Faculty of Medicine, University of Rijeka
Course title: MEDICAL BIOLOGY
Course coordinator: Sanja Dević Pavlić, PhD, Assistant Professor
Department: Medical Biology and Genetics
Study program: Integrated Undergraduate and Graduate University Study of Medicine in English
Year: 1. year
Academic Year: 2021/2022

SYLLABUS

Code	**176890**				
Study program	**Integrated Undergraduate and Graduate University Study of Medicine in English**				
Course title	**Medical Biology**			**Year**	**1.**
	Lectures	**Seminars**	**Practicals**	**Total**	**ECTS**
Course structure	**44**	**40**	**36**	**120**	**10.0**
Explanation: ECTS coefficient **10.0 (10x30h)** means **300 of total hours of work, i.e. 20 hours of work per week** (including lectures, seminars and practicals).					
Coordinator	**Sanja Dević Pavlić, PhD, Assistant Professor**			**sanja.devic@uniri.hr**	
Web site:	**https://www.medri.uniri.hr; http://medical-studies-in-english.com/**				
Lecturers	Alena Buretić-Tomljanović, PhD, Full Professor Saša Ostojić, MD, PhD, Full Professor Dragan Primorac, MD, PhD, Full Professor Nada Starčević Čizmarević, PhD, Associate Professor Jadranka Vraneković, PhD, Assistant Professor Nina Pereza, MD, PhD, Assistant Professor Sanja Dević Pavlić, PhD, Assistant Professor Anita Barišić, MD, PhD, Assistant Tea Mladenić, mag.biotech. in med.				
Collaborators	Rozi Andretić Waldowski, PhD, Assistant Professor				

COURSE DESCRIPTION

In the Course "Medical Biology", students will be introduced to basic principles of modern biology and its achievements, which are of crucial importance for understanding of human disease mechanisms, diagnosis, treatment and prevention.

General and specific learning outcomes

General learning outcomes:

At the end of the course, the student will be able to define the basic principles of cell biology, molecular (functional) biology, developmental biology and genetics. During the course student should also aquire basic mechanisms related to different biological processes and adopt basic experimental skills and terminology utilized in the medical literature. Thus, student should be prepared for understanding of different preclinical courses as well as new trends in biomedicine.

Specific learning outcomes:

At the end of the course, the student will be able to:

01) Describe the morphology of different cellular structures and understand how the morphology of each structure is linked to its function

02) Describe and understand the basic biological mechanisms occurring in the cell

03) Use the light microscope independently and prepare microscope slides

04) Understand the basic genetic mechanisms and the mechanisms of genome maintenance

05) Describe how dysregulation of cellular processes may underlie the development of genetic and non-genetic diseases

06) Describe the genetic predisposition and predict the risk for genetic diseases

07) Solve basic problems related to classical and molecular genetics

08) Differentiate between basic laboratory tools of cell and molecular biology

09) Describe and understand the use of cytogenetic and molecular genetic/cytogenetic analyses in diagnostic and therapeutic approach

10) Apply the data of scientific research in biomedical practice

11) Improve the knowledge regarding the interdisciplinary nature of biomedical sciences

12) Develop the consciousness on the changing nature of biomedical sciences, predict changes and suggest the potential solution based on the relevance of human biology and genetics in modern medical practice

13) Evaluate, understand and critically apply the scientific data from internet and other electronic sources

14) Improve problem solving, communication and self-motivation skills, develop self-criticism, and improve the ability of individual and teamwork, the organization and time management, and the use of information technology.

Correspondence and correlativity of the course

The course is in correlativity and correspondence with the courses from the first year. Furthermore, the course is in correspondence with similar courses in universities in Europe and worldwide. It also provides fundamental knowledge and skills for integration with preclinical and clinical courses as well fundamentals for understanding and following the new trends in genomic medicine.

Course content

This course consists of three parts:

1. **Cell Biology**
2. **Molecular (Functional) Biology**
3. **Developmental Biology and Genetics**

In the course, we will give insight into the basics of the structure and function of the cell and the functional interaction of the cell with its environment, with focusing on eukaryotic cell biology. We will also give insight into common experimental tools and techniques used in cell biology in order to provide better understanding of the cell structure and function, as well as the structure and function of different subcellular structures and macromolecules. Furthermore, we will cover fundamentals of molecular biology and developmental biology and genetics. Throughout the course, we will continuously attempt to relate defects in cellular processes to human diseases in order to improve the understanding of actions occuring when particular cells do not work properly. Medical genetics will be presented in the context of novel findings in molecular biology, recombinant DNA technology and genomics. Finally, the study of this course is relevant to the fields of translational and regenerative medicine and drug discovery.

Students will be continuously included into problem-based learning in order to develop critical thinking and communication skills. Such approach will help to adopt the knowledge regarding modern biological science as well as facilitate the process of the further knowledge implementation.

