



Distance learning (asynchronous)	-	8	-	5	-	-	-	-	-	-	-	-	-	-
Summer Semester ---														
Direct (contact) education	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Online learning (synchronous)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Online learning (asynchronous)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL per year: 65														
Direct (contact) education	-	-	-	10	-	-	-	-	-	-	-	-	-	-
Online learning (synchronous)	25	17	-	-	-	-	-	-	-	-	-	-	-	-
Online learning (asynchronous)	-	8	-	5	-	-	-	-	-	-	-	-	-	-
Educational objectives (max. 6 items)														
C1. Providing students with knowledge of the basics of modern genetics and its experimental methods and preparing them for the clinical genetics course.														
C2. Students receive knowledge about the mechanisms responsible for the integrity of the individual organism gene pool and for the transfer of genes between the subsequent generations in Prokaryota as well as in Eukaryota.														
C3. Students gain information about the influence of environmental pollution by mutagenic and carcinogenic substances on the human organism.														
C4. Students get knowledge about the methods of molecular biology and their application in genetic studies.														
C5 Education of students in the basics of medical parasitology, epidemiology and prevention of parasitic diseases.														
C6. Students receive information about the structure and life cycles of human parasites and learn how to recognize the symptoms of parasitic infection														
Education result matrix for module/course in relation to verification methods of the intended education result and the type of class														
Number of course education result	Number of major education result	Student who completes the module/course knows/is able to			Methods of verification of intended education results (forming and summarising)			Form of didactic class <i>**enter the abbreviation</i>						
K01	B.W10.	- knows the structure of simple organic compounds included in macromolecules present in cells, extracellular matrix and body fluids			test, colloquium, written exam			SE, L						
K02	B.W13.	- describes nucleotide functions in the cell, primary and secondary structures of DNA and RNA, and the structure of chromatin			test, colloquium, written exam			SE, L						
K03	B.W14.	- knows genome, transcriptome and human proteome functions and basic methods used in their study; describes the processes of DNA replication, repair and			test, written exam			SE, L						



		recombination, transcription and translation, and the degradation of DNA, RNA and proteins; knows the concepts of gene expression regulation		
K04	B.W18.	- presents and describes processes: cell cycle, proliferation, cell differentiation and aging, apoptosis and necrosis and their importance for the functioning of the organism	test, colloquium, written exam	SE, L
K05	C.W1.	- defines the basic concepts of genetics	test, colloquium, written exam	SE, L
K06	C.W2.	- describes the gene linkage and interactions	test, colloquium, written exam	SE
K07	C.W3.	- describes normal human karyotype and different types of sex determination	test, colloquium, written exam	SE, L
K08	C.W4.	- describes chromosome structures and knows the molecular background of mutagenesis	test, colloquium, written exam	SE, L
K09	C.W5.	- knows principles of inheritance of different number of traits, quantitative traits, independent inheritance of traits and cytoplasmic inheritance	test, colloquium, written exam	SE, L
K10	C.W6.	- knows the genetic determination of blood groups	test, colloquium, written exam	SE, L
K11	C.W7.	- lists and describes autosomal and heterosomal aberrations leading to genetic diseases	test, colloquium, written exam	SE, L
K12	C.W8.	- knows factors affecting primary and secondary genetic equilibrium of population	test, colloquium, written exam	L
K13	C.W10.	- knows the benefits and threats resulting from the presence of genetically modified organisms (GMOs) in the ecosystem;	written exam	L
K14	C.W12.	- lists and describes microorganisms, including pathogens and those present in the physiological flora	test, colloquium	MC
K15	C.W13.	- knows epidemiology of parasitic infections including geographical localization	test, colloquium	MC
K16	C.W15.	- knows consequences of exposure of the human body to various chemical and biological agents, and principles of prevention	test, colloquium	MC
K17	C.W16.	- describes invasive forms or development stages of chosen	test, colloquium	MC



		parasitic protozoa, helminths, and arthropods, including their geographical localization		
K18	C.W17.	- describes the host-parasite relations and the basic symptoms of parasitic infection	test, colloquium	MC
K19	C.W18.	- defines symptoms of iatrogenic infections, their pathways and pathogens causing changes in specific organs	test, colloquium	MC
K20	C.W19.	- knows basic principles of microbiological and parasitological diagnostics	test, colloquium	MC
S 01	C.U1.	- analyzes genetic crosses and pedigrees of human traits and diseases, as well as assess the risk of having a baby with chromosome aberrations	presentation of individually searched information in the group forum during classes; solving genetic crosses and explaining issues during classes	SE
S 02	C.U4.	- performs morphometric measurements, analyze the morphogram and record the karyotypes of diseases	presentation of individually searched information in the group forum during classes; work during classes - solving tasks prepared by the teacher or other students; Oral answer	SE
S03	C.U5.	- estimates the risk of manifestation of certain genetic disease basing on predispositions of the patient's family	microscopic observation and drawing pictures during classes; written test	SE
S04	C.U7.	- recognizes the most common parasites knowing their life cycles, structure, and symptoms of infection	microscopic observation and self-made drawings during classes	MC
S05	C.U9.	- observes different parasites under microscope	microscopic observation and self-made drawings during classes	MC
K01		- creates the need for learning, inspires and organizes the process of self and other people's learning; shows health-promoting behavior	presents a lecture in the group's forum on the basis of self-prepared materials;	SE, MC



