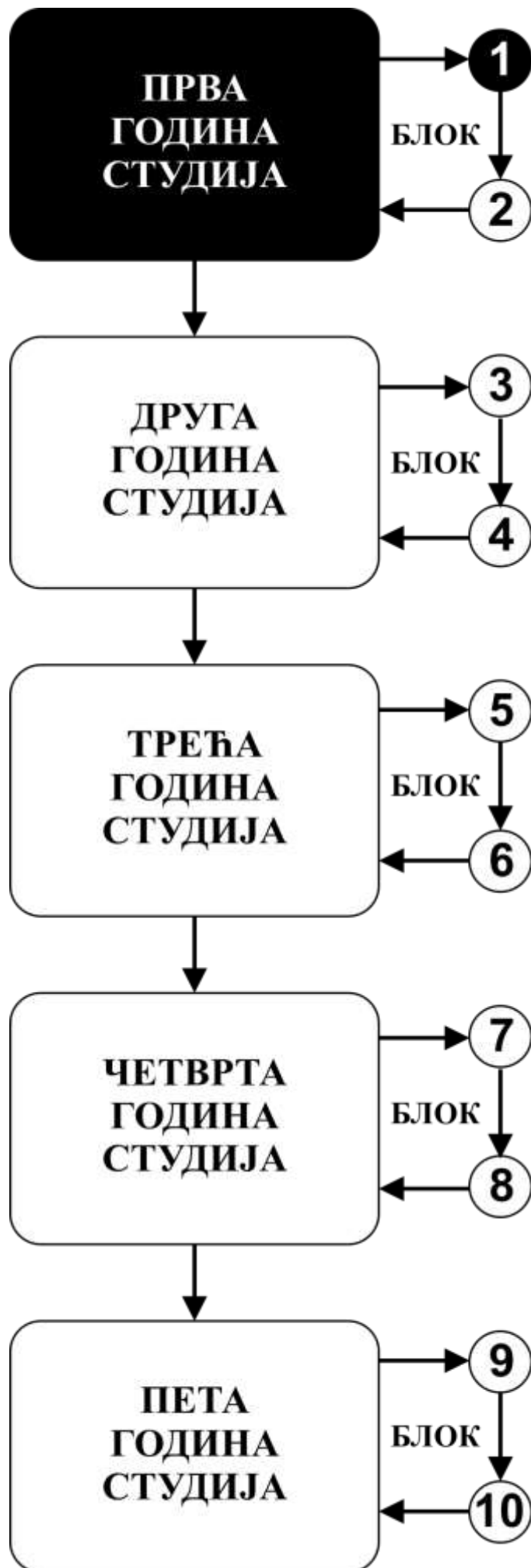


**PHARMACY  
– INTEGRATED ACADEMIC STUDIES**

**FIRST YEAR**

2023/2024

**PHARMACEUTICAL BIOLOGY AND GENETICS**



Course title:

## **PHARMACEUTICAL BIOLOGY AND GENETICS**

ECTS: 6

Number of active teaching hours (weekly): 4 (2 lectures teaching classes, 2 practical classes)

## TEACHERS AND ASSOCIATES:

PB	First name and surname	Email	Academic title
1.	Olivera Milošević-Đorđević	olivera@kg.ac.rs	Full Professor
2.	Vladislav Volarević	drvolarevic@yahoo.com	Full Professor
3.	Danijela Todorović	dtodorovic@medf.kg.ac.rs	Associate Professor
4.	Biljana Ljujić	bljujic74@gmail.com	Associate Professor
5.	Marina Gazdić Janković	marinagazdic87@gmail.com	Assistant Professor
6.	Danijela Cvetković	c_danijela@yahoo.com	Assistant Professor
7.	Nikolina Kastratović	n_kastratovic@outlook.com	Facilitator

## COURSE STRUCTURE:

Module	Name of the course module	Weeks	Teaching Lectures (weekly)	Practice (weekly)	Teacher – in charge
1.	<b>Basics of botany Cellular and molecular organization of the genome</b>	7	2	2	Prof. dr Danijela Todorović
2.	<b>Biological significance of mutations</b>	8	2	2	Prof. dr Biljana Ljujić

## Examination Methods:

By fulfilling the pre-exam obligations and taking the oral exam, the student can achieve a maximum of 100 points. The final grade is determined on the basis of the number of earned points, which could be earned in the following ways:

**PRE-EXAM OBLIGATIONS:** Student can earn up to 40 points by examining two tests. The first test includes material from the first to the seventh teaching unit (the student in accordance with the demonstrated knowledge acquires 0 - 20 points). The second test includes material from the eighth to the fifteenth teaching unit (the student in accordance with the demonstrated knowledge acquires 0 - 20 points).

**FINAL EXAM:** The final exam is in the form of written/test exam, which is organized within the exam terms (dates), and includes total teaching material. In this way a student can earn up to 60 points in accordance with the demonstrated knowledge.