COURSE TEACHING PLAN

List of lectures, seminars and practicals

1. CELL BIOLOGY

L1	Cell and Molecular Biology in Medicine; Plan and Literature

1.1. Introduction to Cell Biology	
L2	Introduction to Cell Biology: Cell Origin and Evolution
L3	Tools of Cell Biology
S1	The Basics of Structure and Function of Prokaryotic and Eukaryotic Cells
P1	The Basics of Light Microscopy. Basic Methods in Slide Preparation. Prokaryotic Cell.

1.2. Biomembranes and Cell Metabolism	
L4	Structure of the Plasma Membrane
L5	Transport of Macromolecules: Endocytosis and Exocytosis
L6	Bioenergetics and Metabolism: The Role of Mitochondria and Peroxisomes
S2	Transport of Small Molecules
P2	Eukaryotic Cell

1.3. The Extracellular Interactions	
L7	Cytoskeleton and Cell Movement
L8	The Extracellular Matrix
S3	Cell-Cell Interactions
S4	The Basics of Cell Signaling

1.4. Cell Nucleus, Chromatin and Chromosomes	
L9	The Structure and Function of Nucleus and Nucleolus
L10	The Organization and Condensation of Chromatin
S5	Mitosis in Plant and Animal Cell. Human Chromosomes.
P3	Mitosis in Plant and Animal Cells. Human Chromosomes.

1.5. Eukaryotic Cell Cycle	
L11	Regulation of the Eukaryotic Cell Cycle
L12	Programmed Cell Death
S6	Meiosis. Human Gametogenesis.
P4	Meiosis. Human Gametogenesis.

2. MOLECULAR (FUNCTIONAL) BIOLOGY

2.1. Flow of Genetic Information I: Nucleic Acids, Genome and DNA Replication	
L13	The Structure and Function of Nucleic Acids
L14	Genome Organization in Prokaryotes and Eukaryotes. The Human Genome.
L15	Human Genome Variation
L16	DNA Replication
P5	Genomic DNA Extraction

2.2. Flow of Genetic Information II: Transcription, Translation and Intracellular Molecules Sorting	
L17	The Structure of Eukaryotic Genes
L18	Transcription. RNA Processing.
L19	Regulation of Transcription
L20	Translation
L21	Posttranslational Modifications, Protein Sorting and Transport (The Endoplasmic Reticulum, Golgi Apparatus and Vesicular Transport)
L22	Regulation of Protein Function. Protein Degradation: The Ubiquitin-Proteasome Pathway and Lysosomal Proteolysis
S7	The Flow of Genetic Information I: DNA Replication, Transcription and RNA Processing
S9	The Flow of Genetic Information II: Translation, Protein Sorting and Transport

2.3. Epigenetic Regulation of Gene Expression	
L23	The Basics of Epigenetics: Epigenetic Modifications
L24	The Basics of Epigenetics: Genomic Imprinting
S8	Noncoding RNA molecules
P6	The Relationship Between Chromatin Structure and Transcriptional Activity

3. DEVELOPMENTAL BIOLOGY AND GENETICS

3.1. The Basics of Developmental Biology and Genetics	
L25	Transcriptional regulation of Homeodomain Genes During Early Embryo Development
L26	Human Disease Models in *Drosophila melanogaster*
S10	Human Fertilization
P7	*Drosophila melanogaster:* A Model and a Tool in Medical Research

3.2. The Basics of Monogenic and Polygenic Diseases	
L27	Gene Mutations
L28	DNA Repair
L29	The Basics of Mendelian Genetics
S11	Monogenic and Polygenic Diseases
P8	Patterns of Disease Inheritance

3.3. The Basics of Chromosomal Aberrations and Non-Mendelian Inheritance	
L30	The Basics of Non-Mendelian Inheritance
L31	The Basics of Chromosomal Abnormalities. Cytogenetic Methods.
L32	Population Genetics
S12	Numerical Chromosomal Aberrations
S13	Problems: Mendelian and Non-Mendelian Inheritance
S14	Structural Chromosomal Aberrations I
S15	Structural Chromosomal Aberrations II

3.4. Cancer Genetics	
L33	The Development and Causes of Cancer
L34	Abnormal Cell Cycle in Malignancy
P9	Molecular Oncogenesis in Clinical Practice
P10	Tumor Cell Biology

3.5. Tools of Molecular Genetics
L35 Tools of Molecular Genetics in Medicine I L36 Tools of Molecular Genetics in Medicine II
P11 Tools of Molecular Genetics

3.6. Regenerative Medicine
L37 Stem Cells. Regenerative Medicine. L38 The Role of Medical Biology in Modern Medicine

Overview of teaching and learning

The student should develop positive attitudes toward the science in the fields of cell and molecular biology and should understand the importance of different studies in the fields of cell and molecular biology for clarifying disease pathogenesis and improving disease diagnosis, treatment and prevention. During the course, the student should acquire the following skills: oral and written communication, the usage of information technology, evidence-based critical thinking and problem solving, individual and teamworking, searching for relevant scientific literature and adopting scientific terminology.