K02		- actively cooperates in a group in order to solve problems, taking care of his own safety and of those around him;	observation of the student while working on microscopy classes and making drawings;	MC
K03		- actively participates in searching for materials for classes expanding knowledge and skills, and critically evaluates the source of information	presentation of individually searched information in the group forum during classes;	SE, MC
<p>** L - lecture; SE - seminar; AC – auditorium classes; MC – major classes (non-clinical); CC – clinical classes; LC – laboratory classes; SCM – specialist classes (magister studies); CSC – classes in simulated conditions; FLC – foreign language course; PCP practical classes with patient; PE – physical education (obligatory); VP – vocational practice; SS – self-study, EL – E-learning .</p>				
<p>Please mark on scale 1-5 how the above effects place your classes in the following categories: communication of knowledge, skills or forming attitudes: Knowledge: 5 Skills: 3 Social competences: 1</p>				
Student's amount of work (balance of ECTS points)				
Student's workload (class participation, activity, preparation, etc.)			Student Workload (h)	
1. Contact hours:			10	
2. Online learning hours (e-learning):			5.5	
3. Student's own work (self-study):			93	
Total student's workload			158	
ECTS points for module/course			7.5	
Comments				
Content of classes (please enter topic words of specific classes divided into their didactic form and remember how it is translated to intended educational effects)				
Lectures (Total - 25 hours: 11 x 2 h and 1 x 1 h – the last lecture) – on-line; synchronous by BBB, Microsoft Teams or another platform				
Lecture 1. DNA, RNA, chromatin, chromosomes, karyotype. (2h)				
Lecture 2. The organization of human genome; mitochondrial genome. (2h)				
Lecture 3. Replication of DNA. Transcription and translation. (2h)				
Lecture 4. Regulation of gene expression with particular reference to eukaryotic organisms. (2 h)				
Lecture 5. The cell cycle and its regulation. Genetic determinants of the immune system functioning. (2 h)				
Lecture 6. DNA diversity, DNA mutations, DNA repair mechanisms, mutagens, the influence of medicines, chemicals, physical factors, and environmental pollution. (2 h)				
Lecture 7. Mechanisms of DNA repair. (2 h)				
Lecture 8. Selected human genetic diseases, particularly X-linked diseases (2 h)				
Lecture 9. Population genetics (2 h)				
Lecture 10. Basic methods of molecular biology and their applications (2h)				
Lecture 11. Fundamentals of genetic engineering and biotechnology; genetically modified organisms (GMOs) (2 h)				
Lecture 12. Basics of pharmacogenetics (1 h)				
Seminars (25 hours: 8 x 3 h and 1 x 1 h – the last seminar) on-line; 18 h - synchronous by BBB, Microsoft Teams or				



another platform; Testportal; 7 h – asynchronous using ownCloud and university e-mail boxes

- **Seminar 1.** (week 1 or 6) 2 h – synchronous + 1 h asynchronous

ATTENTION! Groups starting the semester with parasitology write the **colloquium** – worms in the 6th week (seminar 1).

Transmission Genetics. Organization of classes. Health and safety rules. Internal regulations and syllabus. Basic concepts and definitions of genetics. Mendelian genetics. Mendel's Laws of inheritance (monohybrid, dihybrid crosses); test cross. Incomplete dominance, codominance, multiple alleles, lethal genes, gene interactions, pleiotropy.

- **Seminar 2.** (week 2 or 7) 2 h – synchronous + 1 h asynchronous

Transmission Genetics. Extrachromosomal inheritance. Cell life cycle, mitosis, and meiosis. Human gametogenesis (oogenesis and spermatogenesis).

- **Seminar 3.** (week 3 or 7) 2 h – synchronous + 1 h asynchronous

Transmission Genetics. Morgan's chromosome theory of heredity. Complete and incomplete linkage of genes. X-linked genes. Sex determination. Lyon hypothesis and Barr body – definition, mechanism of X chromosome inactivation.

- **Seminar 4.** (week 4 or 9) 2 h – synchronous + 1 h asynchronous

Colloquium – transmission genetics. **Molecular Genetics.** Nucleic acids – types and functions. Structure of the eukaryotic genome – the levels of chromatin condensation. Replication of DNA.