Determination of final grade		The maximal number of points		
		Pre-exam obligations	Final exam	Σ
1	Basics of botany Cellular and molecular organization of the genome	20	60	
2	Biological significance of mutations	20		
Σ		<b>40</b>	<b>60</b>	<b>100</b>

### Determination of final grade:

To pass the exam, the student must earn the minimum of 51 total points and to fulfill the following:

1. to earn more than 50% points during the pre-exam obligations
2. to earn more than 50% points during the final exam

### Grading system

Final grade	Total number of points Points grade	Description
<b>10</b>	91 – 100	<b>Excellent</b>
<b>9</b>	81 – 90	<b>Exceptionally good</b>
<b>8</b>	71 – 80	<b>Very good</b>
<b>7</b>	61 – 70	<b>Good</b>
<b>6</b>	51 – 60	<b>Passing</b>
<b>5</b>	< 51	<b>Falling</b>

## LITERATURE:

<b>Module</b>	<b>The title of textbook</b>	<b>Authors</b>	<b>Publisher</b>	<b>Library of faculty</b>
Basics of botany	Introduction to Botany	Shipunov, Alexey	Minot State University, North Dakota, USA, 2020	URL: <a href="http://ashipunov.info/shipunov/school/biol_154/textbook/intro_botany.pdf">http://ashipunov.info/shipunov/school/biol_154/textbook/intro_botany.pdf</a>
Celular and molecular organisation of the genome  Biological significance of mutations	Emery's Elements of Medical Genetics	Turnpenny P, Ellard S.	15th edition, Elsevier Ltd., UK, 2017.	
	Human genetics: concepts and applications	Lewis R	9th edition, Mc Graw Hill, NY,USA, 2010.	
	Human molecular biology	Epstein J.E.	Cambrige University press, UK, 2003.	

## **Program of lectures and practical classes:**

### **THE FIRST MODULE:**

#### **Basics of botany Cellular and molecular organization of the genome**

##### **WEEK – 1:**

###### **CELL BIOLOGY**

Teaching lectures (1 class)	Practical classes (2 classes)
Cells - differences between prokaryotic and eukaryotic cells and between plant and animal cells; the morphology and role of the cellular organelles; transport of matter across the cell membrane	

##### **WEEK – 2:**

###### **PLANT TISSUES**

Teaching lectures (1 class)	Practical classes (2 classes)
Organization of plants. Plant tissues: meristems, parenchyma, supportive tissues, epidermis and periderm, vascular tissues, secretory tissues	

##### **WEEK – 3:**

###### **PLANT ORGANS**

Teaching lectures (1 class)	Practical classes (2 classes)
Plant organs: root, shoot, stem, leaf	

##### **WEEK – 4:**

###### **PLANT REPRODUCTION**

Teaching lectures (1 class)	Practical classes (2 classes)
Plant reproduction: asexual, vegetative and sexual reproduction	

##### **WEEK – 5:**

###### **CELL DIVISION**

Teaching lectures (1 class)	Practical classes (2 classes)
Cell cycle. Cell division – mitosis and meiosis. Gametogenesis – spermatogenesis and oogenesis.	

## **WEEK – 6**

### **ORGANIZATION AND FUNCTION OF HUMAN GENOME**

Teaching lectures (1 class)	Practical classes (2 classes)
Chromosomes - chemical structure and physical topography of chromosomes. Human karyotype. Human karyotype standardization.	

## **WEEK – 7:**

### **NUCLEIC ACIDS – STRUCTURE AND FUNCTION**

Teaching lectures (1 class)	Practical classes (2 classes)
DNA; gene – structure, length, number and function; genome, genotype, phenotype, gene polymorphism. RNA - structure, function and types. Mitochondrial genome	

## **THE SECOND MODULE:**

### **Biological significance of mutations**

## **WEEK – 8:**

### **REPLICATION OF DNA**

Teaching lectures (1 class)	Practical classes (2 classes)
Replication of DNA molecules. Replication enzymes. Transitions and transversion	

## **WEEK – 9:**

### **PROTEIN SYNTHESIS**

Teaching lectures (1 class)	Labs (2 classes)
Protein synthesis - transcription and translation. Regulation of gene expression: mechanisms of regulation of transcription and translation.	

## **WEEK – 10:**

### **GENE MUTATIONS**

Teaching lectures (1 class)	Labs (2 classes)
Gene mutations: definition and types of gene mutations; mechanism of gene mutations; spontaneous mutation rate. Reparative mechanisms. Diseases caused by reparation disorders	



**WEEK – 11:**

**MUTAGENIC AGENTS**

Teaching lectures (1 class)	Labs (2 classes)
Effect of environmental agents in mutation induction. Chemical, physical and biological agents. Tests for the diagnosis of genotoxic agents: micronucleus test, SCE test and chromosomal aberration test	

**WEEK – 12:**

**NUMERICAL CHROMOSOMAL ABERRATIONS**

Teaching lectures (1 class)	Labs (2 classes)
Polyploidy and aneuploidy. Aneuploidies of autosomes and sex chromosomes and their effect on human health. Analysis of the karyotypes with numerical aberrations of autosomes and sex chromosomes.	