The course consists of multimedia lectures, seminars and practicals. All information regarding the course will be posted on **the Merlin 2021-22 e-learning system**.

Lectures introduce concepts and theory that are subsequently explored in seminars and practicals. **Seminars** encourage critical thinking and emphasize the significance of research as a tool for obtaining knowledge. Thus, each seminar serves as an intellectual community where students exchange ideas and critically discuss particular problem/cases (individually and in groups). **Practicals** expose students to an overview of modern cell-related and molecular biology-related techniques and offers a hands-on experience in classical cell biology experiments. **Practicals of cytology** include microscoping, drawing microscope slides, discussing on slides, as well as preparing the slides. On the other hand, during **practicals of genetic,** students solve and discuss basic problems related to classical and molecular genetics and are also teached how to classify human chromosomes according to shape and size. For practicals, students are required to carry drawing equipments (a pencil, crayons, a rubber, etc.).

For seminars and practicals obligatory preparation and active participation are required (assignment readings and working tutorials will be set before seminars). Working in small groups is an important aspect of activity for practicals and seminars. Students are encouraged to prepare questions and engage with the lecturer in order to reach a conceptual understanding of the topic. Students are expected to use Microsoft Word, Microsoft Excel, and Microsoft Power Point programs.

All parts of the course (lectures, seminars and practicals) are obligatory. In case of absence, students are required to cover the material missed and inquire about any announcements made during their absence.

Assessment of students' work during the course includes **three written midterm exams** and **practical examinations** at the time of last practical class section. All written exams may be held online.

Modes of teaching				
Lectures **YES**	Seminars and Workshops **YES**	Practicals **YES**	Individual tasks **YES**	Multimedia and Internet **YES**
Distance learning **YES**	Counseling **YES**	Laboratory **YES**	Tutorship **YES**	Fieldwork **NO**

Commentaries:

Internet data sources include relevant biomedical bibliographic databases; searching for biomedical bibliographic databases will be organized in order to help adopting and understaning scientific terminology and relationship between particular medical terms and ideas.

Students are required to fulfill all assignments related to classes, practicals and assesment tasks at the time scheduled by the teacher. Students may miss up to 30% of lectures, seminars and practicals because of illness and/or other relevant reasons. Yet, students who missed more than 30% of lectures, seminars and practicals (lectures: 13 teaching hours; seminars: 12 teaching hours; practicals: 11 teaching hours) have failed the course.

A student who arrives after the classes have begun may be refused admittance to the class, and if not admitted, will be marked as absent. Furthermore, students are not allowed to leave/enter the classroom during the classes.

During the classes, cell phones should be silenced/turned off.

Midterm exams take 45 minutes to complete, and the written part of the final exam takes 35 minutes to complete.

The course will be held in the summer term between February 28th and June 10th, 2022 (15 weeks).

Correspondence

All teaching materials will be available on the Merlin e-learning system. All teachers are available by emails every working day during their working hours/schedule for any questions or concerns regarding this course. Replies will be sent within 24-48 hours.

Assigned reading

1. **Cooper, Geoffrey M; Hausman, Robert E. The Cell. A Molecular Approach, Massachusetts U.S.A., 7th Edition, Sinauer Associates, Inc. Publishers Sunderland, 2015.**
2. **Ostojić, S; Pereza, N. Medical Biology: Methodical Handbook with Problem Assignments for first year students of Integrated Undergraduate and Graduate University Study of Medicine in English, 1th edition, Redak, Split, 2020.**
3. **Turnpenny, P; Ellard, S. Emery's Elements of Medical Genetics, London U.K.,15th Edition, Elsevier, 2017.**

Optional/additional reading

1. Alberts, B et al. Molecular Biology of the Cell. Philadelphia U.S.A., 6th edition, Garland Publishing Co, 2014.

Assessment of the students' work

Assessment of the student's work as well as students' obligations are in line with the policies of the Faculty of Medicine, University of Rijeka and University of Rijeka, Croatia.

Recommendations regarding the epidemiological situation associated with the Covid-19 pandemic

If epidemiological situation allows, all classes will be held on-site at the Faculty of Medicine. If this is not possible, classes will be held in a hybrid model, in accordance with the current decision of the Senate of the University of Rijeka, with up to 40% of teaching hours held in an online environment. If the epidemiological situation worsens, all forms of teaching (lectures, seminars and practicals) will be held online in a real-time according to a schedule that will be posted on the Merlin e-learning system.

Online classes

Online classes will be held in real time according to the schedule posted on the Merlin e-learning system. Lectures, seminars and practicals will be held via MS Teams platform according to the instructions posted on the Merlin e-learning system. During all online classes, it is necessary to have a camera and microphone on.

Onsite classes

All onsite lectures, seminars and practicals will be held in a compliance with the recommended epidemiological measures.

Due to possible changes to the class schedule, students are required to regularly follow notifications on the Merlin e-learning system.

