Uniwersytet Medyczny we Wrocławiu
Wydział Lekarski
KATEDRA I ZAKŁAD BIOLOGII
I PARAZYTOLOGII LEKARSKIEJ
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UNIWERSYTET MEDYCZNY
IM. PIASTÓW ŚLĄSKICH WE WROCŁAWIU

Appendix 5
to Resolution No. 15630
of Senate of Wroclaw Medical University
of 30 March 2016

Syllabus 2019/2020

Description of the course

Module/Course	MOLECULAR BIOLOGY	Group of detailed education results	
		Group code B C	Group name The scientific basis of medicine Preclinical sciences
Faculty	Medicine		
Major	medicine		
Specialties	Not applicable		
Level of studies	Uniform magister studies X * 1st degree studies ☐ 2nd degree studies ☐ 3rd degree studies ☐ postgraduate studies ☐		
Form of studies	X full-time X part-time		
Year of studies	First (I)	Semester	X Winter ☐ Summer
Type of course	X obligatory ☐ limited choice ☐ free choice/elective		
Course	☐ major X basic		
Language of instruction	☐ Polish X English ☐ other		

* mark ☐ with an X

Number of hours

Form of education

Unit teaching the course	Lectures (L)	Seminars (SE)	Auditorium classes (AC)	Major Classes – not clinical (MC)	Clinical Classes (CC)	Laboratory Classes (LC)	Classes in Simulated Conditions (CSC)	Practical Classes with Patient (PCP)	Specialist Classes – magister studies (SCM)	Foreign language Course (FLC)	Physical Education obligatory (PE)	Vocational Practice (VP)	Self-Study (Student's own work)	E-learning (EL)
Winter Semester														
Department of Biology and Medical Parasitology	25	25	-	15	-	-	-	-	-	-	-	-	93	-
Summer Semester														
	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL per year:														

	25	25		15								93	

Educational objectives (max. 6 items)

C1. Students should learn the basics of contemporary genetics, experimental methods used in genetics and become prepared for the course of clinical genetics.

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. Students learn the fundaments of medical parasitology.

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	A student who completes the module/course knows/is able to	Methods of verification of intended education results (forming and summarising)	Form of didactic class ***enter the abbreviation*
K01	B.W.13	- the student knows the function of nucleotides, DNA and RNA structures, the structure of chromatin	test, colloquium, written exam	S, L
	B.W.14	- the student knows the function of the human genome, transcriptome, proteome and knows the basic methods used in their studies, - describes DNA replication, transcription, translation, recombination, repair, and degradation of DNA, RNA, knows the processes of gene expression control and regulation	test, written exam	S, L
K02	B.W.22	- the student knows cell cycle, processes of proliferation, differentiation, and aging of cells, apoptosis, necrosis and their role in organism functioning	test, colloquium, written exam	S, L
K03	C.W.1	- the student knows the basic concepts of genetics	test, colloquium, written exam	S, L
	C.W.2	- the student describes the gene linkage and interactions	test, colloquium, written exam	S, L
	C.W.3	- the student describes normal human karyotype and different types of sex	test, colloquium, written exam	S, L

		determination		
	C.W.4	- the student describes chromosome structures and knows the molecular background of mutagenesis	test, colloquium, written exam	S, L
KO4	C.W.5	- the student knows principles of inheritance of a different number of traits, quantitative traits, independent inheritance of traits and cytoplasmic inheritance	test, colloquium, written exam	S, L
	C.W.6	- the student knows the genetic determination of blood groups	test, colloquium, written exam	S, L
	C.W.7	- the student describes autosomal and heterosomal aberrations leading to genetic diseases	test, colloquium, written exam	S, L
	C.W.8	- the student knows factors affecting primary and secondary genetic equilibrium of population	test, colloquium, written exam	S, L
	C.W.10	- determines the benefits and threats resulting from the presence of genetically modified organisms (GMOs) in the ecosystem;	written exam	L
KO5	C.W.13	- the student knows epidemiology of parasitic infections including geographical localization	test, colloquium	MC
	C.W.14	- the student knows the influence of biotic (parasite) factors on human organism and human population as well as parasite invasion pathways; describes the consequences of parasitic infection and principles of infection prophylaxis	test, colloquium	MC
	C.W.15	- the student knows invasive forms or development stages of chosen parasitic protozoa, helminths, and arthropods, including their geographical localization	test, colloquium	MC
W06	C.W.16	- the student describes the host-parasite relations and knows the basic symptoms of parasitic infection	test, colloquium	MC
	C.W.18	- the student knows basic principles of parasite diagnostics	test, colloquium	MC
S 01	C.U.1	- the student analyses the genetic crosses and pedigrees of human traits and diseases estimates the risk of birth	work during classes - solving genetic crosses;	S, L

		of a child possessing chromosome aberrations	written test; final test exam	
		- describes kariotypes of genetic diseases	work during classes written test; final test exam	S, L
S 02	C.U.5	- student 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	MC
	C.U.7	- the student recognizes the most common parasites knowing their life cycles, structure, and symptoms of infection	microscopic observation; written test	MC
S 03	C.U.9	- student observes different parasites under microscope	microscopic observation and drawing drawings during classes; oral answer, obtaining credit during practicals	MC

