



MEDICAL UNIVERSITY

“PROF. DR. PARASHKEV STOYANOV” VARNA

FACULTY OF DENTAL MEDICINE

Approved with a Protocol of № 02/27-05.2026

Approved by:

DEAN

/Assoc. Prof. Georgi Papanchev, PhD, DMD/



EDUCATIONAL PROGRAMME

OF

Human Biology, Human Genetics and Regenerative Medicine

Specialty: “DENTAL MEDICINE”

Educational and qualification degree “MASTER”

Professional qualification – D.M.D.

	<i>Semester</i>	<i>Horarium – hours per week</i>	<i>Horarium – hours in total</i>
<i>Lectures</i>	I	2	30
	II	1	15
<i>Seminars</i>	I	2	30
	II	2	30
<i>Total hours</i>		8	105
<i>Extracurricular employment</i>		105	
<i>Forms of Evaluation</i>	Continuous assessment of practical activity	Final exam	
<i>Credits (ECTS)</i>		7	

Varna, 2026

ANNOTATION

Aims of the course	The aim of this program in human biology, human genetics, and regenerative medicine is to familiarize students with the main areas of medical biology (the origin of life, the evolution of animals and humans, parasitism as a biological phenomenon, the fundamentals of molecular biology, genetics, and immunobiology), which are directly related to medical issues. Furthermore, the program aims to provide students with fundamental knowledge of the biological mechanisms of tissue regeneration and repair, as well as to familiarize them with the contemporary principles and applications of regenerative medicine in the context of dental practice. In this way, instruction in this course helps students understand humanity's place within the living world, given their future careers in the fields of medicine and healthcare.
---------------------------	--

Outcomes for students at the end of the course:	
Competences	1. Patient Care 2. Medical Knowledge 3. Practice-Based Learning and Improvement 4. Interpersonal and Communication Skills 5. Professionalism
Competence group	1. Patient Care that is compassionate, appropriate, and effective for treating health problems and promoting health.
Knowledge	• for the prevention of vector-borne infections • for personal and public preventive efforts against single and multi-cell parasites • about venomous animals in Bulgarian fauna • for nutritional prophylaxis of certain commonly occurring infectious and parasitic diseases • biological factors of the workplace environment • the importance of immunoprophylaxis, vaccines and serums
Skills	• For providing first aid in cases of tick bites • For identifying bites from various arthropods • For developing measures for the prevention and control of the most significant parasitic and vector-borne diseases • For identifying key parasites of medical importance in humans • For collecting epidemiological data from individuals suffering from parasitic diseases • For developing measures for the prevention and control of HIV and sexually transmitted infections • For the prevention of certain reproductive issues within society
Competence group	2. Medical Knowledge about established and evolving biomedical, clinical, and cognate (eg, epidemio-logical and

	social-behavioral) sciences and the application of this knowledge to patient care.
Knowledge	• About the general principles and cellular foundations of life • About parasitism as a biological phenomenon (its origin, evolution, and ecological characteristics) and the interaction between parasites and their hosts • About the biological mechanisms involved in the pathogenesis of various human diseases • About the mechanisms of inheritance of genetic diseases • About the functioning of the immune system • About the genetic and immunological mechanisms of transplantation • About the main immunological reactions and techniques applied in medical practice • About the the biological mechanisms of tissue regeneration and repair • About the etiology, modes of transmission, and spread of parasitic diseases • About the biology of human populations • About the biology, ecology, and epidemiological significance of arthropods • About the biology of tumor growth and the molecular mechanisms of tumor development • About the ontogenesis of organisms and humans • About pharmacogenetics and its significance for medical practice • About the forensic importance of sex chromatin and alloantigens on human erythrocytes • About the essence of reproductive biology • About the indications for the application of assisted reproduction methods
Skills	• For solving biological and immunological cases • For collecting samples for parasitological studies • For applying genetic and immunological methods for diagnosis and prevention • For determining blood groups using test serums or test erythrocytes • For working with a light microscope • For preparing temporary and permanent microscopic slides
Competence group	3. Practice-Based Learning and Improvement that involves investigation and evaluation of their own patient care, appraisal, and assimilation of scientific evidence, and improvements in patient care.
Knowledge	• For searching, selecting, and analyzing educational and scientific information • For detection methods of parasites common in Bulgaria and worldwide • For screening methods for the early diagnosis of patients
Skills	• For working with an ELISA reader • For preparing samples for sex chromatin analysis • For applying some methods in genetics: genealogical, cytogenetic (preparation of karyograms), and population (studying the frequency of normal and mutant alleles in a population based on the Hardy-Weinberg principle) • For recording and comparing different fingerprint and palm dermatoglyphic patterns in women diagnosed with breast cancer • For selecting and analyzing relevant educational and scientific literature from specialized databases on a given topic in medical biology