ECTS grading system

For evaulation of students' results both **ECTS grading system (%/A-F)** and **numerical grading system (1-5)** will be used. **The evaluation of students' results will be performed during the course as well as on final exam (Table 1). Students may obtain a total of 100 credits: a maximum of 70 credits during the course and a maximum of 30 credits on the final exam.**

Students who have gained at least 35 credits during the course are allowed to take the final exam. In the written part of the final exam, which weighs max. 14 credits, students must give a correct answer to at least 50% of questions to pass. The written part of the final exam is a prerequisite for the oral part. In the oral part of the final exam, which weighs max.16 credits, students must gain at least 8 credits to pass.

Students who have gained less than 35 credits during the course or students who missed more than 30% of lectures, seminars and practicals (lectures: 13 teaching hours; seminars: 12 teaching hours; practicals: 11 teaching hours) are not allowed to take the final exam. Those students have failed the course (grade: ssessed nt, F) and should repeat the course next year.

Table 1. Assessment of students' work during the course and on the final exam
*microscope-using skills, identifying microscope slides
L = lectures; S = seminars; P = practicals

	L	S	P	Teaching week	No. of questions	Credits
Midterm exam 1 (Cell Biology)	2-12	1-6	1-4	1-5	40	24
Midterm exam 2 (Molecular Biology)	13-24	7-9	5, 6	5-8	40	22
Midterm exam 3 (Developmental Biology and Genetics)	25-38	10-15	7-11	9-15	40	24
Practical examinations*						+ / -
Final exam: written part					30	14
Final exam: oral part						16

Practical examinations

The prerequisite for the **obligatory practical exam** are completed handbooks. **Completed handbooks should be given for evaluation after the 10th practical.** If the handbooks are not fully completed, or drawings need to be improved, students will be given the opportunity and time for revisions. Explanations regarding revisions, changes, etc. will be provided by teacher at the ssessed of the 11th practical.

Students will not gain any credits for practical exam, yet only **descriptive marks (passed/failed).** Students who did not pass the practical exam will be given the opportunity to repeat the practical exam before taking the final exam, since they **must pass the practical exam to be allowed to take the final exam.**

Onsite practicals:

During the practical exam, **microscope-using skills** will be ssessed. Students **should be able to:**

1. **find the image under immersion oil objective**
2. **identify two different microscope slides.**

Online practicals:

During the practical exam, **microscope-using skills** will be ssessed. Students **should be able to:**

1. **identify three digital microscope slides**
2. **answer one theoretical question regarding light microscope parts**
3. **answer one theoretical question regarding microscopy technique**

The practical exam is succsefuly finished if the student identifies 2 out of 3 digital microscope slides and answers both theoretical questions correctly.

Theoretical knowledge examinations (midterm exams)

Midterm exams (a maximum of 70 credits)

Throughout the course, students have **three written midterm exams** based on the content of the **lectures, seminars and practicals. Students must give a correct answer to at least 50% of questions on each midterm exam in order to gain credits.** According to the current recommendations, Midterm exames will be conducted **onsite or online** in the Merlin e-learning system.

Midterm exams 1 and 3 consist of 40 questions, and each is worth 24 credits (median 10 – 22) if the student gives a correct answer to at least 50% of questions. The distribution of credits for midterm exams 1 and 3 is presented in Table 2.

Table 2. Midterm exams 1 and 3 – result evaluation

A total of 40 questions	No. Of correct answers	Credits
	20-21	12
	22-23	13
	24-25	15
	26-27	16
	28-29	17
	30-31	18
	32-33	20
	34-35	21
	36-37	22
	38-40	24

The Midterm exam 2 has 40 questions and is worth 22 credits (median 11 – 22), if the student gives a correct answer to at least 50% of questions. The distribution of credits for the midterm exam 2 is presented in Table 3.

Table 3. Midterm exam 2 – result evaluation

A total of 40 questions	No. Of correct answers	Credits
	20-21	11
	22-23	12
	24-25	13
	26-27	14
	28-29	15
	30-31	16
	32-33	18
	34-35	19
	36-37	20
	38-40	22

Midterm exam 1 is held in teaching **week 6.** It is based on the content of the **lectures 2 – 12, seminars 1 – 6, and practicals 1 – 4.**

Midterm exam 2 is held in teaching **week 9.** It is based on the content of the **lectures 13 – 24, seminars 7 – 9, and practicals 5 and 6.**

Midterm exam 3 is held in teaching **week 15.** It is based on the content of the **lectures 25 – 38, seminars 10 – 15, and practicals 7 – 11.**

Midterm retakes

Those students who have gained less than 35 credits during the course (because of illness or because they answered to less than 50% of questions in one or more midterm exams) will be given the opportunity to repeat the midterm exam(s). Such opportunity will be given only once, during the first final exam term.