** 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 .

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

Student's amount of work (balance of ECTS points)

Student's workload (class participation, activity, preparation, etc.)	**Student Workload (h)**
1. Contact hours:	65
2. Student's own work (self-study):	93
Total student's workload	158
ECTS points for module/course	7.5
Comments	

The 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)

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)

- **Seminar 1.** (week 1 or 6) **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.

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

- **Seminar 2.** (week 2 or 7)

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

- **Seminar 3.** (week 3 or 7)

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)

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)

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)

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)

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, glycogenosis,

hemoglobinopathies).

• **Seminar 8.** (week 8 or 13)

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)

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)

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)

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

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

• **Practical 2.** (week 2 or 10)

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

• **Practical 3.** (week 3 or 11)

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

• **Practical 4.** (week 4 or 12)

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

• **Practical 5.** (week 5 or 13)

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. **A. Cisowska, A. Hendrich, M. Kicia, P. Leszczyński, M. Szydłowicz, D. Tichaczek-Goska, M. Wesołowska, D. Wojnicz** "Medical Biology for students of Medicine and Dentistry of English Division", Wrocław Medical University, Wrocław 2019
2. **Klug WS, Cummings MR, Spencer ChA, Palladino MA**, Concepts of genetics, Pearson Benjamin Cummings, 2009.
3. **B.J. Bogitsch, T.C. Cheng** „Human parasitology" 2nd edition, Academic Press 1998

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

1. Connor M., Ferguson-Smith M. "Essential medical genetics" Blackwell Science Ltd 1997
2. R. Muller "Worms and human disease" Second edition, CABI Publishing 2002
1. 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 multimedia, microscopes. Lecture hall equipped with multimedia.

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 med by the student to pass it and criteria for specific grades)

Passing 5 partial tests (transmission genetics, molecular genetics, human genetic diseases, 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 who obtains an average of at least 4.75 from partial tests is exempted from the exam with a very good grade (5.0).

In the absence of a student resulting e.g. from illness, due to another important reason (justified by medical note or other official document), from the Rector's Day or Dean's Hours, the **student is obliged to make up** for the abandoned classes by preparing a presentation or an essay in an electronic version on the topic given by the teacher; or participating in classes with another group (if it is possible), after obtaining the teacher's permission.

The exam is in the form of single choice test and covers the genetics (classes, seminars, and lectures). **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 for course**
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%

Grade:	**Criteria for exam**
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%

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to Resolution No. 15630
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of 30 March 2016

Name of unit teaching course:	Department of Biology and Medical Parasitology
Address	Mikulicza-Radeckiego 9, 50-345 Wrocław
Phone	71 784 15 12 (secretariat)
E-mail	malgorzata.pekalska-cisek@umed.wroc.pl

Person responsible for course:	Prof. dr hab. Andrzej Hendrich
Phone	71 784 15 12 (secretariat); 71 784 15 11
E-mail	andrzej.hendrich@umed.wroc.pl

List of persons conducting specific classes:	*degree/scientific or professional title*	*Discipline*	*Performer profession*	*Form of classes*
Andrzej Hendrich	prof. dr hab.	medical biology	academic teacher	L
Dorota Wojnicz	dr hab.	medical biology	academic teacher	S
Magdalena Szydłowicz	dr	medical biology	academic teacher	S
Maria Wesołowska	dr	medical biology	academic teacher	MC
Dorota Tichaczek-Goska	dr	medical biology	academic teacher	S
Przemysław Leszczyński	mgr	medical biology	academic teacher	S
Agnieszka Cisowska	dr	medical biology,	academic teacher	S, MC

Date of Syllabus development

27.06.2019

Syllabus developed by

Dr Dorota Tichaczek-Goska

Signature of Head of teaching unit

KATEDRA I ZAKŁAD BIOLOGII I PARAZYTOLOGII LEKARSKIEJ
Kierownik

.....

prof. dr hab. Andrzej Hendrich

Signature of Faculty Dean

Wroclaw Medical University
FACULTY OF MEDICINE
VICE-DEAN FOR STUDIES IN ENGLISH

.....

Prof. Andrzej Hendrich, PhD