**WEEK – 13:**

**STRUCTURAL CHROMOSOMAL ABERRATIONS**

Teaching lectures (1 class)	Labs (2 classes)
Structural chromosome aberrations: deletions, duplications, inversions and translocations. Syndromes that occur as a consequence of structural chromosome aberrations. Analysis of karyotypes with structural chromosome aberrations.	

**WEEK – 14:**

**PATTERNS OF INHERITANCE**

Teaching lectures (1 class)	Labs (2 classes)
Patterns of inheritance in humans. Monogenic, polygenic and multifactorial inheritance.	

**WEEK – 15:**

**GENETIC ENGINEERING - RECOMBINANT DNA TECHNOLOGY**

Teaching lectures (1 class)	Labs (2 classes)
Clone and cloning. Recombinant DNA methods in medicine: hybridization, electrophoresis, PCR, blotting	



## LECTURES AND PRACTICAL CLASSES

week	type	Teaching and practice lectures	Teacher
1	<b>L</b>	Cell biology	Asst. Prof. Marina Gazdić Janković
1	<b>P</b>	Cell biology	Asst. Prof. Marina Gazdić Janković Mr. ph. Nikolina Kastratovic
2	<b>L</b>	Plant tissues	Asst. Prof. Marina Gazdić Janković
2	<b>P</b>	Plant tissues	Asst. Prof. Marina Gazdić Janković Mr. ph. Nikolina Kastratovic
3	<b>L</b>	Plant organs	Asst. Prof. Marina Gazdić Janković
3	<b>P</b>	Plant organs	Asst. Prof. Marina Gazdić Janković Mr. ph. Nikolina Kastratovic
4	<b>L</b>	Plant reproduction	Asst. Prof. Marina Gazdić Janković
4	<b>P</b>	Plant reproduction	Asst. Prof. Marina Gazdić Janković Mr. ph. Nikolina Kastratovic
5	<b>L</b>	Cell division	Prof. dr Vladislav Volarević
5	<b>P</b>	Cell division	Prof. dr Vladislav Volarević Mr. ph. Nikolina Kastratovic
6	<b>L</b>	Organization and function of human genome	Prof. dr Vladislav Volarević
6	<b>P</b>	Organization and function of human genome	Prof. dr Vladislav Volarević Mr. ph. Nikolina Kastratovic
7	<b>L</b>	Nucleic acids – structure and function	Prof. dr Vladislav Volarević
7	<b>P</b>	Nucleic acids – structure and function	Prof. dr Vladislav Volarević Mr. ph. Nikolina Kastratovic
8	<b>L</b>	Replication of DNA	Prof. dr Vladislav Volarević
8	<b>P</b>	Replication of DNA	Prof. dr Vladislav Volarević Mr. ph. Nikolina Kastratovic

## LECTURES AND PRACTICAL CLASSES

week	type	Teaching and practice lectures	Teacher
9	<b>L</b>	Protein synthesis	Prof. dr Vladislav Volarević
9	<b>P</b>	Protein synthesis	Prof. dr Vladislav Volarević Mr. ph. Nikolina Kastratovic
10	<b>L</b>	Gene mutation	Prof. dr Vladislav Volarević
10	<b>P</b>	Gene mutation	Prof. dr Vladislav Volarević Mr. ph. Nikolina Kastratovic
11	<b>L</b>	Mutagenic agents	Prof. dr Vladislav Volarević
11	<b>P</b>	Mutagenic agents	Prof. dr Vladislav Volarević Mr. ph. Nikolina Kastratovic
12	<b>L</b>	Numerical chromosomal aberrations	Asst. Prof. Marina Gazdić Janković
12	<b>P</b>	Numerical chromosomal aberrations	Asst. Prof. Marina Gazdić Janković Mr. ph. Nikolina Kastratovic
13	<b>L</b>	Structural chromosomal aberrations	Asst. Prof. Marina Gazdić Janković
13	<b>P</b>	Structural chromosomal aberrations	Asst. Prof. Marina Gazdić Janković Mr. ph. Nikolina Kastratovic
14	<b>L</b>	Patterns of inheritance	Asst. Prof. Marina Gazdić Janković
14	<b>P</b>	Patterns of inheritance	Asst. Prof. Marina Gazdić Janković Mr. ph. Nikolina Kastratovic
15	<b>L</b>	Genetic engineering - recombinant DNA technology	Asst. Prof. Marina Gazdić Janković
15	<b>P</b>	Genetic engineering - recombinant DNA technology	Asst. Prof. Marina Gazdić Janković Mr. ph. Nikolina Kastratovic