- **Seminar 5.** (week 5 or 10) 2 h – synchronous + 1 h asynchronous

Molecular Genetics. The genetic code (features and examples of exceptions). Gene expression in prokaryotes and eukaryotes: Transcription and enzymes participating in the steps of the process.

- **Seminar 6.** (week 6 or 11) 2 h – synchronous + 1 h asynchronous

Molecular Genetics. Gene expression in prokaryotes and eukaryotes: Translation and enzymes participating in the steps of the process. The control of gene expression in prokaryotes. Operon Theory (lactose operon, glucose catabolite repression; tryptophan operon, attenuation).

- **Seminar 7.** (week 7 or 12) 2 h – synchronous + 1 h asynchronous

Colloquium – molecular genetics. **Human genetics.** Mutations – definition, types of mutations (point mutations, structural aberrations, numerical aberrations). Consequences of point mutations. Inheritance of diseases caused by point mutations: single-gene disorders – dominant (Huntington's chorea, Alzheimer's syndrome, achondroplasia, polydactyly, syndactyly, brachydactyly, camptodactyly, Recklinghausen disease, Marfan's syndrome, Ehlers-Danlos syndrome) and recessive (phenylketonuria, alkaptonuria, albinism, cystic fibrosis, galactosemia, mucopolysaccharidosis, lipidosis, glycogenesis, hemoglobinopathies).

- **Seminar 8.** (week 8 or 13) 2 h – synchronous + 1 h asynchronous

Human genetics. Diseases caused by chromosomal numerical mutations (Down syndrome, Edwards syndrome, Patau syndrome, Klinefelter's syndrome, Turner syndrome) and chromosomal structural mutations (Wolf-Hirschhorn syndrome, Cri-du-chat syndrome, Prader-Willi syndrome, Angelman syndrome, Philadelphia chromosome).

- **Seminar 9.** (week 14) 1 h – synchronous

Colloquium - human genetics (for groups ending the semester with a genetics) or **Colloquium** - worms (for groups ending the semester with parasitology). **Completion of the course.**

Practical classes (15 hours: 5 x 3 h) – 10 h – contact/direct classes; 5 h - asynchronous

Parasitology course content: life cycles, geographical distribution, diagnosis and diagnostic features of the parasites' developmental forms, symptoms of diseases caused by the parasites, pathogenicity, epidemiology, prevention of human parasites infection.

- **Practical 1.** (week 1 or 9) 2 h – contact/direct classes + 1 h asynchronous



ATTENTION! groups starting the semester with genetics write in the 9th week (practical 1) the **colloquium** - human genetics)

Parasitic protozoa – Flagellates: *Trichomonas vaginalis*, *Giardia intestinalis*, *Trypanosoma brucei gambiense*, *Leishmania infantum*, *L. donovani*, *L. tropica*

● **Practical 2.** (week 2 or 10) 2 h – contact/direct classes + 1 h asynchronous

Parasitic protozoa – Amoebae: *Entamoeba histolytica/dispar*, *Acanthamoeba castellanii*, *Naegleria fowleri*;
Apicomplexans: *Plasmodium spp.*, *Toxoplasma gondii*, *Cryptosporidium parvum*

● **Practical 3.** (week 3 or 11) 2 h – contact/direct classes + 1 h asynchronous

Parasitic worms – Trematoda: *Fasciola hepatica*, *Dicrocoelium dendriticum*, *Schistosoma spp.*, *Paragonimus westermani*, *Clonorchis sinensis*

● **Practical 4.** (week 4 or 12) 2 h – contact/direct classes + 1 h asynchronous

Parasitic worms – Cestoda: *Diphyllobothrium latum*, *Taenia saginata*, *Taenia solium*, *Echinococcus granulosus*, *Echinococcus multilocularis*, *Hymenolepis nana*

● **Practical 5.** (week 5 or 13) 2 h – contact/direct classes + 1 h asynchronous

Parasitic worms – Nematoda: *Ascaris lumbricoides hominis*, *Enterobius vermicularis*, *Trichuris trichiura*, *Trichinella spiralis*, *Toxocara canis*, *Loa loa*, *Strongyloides stercoralis*

ATTENTION! Groups ending the semester with parasitological part write in the 14th week the **colloquium** - worms

Other ----

Basic literature (list according to importance, no more than 3 items)

1. Cisowska A., Hendrich A., Kicia M., Leszczyński P., Szydłowiec M., Tichaczek-Goska D., Wesółowska M., Wojnicz D. "Medical Biology for students of Medicine and Dentistry English Division", Wrocław Medical University, Wrocław, 2019
2. Bogitsch B.J., Carter C., Oeltmann T „Human parasitology“ 5th edition, Academic Press 2018 or elder,
3. Klug WS, Cummings MR, Spencer ChA, Palladino, Killian D "Concepts of genetics", 12th edition, Pearson, 2019 or elder

Additional literature and other materials (no more than 3 items)

1. McLennan A.G., Bates A.D., Turner P.C., White M.R.H.: BIOS Instant notes: Molecular Biology. Garland Science, NY & London, 2013
2. Tobias E.S, Connor M., Ferguson-Smith M. "Essential medical genetics" 6th edition, Wiley-Blackwell, 2011
3. Campbell NA, Reece JB, Cain ML et al. Biology. A global approach. Pearson, 2016 (11th edition)

Didactic resources requirements (e.g. laboratory, multimedia projector, other...)