Competence group	4. Interpersonal and Communication Skills that result in effective information exchange and teaming with patients, their families, and other health professionals.
Knowledge	• Latin language and medical terminology • Specific basic terminology in medical genetics, immunology, parasitology, embryology, and reproductive biology • Principles of scientific presentation in oral and written form
Skills	• For analyzing and presenting scientific results through reports, posters, or articles • For effectively using PowerPoint for data visualization
Competence group	5. Professionalism , as manifested through a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population.
Knowledge	• About the issues of aging and their impact on society • About the specific needs and challenges of people with Down syndrome, as well as their families, with the aim of providing quality and equitable medical care
Skills	-

Key competencies for lifelong learning¹, that the discipline develops:	
Literacy competence Literacy is the ability to identify, understand, express, create, and interpret concepts, feelings, facts and opinions in both oral and written forms, using visual, sound/audio and digital materials across disciplines and contexts. It implies the ability to communicate and connect effectively with others, in an appropriate and creative way.	X
Multilingual competence This competence defines the ability to use different languages appropriately and effectively for communication. It broadly shares the main skill dimensions of literacy: it is based on the ability to understand, express and interpret concepts, thoughts, feelings, facts and opinions in both oral and written form (listening, speaking, reading and writing) in an appropriate range of societal and cultural contexts according to one's wants or needs.	X
Mathematical competence and competence in science, technology, engineering A. Mathematical competence is the ability to develop and apply mathematical thinking and insight in order to solve a range of problems in everyday situations. Building on a sound mastery of numeracy, the emphasis is on process and activity, as well as knowledge. Mathematical competence involves, to different degrees, the ability and willingness to use mathematical modes of thought and presentation (formulas, models, constructs, graphs, charts). B. Competence in science refers to the ability and willingness to explain the natural world by making use of the body of knowledge and methodology employed, including observation and experimentation, in order to identify questions and to draw evidence-based conclusions. Competences in technology and engineering are applications of that knowledge and methodology in response to perceived human wants or needs. Competence in science, technology and engineering involves an understanding of the changes caused by human activity and responsibility as an individual citizen.	X

¹ As defined in 2018 r. by the European Union Council ([https://eur-lex.europa.eu/legal-content/BG/TXT/HTML/?uri=CELEX:32018H0604\(01\)&from=EN](https://eur-lex.europa.eu/legal-content/BG/TXT/HTML/?uri=CELEX:32018H0604(01)&from=EN))

Digital competence Digital competence involves the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society. It includes information and data literacy, communication and collaboration, media literacy, digital content creation (including programming), safety (including digital well-being and competences related to cybersecurity), intellectual property related questions, problem solving and critical thinking.	
Personal, social and learning to learn competence Personal, social and learning to learn competence is the ability to reflect upon oneself, effectively manage time and information, work with others in a constructive way, remain resilient and manage one's own learning and career. It includes the ability to cope with uncertainty and complexity, learn to learn, support one's physical and emotional well-being, to maintain physical and mental health, and to be able to lead a health-conscious, future-oriented life, empathize and manage conflict in an inclusive and supportive context.	X
Citizenship competence the ability to act as responsible citizens and to fully participate in civic and social life, based on an understanding of social, economic, legal and political concepts and structures, as well as global developments and sustainability.	
Entrepreneurship competence Entrepreneurship competence refers to the capacity to act upon opportunities and ideas, and to transform them into values for others. It is founded upon creativity, critical thinking and problem solving, taking initiative and perseverance and the ability to work collaboratively in order to plan and manage projects that are of cultural, social or financial value.	
Cultural awareness and expression competence Competence in cultural awareness and expression involves having an understanding of and respect for how ideas and meaning are creatively expressed and communicated in different cultures and through a range of arts and other cultural forms. It involves being engaged in understanding, developing and expressing one's own ideas and sense of place or role in society in a variety of ways and contexts.	X

