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| **Syllabus 2020/2021****Learning cycle: 2020-2025** |
| **Description of the course** |
| **Module/Course** | **MOLECULAR BIOLOGY, GENETICS** |
| **Faculty** | **Dentistry** |
| **Major**  | dentistry |
| **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 part-time |
| **Year of studies**  | 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** | **10** | **5** | **-** | **25** | **-** | **-** | - | - | - | - | - | - | **-** | - |
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| **Summer Semester** |
|  | **-** | **-** | - | - | - | - | **-** | **-** | - | - | - | - | - | - |
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| **TOTAL per year: 40** |
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| **Educational objectives** (max. 6 items)**C1.** Providing students with knowledge of modern genetics and its experimental methods.**C2.** Preparation of the basis for clinical knowledge passed on in subsequent years of studies for understanding issues in the field of epidemiology and pathogenesis of human diseases, clinical genetics, as well as pharmacology and medical diagnostics.**C3.** Education of students in the basics of medical parasitology, epidemiology and prevention of parasitic diseases. |
| **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*\*\*enter the abbreviation* |
| **W01** | **B.W4.** | - describes the structure and functions of important chemical compounds present in the human body, in particular the properties, functions, metabolism and energy of reactions of proteins, nucleic acids, carbohydrates, lipids, enzymes and hormones; | written test or colloquium, written test exam | MC, L |
| **W 02** | **B.W14.** | - defines the basic concepts of biology and ecology; | written test or colloquium, written test exam | MC |
| **W03** | **B.W15.** | - describes the interrelationships between organisms in the ecosystem; | written test or colloquium, | MC |
| **W04** | **B.W16.** | - explains interactions in the parasite-host system; | written test or colloquium, written test exam | MC |
| **W05** | **B.W17.** | - describes and explains selected issues in the field of genetics and molecular biology; | written test or colloquium, written test exam | MC, S, L |
| **W06** | **C.W1.** | knows the types and species and the structure of viruses, bacteria, fungi and parasites, their biological characteristics and mechanisms of pathogenicity; | written test or colloquium | MC |
| **W07** | **C.W3.** | - describes the basics of epidemiology of viral and bacterial infections, fungal and parasitic infections and ways of their spread in the human body; | written test or colloquium | MC |
| **W08** | **C.W6.** | - describes external and internal pathogens; | written test or colloquium | MC, S, L |
| **W09** | **C.W13.** | - explains the concept of health and disease, mechanisms of the formation and development of the disease process at the molecular, cellular, tissue and systemic level, clinical symptoms of the disease, prognosis and complications of the disease; | written test or colloquium, written test exam | MC |
| **W10** | **C.W31.** | - describes the impact on the patient's body of physical, chemical and biological factors as well as avitaminosis and stress; | written test or colloquium, written test exam | MC |
| **U01** | **B.U4.** | - can use biological and ecological concepts in the context of human - living environment; | independent solving of tasks prepared by the teacher | MC, S |
| **U02** | **B.U5.** | - uses knowledge of genetics and molecular biology in clinical work; | solving genetic crosswords and explaining issues during classes | MC, S |
| **U03** | **C.U1.** | - explains how to collect a properly selected type of biological material for microbiological (parasitological) examination depending on the location and course of infection; | oral statement 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; | S, 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; | S, 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**Social competences: **1** |
| **Student's amount of work (balance of ECTS points)** |
| **Student's workload** (class participation, activity, preparation, etc.) | **Student Workload (h)** |
| 1. Contact hours: | **40** |
| 2. Student's own work (self-study): | **25** |
| Total student's workload | **65** |
| **ECTS points for module/course** | **6.0** |
| 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:** (10 hours)**Lecture 1.** DNA, RNA, chromatin, chromosomes. Karyotype, organization of human genome, mitochondrial genome (2 h). **Lecture 2.** Replication of DNA in Eukaryotes. Transcription, translation. Regulation of gene expression in Eukaryotes (2 h).**Lecture 3.** DNA diversity, DNA mutations, mutagens, the influence of medicines, chemicals, physical factors, and environmental pollution. DNA repair mechanisms (2 h). **Lecture 4.** Examples of genetic diseases including X-linked diseases (2 h).**Lecture 5.** Basic methods of molecular biology and their applications (2 h). |
| **Seminars:** (5 hours)* **Seminar 1.** (week 12; 2h)

**Colloquium –** molecular genetics. **HUMAN GENETICS:** Types and mechanism of mutation formation. The correct human karyotype. Chosen diseases caused by **numerical mutations:** Down syndrome, Edwards syndrome, Patau syndrome, Turner syndrome, Klinefelter syndrome; and chosen diseases caused by **structural mutations:** Wolf-Hirschhorn syndrome, Cri-du-chat syndrome, Prader-Willi syndrome, Angelman syndrome.* **Seminar 2.** (week 13; 2h)

**HUMAN GENETICS:** Mechanisms of gene mutations. Chosen **autosomal inherited diseases** – **dominant**: Huntington's chorea, Alzheimer's syndrome, achondroplasia, Marfan syndrome, polydactyly, syndactyly; and **recessive**: phenylketonuria, alkaptonuria, albinism, cystic fibrosis, galactosemia, lipidosis hemoglobinopathies.* **Seminar 3.** (week 14; 1h)