Midterm retake dates:

1st Midterm retake	June 13, 2022
2nd Midterm retake	June 14, 2022
3rd Midterm retake	June 15, 2022

Final exam (15-30 credits)

Final exam consists of written and oral part (both are obligatory). The written part of the final exam consists of 30 questions and is worth 14 credits (median 7 – 14), if the student gives a correct answer to at least 50% of questions, and is a prerequisite for the oral part. In the oral part of the final exam, which is worth max. 16 credits, the student must gain at least 8 credits to pass. Students who did not pass the written part of the final exam can repeat the written part during another exam term (after 15 days). Students who have passed the the written part of the final exam, but have failed the oral part, do not need to repeat written part of the final exam in Academic Year 2021/2022. The distribution of credits on the final exam is presented in Tables 4 and 5.

Table 4. Final exam (written part) – result evaluation

A total of 30 questions	No. Of correct answers	Credits
	15-16	7
	17-18	8
	19-20	9
	21-22	10
	23-24	11
	25-26	12
	27-28	13
	29-30	14

Table 5. Final Exam (oral part) – result evaluation

Grade	Credits
Poor – Minimal Achievement	8
Satisfactory – Acceptable Achievement	9-11
Good – Extensive Achievement	12-14
Excellent – Exceptional Achievement	15-16

In final grading ECTS grades are converted into numerical grades (1-5) as shown in Table 6.

Table 6. Relationship between assessed credits, ECTS grades and numerical grades

% of assesed credits	ECTS grade	Numerical grade
90 – 100	A	excellent (5)
75 – 89.9	B	very good (4)
60 – 74.9	C	good (3)
50 – 59.9	D	sufficient (2)
0 – 49.9	F	insufficient (1)

Final grading is presented in Table 7.

Table 7. Final grading

	ECTS workload	Learning outcomes	Students' activity	Assessment method	Maximum of credits
Assessment during the course	**7.0**	01-10	Midterm exames 1, 2 and 3 (written exams)	Conversion of correct answers into credits	**70 (24+22+24)**
Assessment at final exam	**3.0**	01-11	Final exam (written and oral)	Conversion of correct answers and grades into credits	**30 (14+16)**
ukupno	**10.0**				**100**

Final exam dates for Academic Year 2021/2022

1.	2.	3.	4.	5.
6/16/2022	6/30/2022	7/14/2022	9/6/2022	9/20/2022

Academic policies

As a student enrolled in this course and at the University of Rijeka you should be familiar with the policies that govern the institution's academic processes (i.e. Academic Dishonesty, Enrollment Status, and Grades and Grading). Please read the Undergraduate Academic Policies at www.uniri.hr, www.medri.hr and http://medical-studies-in-english.com/.

July 23, 2021

Sanja Dević Pavlić, PhD, Assistant Professor
Course Coordinator

Faculty of Medicine, University of Rijeka
Course title: MEDICAL BIOLOGY
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COURSE SCHEDULE

Date	Lecture (time & place)	Seminars (time & place)	Practicals (time and place)	Lecturer
Week 1				
28/2/2022	L1 (08:15-09:00) (P1)			Assist. Prof. Sanja Dević Pavlić, PhD
	L2 (09:15-10:00) (P1)			Prof. Saša Ostojić, MD, PhD
1/3/2022	L3 (08:15-09:00) (P1)			Assist. Prof. Nina Pereza, MD, PhD
		S1 (I / II) (09:15-10:45) (P7 / P8)		Assist. Prof. Nina Pereza, MD, PhD Assist. Prof. Sanja Dević Pavlić, PhD
			P1 (I) (14:15-16:30) (B)	Anita Barišić, MD, PhD
3/3/2022			P1 (III) (13:15-15:30) (B)	Assist. Prof. Sanja Dević Pavlić, PhD
4/3/2022			P1 (II) (13:15-15:30) (B)	Assist. Prof. Nina Pereza, MD, PhD
Week 2				
7/3/2022	L4 (08:15-09:00) (P1)			Prof. Alena Buretić-Tomljanović, PhD
	L5 (09:15-10:00) (P1)			Prof. Alena Buretić-Tomljanović, PhD
8/3/2022	L6 (08:15-09:00) (P1)			Prof. Saša Ostojić, MD, PhD
		S2 (I / II) (09:15-10:45) (P7 / P8)		Assist. Prof. Nina Pereza, MD, PhD Assist. Prof. Sanja Dević Pavlić, PhD
			P2 (I) (14:15-16:30) (B)	Anita Barišić, MD, PhD
10/3/2022			P2 (III) (13:15-15:30) (B)	Anita Barišić, MD, PhD
11/3/2022			P2 (II) (13:15-15:30) (B)	Assist. Prof. Sanja Dević Pavlić, PhD
Week 3				
14/3/2022	L7 (08:15-09:00) (P1)			Assist. Prof. Sanja Dević Pavlić, PhD
	L8 (09:15-10:00) (P1)			Assist. Prof. Nina Pereza, MD, PhD
15/3/2022	L9 (08:15-09:00) (P1)			Prof. Alena Buretić-Tomljanović, PhD
		S3 (I / II) (09:15-10:45) (P7 / P8)		Assist. Prof. Jadranka Vraneković, PhD Anita Barišić, MD, PhD
			S4 (I) (14:15-16:30) (B)	Tea Mladenić, MSc
17/3/2022			S4 (III) (13:15-15:30) (B)	Tea Mladenić, MSc
18/3/2022			S4 (II) (13:15-15:30) (B)	Assist. Prof. Sanja Dević Pavlić, PhD