Methods of education
▪ lectures ▪ seminars ▪ practicals and laboratory exercises, practical and creative problem solving, case studies, discussions, work with scientific literature, regulatory documents, databases, analyses, presentations.

Links with other courses from the curriculum of the specialty
Necessary for the following disciplines: medical genetics, oncology, clinical immunology, cytology, embryology, infectious and parasitic diseases, microbiology, transplant medicine, implantology, periodontology, oral surgery, endodontics, prosthodontics Other related disciplines: forensic medicine, pharmacology, hematology, obstetrics and gynecology, epidemiology, hygiene, oral and maxillofacial surgery, pediatric dentistry

THEMATIC PLAN OF LECTURES AND SEMINARS

№	I. THEMATIC PLAN OF THE LECTURES	ACADEMIC HOURS	SEMESTER
1.	Introduction to general biology. The origin of life.	2	first
2.	Evolution of invertebrates with medical significance. Taxonomy of invertebrates – basic types and classes. Parasitism and parasites. Parasitic and transmissible diseases.	2	first
3.	Evolution of vertebrates. Taxonomy of vertebrates – general characteristic and some evidence from comparative anatomy.	2	first

	Atavisms and vestigial organs in man – nature and medical significance. Atavisms in skin, skeleton, uro-genital and cardio-vascular system		
4.	Anthropogenesis – origin and evolution of man. Evidences for natural origin of man, similarities with animals. Taxonomical place of man in order Primates. Human races – some medical and biological aspects. The man as a biosocial being.	2	first
5.	Molecular bases of inheritance. DNA and RNA. DNA model. Replications of DNA. RNA – structure, characteristics, types and functions.	2	first
6.	Transcription, translation and genetic code. Transcription in prokaryotes and eukaryotes. Processing of the primary transcript. Alternative splicing.	2	first
7.	Translation – nature and mechanisms. The genetic code – characteristics.	2	first
8.	Regulation of protein synthesis – types and mechanisms. Contemporary theories of the gene. The nature of operon. Organization of the genome in prokaryotes and eukaryotes. Transposons. Posttranslational modifications of proteins.	2	first
9.	Realization of genetic information – types of transfers. Central dogma of molecular biology. Reverse transcriptase. Crossing over and recombination. Mapping of genes and chromosomes.	2	first
10.	Classic genetics – Mendelian genetics. Basic types of inheritance - autosomal and sex linked. Deviations of Mendel's laws. Interaction between alleles and between genes – types. Penetrance and expressivity of the gene	2	first
11.	Population genetics. Phenotype, genotype and gene frequency. Hardy-Weinberg law – definition and validity - conditions. Factors that can change the gene frequency. The human as genetic object – methods in human genetics.	2	first
12.	Inheritance and environment. Variability – types. Phenotype variability. Phenocopies and genocopies. Genotype variability–combinatory and mutational. Mutations -- nature and classification.	2	first
13.	Chromosomal organization of the genetic material. Different types of chromosomes and chromatin. Karyotype – definition, characteristics and evolution. Mapping of chromosomes.	2	first
14.	Mutations – characteristics and types. The theory of mutations. Types of mutations. Mutagenic factors. Types of mutagenic factors and their medical significance. Gene, chromosome and genome mutations – definition, types and medical significance.	2	first
15.	Genetic engineering. Bases of biological engineering. Genetic engineering on a populational, organismal and cellular level. Cloning – problems and perspectives. Hybridoma technique and monoclonal antibodies. Gene engineering and recombinant DNA technique.	2	first