Classroom equipped with laptop, multimedia, microscopes. Access to the Internet and a platform enabling virtual teaching in a synchronous version, eg BBB or Microsoft Teams or other

Preliminary conditions (minimum requirements to be met by the student before starting the module/course)

Knowledge of genetics and parasitology at the high school level

Conditions to receive credit for the course (specify the form and conditions of receiving credit for classes included in the module/course, admission terms to final theoretical or practical examination, its form and requirements to be met by the student to pass it and criteria for specific grades)

Passing 5 partial tests (transmission genetics, molecular genetics, human genetics, protozoa, helminths) allows for getting credit and enter the final exam. **The attendance at all classes in accordance with the study regulations.** The percentage criteria for passing partial tests are identical to the examination criteria. **A student can be exempted from the final exam with a very good grade (5.0) in two cases:** 1) when obtains an average of at least 4.75 from all (5) partial tests; or 2) when a student fails the colloquium once but receives a very good grade (5.0) from the re-take of this colloquium and very good grades (5.0) from each of the other four colloquiums.



In the absence of a student resulting e.g. the disease, because of another important reason (justified by the sick leave, or other official document), the student is obliged to make up abandoned classes preparing a presentation or essay in electronic form on a topic given by the teacher covering abandoned classes, or participating in the classes of another group - if possible, and after obtaining the teacher's permission. In case of cancellation of classes for reasons beyond the control of students, e.g. Rector's Day, Dean's hours, etc., at the students' request, the classes will be conducted at another time agreed with the person conducting the classes.

The exam takes the form of a test (single choice) in the field of genetics (lectures and seminars). The final mark of the subject is the sum of points obtained during the exam (max. 80) and points obtained after converting grades from tests in parasitology during the semester (max. 20).

Grade:	Criteria (only for courses/modules ending with an examination)
Very Good(5.0)	92-100%
Good Plus (4.5)	84-91%
Good(4.0)	76-83%
Satisfactory Plus (3.5)	68-75%
Satisfactory (3.0)	60-67%
	Criteria (only for courses/modules ending with e credit)
Credit	Does not apply to the Faculty of Medicine

Grade:	Criteria (examination evaluation criteria)
Very Good(5.0)	92-100%
Good Plus (4.5)	84-91%
Good(4.0)	76-83%
Satisfactory Plus (3.5)	68-75%
Satisfactory (3.0)	60-67%
Unit realizing the subject	Department of Biology and Medical Parasitology
Unit address	Mikulicza-Radeckiego 9, 50-345 Wrocław
Telephone	71 784 15 12 (secretariat)
E-Mail	malgorzata.pekalska-cisek@umed.wroc.pl

Person responsible for module	Prof. dr hab. Andrzej Hendrich
Coordinator	Prof. dr hab. Andrzej Hendrich
Telephone	71 784 15 12 (secretariat); 71 784 15 11
E-Mail	andrzej.hendrich@umed.wroc.pl



List of persons conducting specific classes				
Full name	Degree/scientific or professional title	Discipline	Performed profession	Form of classes
Andrzej Hendrich	prof. dr hab.	medical sciences	academic teacher	L
Dorota Wojnicz	dr hab.	medical sciences	academic teacher	SE
Agnieszka Cisowska	dr	medical sciences	academic teacher	SE, MC
Maria Wesołowska	dr	medical sciences	academic teacher	MC
Dorota Tichaczek-Goska	dr	medical sciences	academic teacher	SE
Magdalena Szydłowicz	dr	medical sciences	academic teacher	SE
Przemysław Leszczyński	mgr	medical sciences	academic teacher	SE

Date of Syllabus development

30.09.2020

Syllabus developed by

Dr Dorota Tichaczek-Goska

Signature of Head of teaching unit

Uniwersytet Medyczny we Wrocławiu
KATEDRA ZAKŁAD BIOLOGII
I PARAZYTOLOGII PARAZITARNEJ
Kierownik

prof. dr hab. Andrzej Hendrich

Signature of Faculty Dean

Wrocław Medical University
Faculty of Medicine
Vice-Dean for Health Studies
prof. Beata Scieszczonińska, PhD