Week 4				
21/3/2022	L10 (08:15-09:00) (P1)			Assist. Prof. Sanja Dević Pavlić, PhD
	L11 (09:15-10:00) (P1)			Prof. Saša Ostojić, MD, PhD
22/3/2022	L11 (08:15-09:00) (P1)			Prof. Saša Ostojić, MD, PhD
		S5 (I / II) (09:15-10:45) (P7 / P8)		Assist. Prof. Jadranka Vraneković, PhD Assist. Prof. Nada Starčević Čizmarević, PhD
			P3 (I) (14:15-16:30) (B)	Assist. Prof. Jadranka Vraneković, PhD
24/3/2022			P3 (III) (13:15-15:30) (B)	Assoc. Prof. Nada Starčević Čizmarević, PhD
25/3/2022			P3 (II) (13:15-15:30) (B)	Assoc. Prof. Nada Starčević Čizmarević, PhD
Week 5				
28/3/2022	L12 (08:15-09:00) (P1)			Assist. Prof. Sanja Dević Pavlić, PhD
	L13 (09:15-10:00) (P1)			Prof. Saša Ostojić, MD, PhD
29/3/2022	L14 (08:15-09:00) (P1)			Prof. Saša Ostojić, MD, PhD
		S6 (I / II) (09:15-10:45) (P7 / P8)		Assoc. Prof. Nada Starčević Čizmarević, PhD Anita Barišić, MD, PhD
			P4 (I) (14:15-16:30) (B)	Anita Barišić, MD, PhD
31/3/2022			P4 (III) (13:15-15:30) (B)	Anita Barišić, MD, PhD
1/4/2022			P4 (II) (13:15-15:30) (B)	Tea Mladenić, MSc
Week 6				
4/4/2022	L15 (08:15-09:00) (P1)			Assist. Prof. Sanja Dević Pavlić, PhD
	L16 (09:15-10:00) (P1)			Prof. Saša Ostojić, MD, PhD
5/4/2022	L17 (08:15-09:00) (P1)			Prof. Alena Buretić-Tomljanović, PhD
	Midterm exam 1 (09:15-10:00)			
			P5 (I) (14:15-16:30) (B)	Assoc. Prof. Nada Starčević Čizmarević, PhD
7/4/2022			P5 (III) (13:15-15:30) (B)	Assoc. Prof. Nada Starčević Čizmarević, PhD
8/4/2022			P5 (II) (13:15-15:30) (B)	Assoc. Prof. Nada Starčević Čizmarević, PhD
Week 7				
11/4/2022	L18 (08:15-09:00) (P1)			Assist. Prof. Sanja Dević Pavlić, PhD
	L19 (09:15-10:00) (P1)			Assist. Prof. Sanja Dević Pavlić, PhD
12/4/2022	L20 (08:15-09:00) (P1)			Assist. Prof. Jadranka Vraneković, PhD
		S7 (I / II) (09:15-10:45) (P7 / P8)		Assoc. Prof. Nada Starčević Čizmarević, PhD Prof. Alena Buretić-Tomljanović, PhD
			P6 (I) (14:15-16:30) (B)	Tea Mladenić, MSc
14/4/2022	L21 (08:15-09:00) (P1) L21 (09:15-10:00) (P1)			Assoc. Prof. Nada Starčević Čizmarević, PhD
			P6 (III) (13:15-15:30) (B)	Anita Barišić, MD, PhD
15/4/2022			P6 (II) (13:15-15:30) (B)	Assist. Prof. Sanja Dević Pavlić, PhD