**Colloquium –** human genetics.Completion of the course. |
| **Practical classes:** (25 hours)**Parasitology course contents:** life cycles, geographical distribution, diagnosis and diagnostic features of the parasites’ developmental forms, detection (what form, in what biological material), disease symptoms, pathogenicity, epidemiology, prevention of infection* **Practical 1.** (week 1; 2h)

**Organizational part** - reading the internal regulations of the Biology Department; information about the Syllabus content and criteria for passing the subject. **PARASITOLOGY: Protozoa** – Flagellates: *Trichomonas vaginalis, Trichomonas tenax, Giardia intestinalis, Trypanosoma brucei gambiense** **Practical 2.** (week 2; 2h)

**PARASITOLOGY: Protozoa** – Amoebae: *Entamoeba histolytica/dispar, Entamoeba gingivalis,* and Apicomplexans: *Plasmodium* spp*., Toxoplasma gondii** **Practical 3.** (week 3; 3h)

**Colloquium –** protozoa. **PARASITOLOGY** – **Trematoda**: *Fasciola hepatica, Clonorchis sinensis, Schistosoma* spp*.*; * **Practical 4.** (week 4; 2h)

**PARASITOLOGY** – **Cestoda**: *Taenia saginata, Taenia solium, Hymenolepis nana*, *Echinococcus granulosus, Echinococcus multilocularis** **Practical 5.** (week 5; 2h)

**PARASITOLOGY** – **Nematoda:** *Ascaris lumbricoides hominis, Enterobius vermicularis, Trichuris trichiura, Trichinella spiralis** **Practical 6.** (week 6; 3h)

**Colloquium –** worms. **TRANSMISSION GENETICS:** Basic concepts and definitions of transmission genetics. Mendel’s laws. Practical use of the laws of classical genetics in solving tasks related to mono- and dihybrid crosses. Codominance, multiple alleles; Gene cooperation e.g. epistasis, polygenes, complementary genes. * **Practical 7.** (week 7; 2h)

**TRANSMISSION GENETICS:** The cell’s life cycle. The analysis of the stages of the animal cell division. Meiosis and gametogenesis (oogenesis and spermatogenesis).* **Practical 8.** (week 8; 2h)

**TRANSMISSION GENETICS:** Morgan theory of chromosomal inheritance. Practical solving of tasks related to linked genes. Sex determination. Barr body and Lyon hypothesis.* **Practical 9.** (week 9; 3h)

**Colloquium –** transmission genetics. **MOLECULAR GENETICS:** DNA and RNA structure. Chromatin structure and organization. DNA replication in Prokaryotes. * **Practical 10.** (week 10; 2h)

**MOLECULAR GENETICS:** The genetic code features and exceptions. Protein synthesis in living organisms (transcription and translation) with the factors and enzymes involved. * **Practical 11.** (week 11; 2h)

**MOLECULAR GENETICS:** The theory of operon - types of operons and their role in gene expression regulation in Prokaryotes (induction, glucose catabolic repression, repression, attenuation) |
| **Other** ------ |
| **Basic literature** (list according to importance, no more than 3 items)1. **Cisowska A., Hendrich A., Kicia M., Leszczyński P., Szydłowicz M., Tichaczek-Goska D., Wesołowska 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)
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| **Didactic resources requirements** (e.g. laboratory, multimedia projector, other…)Classroom equipped with laptop, multimedia, microscopes. Lecture hall equipped with laptop and 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 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). |
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| **Grade:** | **Criteria for grade:** (only for subjects/modules ending with an 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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| **Name and address of module/course teaching unit, contact: telephone and e-mail address****Department of Biology and Medical Parasitology** J. Mikulicza-Radeckiego Street 9, Wroclaw tel. 71 784 15 12 (secretariat)e-mail: **malgorzata.pekalska-cisek@umed.wroc.pl****Coordinator / Person responsible for module/course, contact: telephone and e-mail address****Prof. dr hab. Andrzej Hendrich** tel. 71 784 15 12 (secretariat); 71 784 15 11e-mail: **andrzej.hendrich@umed.wroc.pl** **List of persons conducting specific classes: full name, degree/scientific or professional title, discipline, performed profession, a form of classes**.**Andrzej Hendrich**, prof. dr hab., medical sciences, academic teacher; L**Dorota Wojnicz**, dr hab., medical sciences, academic teacher; S**Agnieszka** **Cisowska**, dr, medical sciences, academic teacher; MC**Maria Wesołowska**, dr, medical sciences, academic teacher; MC**Dorota Tichaczek-Goska**, dr, medical sciences, academic teacher; MC**Magdalena Szydłowicz**, dr, medical sciences, academic teacher; MC**Przemysław** **Leszczyński**, mgr, medical sciences, academic teacher; MC

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| **Date of Syllabus development**  | **Syllabus developed by**  |
| **27.05.2020** | Dr Dorota Tichaczek-Goska |
| **Signature of Head of teaching unit** |
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**Signature of Faculty Dean**  |
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