16.	Immunity and immune system. The organism as an integrated system. Immunity – nature and types. Immune system – central and peripheral lymphoid organs.	2	second
17.	Antigens – characteristic. Antigens – definition and types. Alloantigens of human erythrocytes – the ABO/H/ system. Genetic of the blood groups. Rhesus system. Nature of the immune conflict “mother-fetus”. Biological significance of alloantigens, medical significance and practical application	2	second
18.	Antibodies – structure, functions, characteristics, types. Classes of immunoglobulins in human. Interaction “antigen-antibody”.	2	second
19.	Cells of the immune system. T and B populations of lymphocytes. B-lymphocytes – differentiation, receptors, subpopulations. Humoral immune response – synthesis of antibodies from the. T lymphocytes – differentiation, receptors, subpopulations. Cell cooperation. Mechanism of cell immune response. Genetic control of the antibody synthesis. Growth factors and cell signaling.	2	second
20.	Histocompatibility and biological problems of transplantation. Genetic base of the histocompatibility – H-2 and HLA system. Genetic of the immune response. The immune tolerance. Immunologic suppression. Transplantation – definition and types. Genetic laws of transplantation.	2	second
21.	Problems of the sex and sexuality. Sex and sexual trends. Determination and differentiation of the sex. Sex chromatin – nature and medical significance. Sexual reproduction – definition and mechanisms. Haploid-diploid cycle. Atypical forms of sexual reproduction. “In vitro” fertilization.	2	second
22.	Biology of individual development. Ontogenesis – embryonic period. Factors and mechanisms of morphogenesis. The Speman’s theory of embryonic induction. Postembryonic period – ageing and death.	2	second
23.	Regeneration – essence and mechanisms. Fundamentals and principles of regenerative medicine.	1	second
TOTAL ACADEMIC HOURS:		45	

№	II. I. THEMATIC PLAN OF THE SEMINARS	ACADEMIC HOURS	SEMESTER
1.	Microscope - rules for use. Types of microscopic preparations.	2	first
2.	Evolution of invertebrates – parasites. Subphylum Sarcodina.	2	first
3.	Subphylum Mastigophora – representatives with medical importance.	2	first
4.	Phylum Sporozoa. Genus Plasmodium. Toxoplasma gondii.	2	first
5.	Phylum Ciliophora. Phylum Coelenterata	2	first
6.	Phylum Platyhelminthes (tapeworms). Class Trematoda.	2	first
7.	Class Cestoda. Diphylobothrium latum, Taenia solium, Taenia saginata, Echinococcus granulosus.	2	first

8.	Phylum Nemathelminthes (roundworms). Class Nematoda. Phylum Annelida.	2	first
9.	Phylum Arthropoda – scorpions, spiders and ticks	2	first
10.	Class Insecta. Part I – sucking lice, fleas, bed-bugs.	2	first
11.	Class Insecta. Part II – mosquitoes, midges and flies.	2	first
12.	Seminar. Summary of the material in parasitology.	2	first
13.	Colloquium in parasitology – practical and theoretical part.	2	first
14.	Regeneration – essence and mechanisms.	2	first
15.	Atavistic traits in humans.	2	first
16.	Bases of classic genetics	2	second
17.	Cell – life and mitotic cycle. Cell division. Chromosomes.	2	second
18.	Normal karyotype of animals and human	2	second
19.	Variability. Gene mutations. Pharmacogenetics.	2	second
20.	Chromosome and genome mutations. Inheritance and environment. Phenocopies and genocopies	2	second
21.	Population genetics. Hardy-Weinberg law. Genealogy method.	2	second
22.	Anthropometry. Basics of fingerprinting. Test in genetics	2	second
23.	Immune system – organs and cells	2	second
24.	Immunological reactions and current diagnostic methods	2	second
25.	Alloantigens of human. Immunogenetics of blood groups	2	second
26.	Transplantation immunity. Test in immunology	2	second
27.	Reproduction of organisms. Gametogenesis. Fertilization	2	second
28.	Ontogenesis. Embryonic development	2	second
29.	Postembryonic development. Ageing and death. Sex chromatin	2	second
30.	Regeneration. Explantation. Anabiosis	2	second
TOTAL ACADEMIC HOURS:		60	