Week 8				
19/4/2022	L22 (08:15-09:00) (P1)			Assist. Prof. Sanja Dević Pavlić, PhD
		S8 (I / II) (09:15-10:45) (P7 / P8)		Tea Mladenić, MSc Assist. Prof. Sanja Dević Pavlić, PhD
			S9 (I) (14:15-16:30) (B)	Tea Mladenić, MSc
21/4/2022	L23 (13:15-14:00) (P1)			Assist. Prof. Nina Pereza, MD, PhD
	L24 (14:15-15:00) (P1)			Assist. Prof. Nina Pereza, MD, PhD
22/4/2022			S9 (III) (8:15-10:30) (P6)	Assoc. Prof. Nada Starčević Čizmarević, PhD
			S9 (II) (13:15-15:30) (B)	Assist. Prof. Jadranka Vraneković, PhD
Week 9				
25/4/2022	L25 (08:15-09:00) (online)			Assist. Prof. Rozi Andretić Waldowski, PhD
	L26 (09:15-10:00) (online)			Assist. Prof. Rozi Andretić Waldowski, PhD
26/4/2022	L26 (08:15-09:00) (online)			Assist. Prof. Rozi Andretić Waldowski, PhD
		S10 (I / II) (09:15-10:45) (P7 / P8)		Assist. Prof. Nina Pereza, MD, PhD Anita Barišić, MD, PhD
			P7 (I) (14:15-16:30) (B)	Tea Mladenić, MSc
28/4/2022			P7 (III) (13:15-15:30) (B)	Tea Mladenić, MSc
29/4/2022	**Midterm exam 2** (08:15-09:00)			
			P7 (II) (13:15-15:30) (B)	Tea Mladenić, MSc
Week 10				
2/5/2022	L27 (08:15-09:00) (P1)			Assist. Prof. Nina Pereza, MD, PhD
	L28 (09:15-10:00) (P1)			Assist. Prof. Nina Pereza, MD, PhD
3/5/2022	L29 (08:15-09:00) (P1)			Assist. Prof. Sanja Dević Pavlić, PhD
		S11 (I / II) (09:15-10:45) (P7 / P8)		Assist. Prof. Nina Pereza, MD, PhD Assist. Prof. Sanja Dević Pavlić, PhD
			P8 (I) (14:15-16:30) (B)	Assist. Prof. Nina Pereza, MD, PhD
5/5/2022			P8 (III) (13:15-15:30) (B)	Assist. Prof. Sanja Dević Pavlić, PhD
6/5/2022			P8 (II) (13:15-15:30) (B)	Tea Mladenić, MSc
Week 11				
9/5/2022	L30 (08:15-09:00) (P1)			Assist. Prof. Sanja Dević Pavlić, PhD
	L31 (09:15-10:00) (P1)			Assist. Prof. Jadranka Vraneković, PhD
10/5/2022	L31 (08:15-09:00) (P1)			Assist. Prof. Jadranka Vraneković, PhD
		S12 (I / II) (09:15-10:45) (P7 / P8)		Assist. Prof. Jadranka Vraneković, PhD Anita Barišić, MD, PhD
			S13 (I) (14:15-16:30) (B)	Tea Mladenić, MSc
12/5/2022			S13 (III) (13:15-15:30) (B)	Anita Barišić, MD, PhD
13/5/2022			S13 (II) (13:15-15:30) (B)	Assist. Prof. Sanja Dević Pavlić, PhD

Week 12				
16/5/2022	L32 (08:15-09:00) (P1)			Assist. Prof. Sanja Dević Pavlić, PhD
17/5/2022	L33 (08:15-09:00) (P1)			Prof. Saša Ostojić, MD, PhD
		S14 (I / II) (09:15-10:45) (P7 / P8)		Assist. Prof. Jadranka Vraneković, PhD Anita Barišić, MD, PhD
			P9 (I) (14:15-16:30) (B)	Anita Barišić, MD, PhD
19/5/2022			P9 (III) (13:15-15:30) (B)	Assist. Prof. Sanja Dević Pavlić, PhD
20/5/2022			P9 (II) (13:15-15:30) (B)	Tea Mladenić, MSc
Week 13				
23/5/2022	L34 (08:15-09:00) (P1) L34 (09:15-10:00) (P1)			Prof. Alena Buretić-Tomljanović, PhD
24/5/2022	L35 (08:15-09:00) (P1)			Assoc. Prof. Nada Starčević Čizmarević, PhD
		S15 (I / II) (09:15-10:45) (P7 / P8)		Assist. Prof. Jadranka Vraneković, PhD Anita Barišić, MD, PhD
			P10 (I) (14:15-16:30) (B)	Tea Mladenić, MSc
26/5/2022			P10 (III) (13:15-15:30) (B)	Assist. Prof. Nina Pereza, MD, PhD
27/5/2022			P10 (II) (13:15-15:30) (B)	Anita Barišić, MD, PhD
Week 14				
30/5/2022	Holiday			
31/5/2022	L36 (08:15-09:00) (P1)			Assoc. Prof. Nada Starčević Čizmarević, PhD
			P11 (I) (14:15-16:30) (B)	Assoc. Prof. Nada Starčević Čizmarević, PhD
2/6/2022			P11 (III) (13:15-15:30) (B)	Assoc. Prof. Nada Starčević Čizmarević, PhD
3/6/2022	L37 (09:15-10:00) (online)			Prof. Dragan Primorac, MD, PhD
			P11 (II) (13:15-15:30) (B)	Assist. Prof. Sanja Dević Pavlić PhD
Week 15				
6/6/2022	L38 (08:15-09:00) (P1) L38 (09:15-10:00) (P1)			Prof. Saša Ostojić, MD, PhD Assist. Prof. Sanja Dević Pavlić, PhD
7/6/2022	**Midterm exam 3** (09:15-10:00)			
			P12 (I) (14:15-16:30) (B)	Assist. Prof. Sanja Dević Pavlić PhD
9/6/2022			P12 (III) (13:15-15:30) (B)	Anita Barišić, MD, PhD
10/6/2022			P12 (II) (13:15-15:30) (B)	Assist. Prof. Nina Pereza, MD, PhD

List of lectures, seminars and practicals:

Lectures		Teaching Hours	Lecture Room
L1	Cell and Molecular Biology in Medicine; Plan and Literature	1	Lecture Room P1
L2	Introduction to Cell Biology: Cell Origin and Evolution	1	
L3	Tools of Cell Biology	1	
L4	Structure of the Plasma Membrane	1	
L5	Transport of Macromolecules: Endocytosis and Exocytosis	1	
L6	Bioenergetics and Metabolism: The Role of Mitochondria and Peroxisomes	1	
L7	Cytoskeleton and Cell Movement	1	
L8	The Extracellular Matrix	1	
L9	The Structure and Function of Nucleus and Nucleolus	1	
L10	The Organization and Condensation of Chromatin	1	
L11	Regulation of the Eukaryotic Cell Cycle	2	
L12	Programmed Cell Death	1	
L13	The Structure and Function of Nucleic Acids	1	
L14	Genome Organization in Prokaryotes and Eukaryotes. The Human Genome.	1	
L15	Human Genome Variation	1	
L16	DNA Replication	1	
L17	The Structure of Eukaryotic Genes	1	
L18	Transcription. RNA Processing.	1	
L19	Regulation of Transcription	1	
L20	Translation	1	
L21	Posttranslational Modifications, Protein Sorting and Transport (The Endoplasmic Reticulum, Golgi Apparatus and Vesicular Transport)	2	
L22	Regulation of Protein Function. Protein Degradation: The Ubiquitin-Proteasome Pathway and Lysosomal Proteolysis)	1	
L23	The Basics of Epigenetics: Epigenetic Modifications	1	
L24	The Basics of Epigenetics: Genomic Imprinting	1	
L25	Transcriptional regulation of Homeodomain Genes During Early Embryo Development	1	
L26	Human Disease Models in *Drosophila melanogaster*	2	
L27	Gene Mutations	1	
L28	DNA Repair	1	
L29	The Basics of Mendelian Genetics	1	
L30	The Basics of Non-Mendelian Inheritance	1	
L31	The Basics of Chromosomal Abnormalities. Cytogenetic Methods.	2	
L32	Population Genetics	1	
L33	The Development and Causes of Cancer	1	
L34	Abnormal Cell Cycle in Malignancy	2	
L35	Tools of Molecular Genetics in Medicine I	1	
L36	Tools of Molecular Genetics in Medicine II	1	
L37	Stem Cells. Regenerative Medicine.	1	
L38	The Role of Medical Biology in Modern Medicine	2	
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Seminars (Problem-based learning)		Teaching Hours	Lecture Room
S1	The Basics of Structure and Function of Prokaryotic and Eukaryotic Cells	2	P7/P8
S2	Transport of Small Molecules	2	P7/P8
S3	Cell-Cell Interactions	2	P7/P8
S4	The Basics of Cell Signaling	3	Dept. of Medical Biology and Genetics
S5	Mitosis in Plant and Animal Cell. Human Chromosomes.	2	P7/P8
S6	Meiosis. Human Gametogenesis.	2	P7/P8
	Midterm exam – Cell Biology	2	
S7	The Flow of Genetic Information: DNA Replication, Transcription and RNA Processing	2	P7/P8
S8	Noncoding RNA molecules	2	P7/P8
S9	The Flow of Genetic Information: Translation, Protein Sorting and Transport	3	Groups I/II: Dept. of Medical Biology and Genetics Group III: P6
S10	Human Fertilization	2	P7/P8
	Midterm exam – Molecular (functional) Biology	2	
S11	Monogenic and Polygenic Diseases	2	P7/P8
S12	Numerical Chromosomal Aberrations	2	P7/P8
S13	Problems: Mendelian and Non-Mendelian Inheritance	3	Dept. of Medical Biology and Genetics
S14	Structural Chromosomal Aberrations I	2	P7/P8
S15	Structural Chromosomal Aberrations II	2	P7/P8
	Midterm exam – Developmental Biology and Genetics	3	
		40	

Practicals		Teaching Hours	Lecture Room
P1	The Basics of Light Microscopy. Basic Methods in Slide Preparation. Prokaryotic Cell.	3	Dept. of Medical Biology and Genetics
P2	Eukaryotic Cell	3	
P3	Mitosis in Plant and Animal Cells. Human Chromosomes.	3	
P4	Meiosis. Human Gametogenesis.	3	
P5	Genomic DNA Extraction	3	
P6	The Relationship Between Chromatin Structure and Transcriptional Activity	3	
P7	*Drosophila melanogaster:* A Model and a Tool in Medical Research	3	
P8	Patterns of Disease Inheritance	3	
P9	Molecular Oncogenesis in Clinical Practice	3	
P10	Tumor Cell Biology	3	
P11	Tools of Molecular Genetics	3	
P12	Examination (practicals)	3	
		36	