MONITORING AND ASSESSMENT OF KNOWLEDGE, SKILLS AND COMPETENCES

The quality and volume of the acquired knowledge, skills and competences is established by:

- **continuous assessment of practical activity:** tests, practical skills test, case studies, presentations, practical tests;
- **final examination:** written/oral part: test, development of topics from the conspectus

Regulations for the conduct of the Final examination

Admission to the Final Examination is granted on the basis of completed tasks for independent practice (according to the thematic plan and the norm for practical activities).

- If the student demonstrates excellent performance during the practical exercises in Parasitology during the first semester and achieves a grade "Excellent (5.50-6.00)" on Parasitology Colloquium, the student will be exempted from Parasitology questions on the final Biology exam.

Final exam consists of a multiple choice test (a *minimum score* of 50% to pass) and oral part)

The final grade is formed on the basis of the grades accumulated during the year - practical exercises, semester exams (30 %) and the grades from the final exam (70%)

The objectivity of the assessment is guaranteed by the application of common criteria for determining the level of knowledge and skills acquired in the discipline, as follows:

Six-point evaluation system	CRITERIA FOR DETERMINING THE LEVEL OF KNOWLEDGE, SKILLS AND COMPETENCES	Degree of acquired theoretical and practical skills
Excellent 6	VERY HIGH LEVEL excellent results with minor gaps in the demonstration of knowledge, skills, and competences	91-100 %
Very Good 5	HIGH LEVEL very good results with minimal gaps in the demonstration of knowledge, skills and competences	81-90 %
Good 4	INTERMEDIATE LEVEL satisfactory results with a number of significant errors in the demonstration of knowledge, skills and competences	71-80 %
Satisfactory 3	MINIMAL REQUIRED LEVEL demonstration of knowledge, skills and competences within the scope of the compulsory minimum mastery of the discipline	60-70 %
Poor 2	UNDER THE MINIMAL REQUIRED LEVEL demonstration of knowledge, skills and competences below the specified minimum where additional work is required to meet the minimal criteria	< 60 %

LITERATURE and other sources of information

Recommended literature:

1. Medical Genetics, 6th Edition

Author(s) - Lynn B. Jorde, John C. Carey MD, Michael J. Bamshad MD
ISBN-13: 978-0323597371
Publisher: Elsevier
Publication Date: 20/12/2019

2. Basics and Fundamentals of Immunology

Author - Manzoor Ahmad Mir
ISBN- 978-1-53616-639-2
Publisher: NOVA Medicine and Health
Publication Date: 20/02/2020

3. Human Biology, 17th Edition

Author(s) - Sylvia S. Mader, Michael Windelspecht
ISBN- 9781265250065
Publisher: McGraw-Hill Education
Publication Date: 01/01/2022

4. Molecular Biology of the Cell. 7th Edition

Author(s) - Alberts, Bruce, et al.
ISBN-13: 978-0393884821
Publisher: W. W. Norton & Company
Publication Date: 01/07/2022

5. Human Parasitology, 6th Edition

Author(s) - Burton J. Bogitsh, Clint E. Carter, Thomas N. Oeltmann
ISBN-13: 978-0128137123
Publisher: Academic Press
Publication Date: 09/04/2023

Other sources:

1. Lectures in the Blackboard

CONSPECTUS of the final examination

1. Development of the concepts for origin of life. Theory of Oparin and Holdane.
2. Parasitism as a biological event. Parasites and hosts.
3. Relationships between parasite and host and its medical significance.
4. Taxonomy of Invertebrates. Parasitic forms.
5. Characterization of kingdom Protista. Phylum Sarcomatigophora. Subphylum Sarcodina. *Entamoeba histolytica*.
6. Subphylum Mastigophora – genus *Lieshmania* and genus *Trypanosoma*.
7. Genus *Trichomonas* and genus *Lambliia*.
8. Phylum Sporozoa. Genus *Plasmodium* and genus *Toxoplasma*- representatives and medical significance.
9. Phylum Ciliophora- characterization. *Balantidium coli*. Transition to multicellular animals.
10. Phylum Platyhelminthes (flat worms) – characterization. Class Trematoda. *Fasciola hepatica* and *Dicrocoelium lanceatum* – characterization and medical significance.
11. Class Cestoda (tapeworms). *Taenia solium* and *Taenia saginata* – characterization and medical significance.
12. *Echinococcus granulosus* (dog tapeworm), *Diphyllobothrium latum* (fish tapeworm) - characterization and medical significance.
13. Phylum Nematelminthes (round worms) – characterization. Class Nematoda. *Enterobius vermicularis* and *Ascaris lumbricoides*- biological cycle and medical significance.
14. *Trichinella spiralis* and *Trichocephalus trichiurus* - characterization and medical significance.
15. Phylum Arthropoda. Class Arachnida (spiderlike). *Scorpiones* and *Spiders* - characterization and medical significance.
16. Subclass Acari (ticks). Order Parasitiformes – characterization. *Acarus siro*. Ticks from genus *Ixodes* and *Argas*. Transmissive diseases.
17. Class Insecta. Genus *Pediculus* and genus *Phthirus* - characterization and medical significance.
18. *Cimex lectularius* and *Pulex irritans* - characterization and medical significance.
19. Genus *Culex* and genus *Anopheles*. *Phlebotomus papatasi* - characterization and medical significance.
20. Family Muscidae / flies /. *Glossina palpalis* - medical significance.
21. Taxonomy of Vertebrata- characterization and some ideas about comparative anatomy. Atavistic traits.
22. Cell reproduction. Haploid-diploid cycle. Aberrations in the normal run of mitosis and meiosis.
23. Sex and sexual traits. Determination and differentiation of the sex.
24. Sex chromatin (Barr's body) – nature and medical significance.
25. Sexual reproduction. Gametogenesis. Fertilization. Not typical forms of sexual reproduction.
26. Embryonic period – stages. The “induction” theory of Spemann.
27. Factors and mechanisms of the morphogenesis. Genetic basis of embryogenesis.
28. Postembryonic period – direct development and metamorphosis, aging and death. Stem cells.
29. Regeneration – definition, mechanisms, medical significance.
30. Explantation – definition, conditions, medical significance.
31. Anabiosis, hypothermia and hibernation – nature and medical significance.
32. Molecular base of heredity. DNA and RNA – structure and functions.
33. DNA replication in prokaryotes and eukaryotes. DNA repairs.
34. Transcription – definition and mechanism.
35. Translation – definition, stages, mechanism.
36. Genetic code – definition and characteristics.
37. Gene and regulation of the gene activity. Operons and its functions.
38. Hereditary material. Chromosomes – composition, submicroscopic and microscopic structure.

39. Karyotype – definition and evolution. The human karyotype.
40. Inheritance – basic of Mendelian genetics. Main types of inheritance. Multiple alleles and sex-linked traits.
41. Interactions between alleles and genes.
42. Deviations from the Mendel's laws – main causes.
43. Heredity and environment – phenocopy, genocopy, incomplete(reduced) penetrance and variable expressivity of the gene.
44. Genetic variation. Phenotype variations – modifications.
45. Genotype alteration. Mutations – definition, different kinds.
46. Gene (point) mutations - definition, kinds, mechanism, “molecular diseases”.
47. Chromosomal (structural) mutations - definition, different rearrangements, “chromosomal diseases”.
48. Genomic (numerical) mutations – definition, types, human syndromes.
49. Immune system – lymphoid organs and cells involved. Innate and acquired immunity.
50. Immune response – diversity and memory. Primary and secondary response, cellular and humoral immunity.
51. Antigens – definition, characteristics, different types.
52. Human blood groups alloantigens. The ABO/H/ system.
53. Rhesus system. The immune conflict “mother-fetus”.
54. Antibodies – definition, structure, major classes and functions.
55. Cells of the immune system. T and B cell populations, markers. Cell cooperation.
56. Major Histocompatibility Complex – H-2 and HLA system.
57. Transplantation immunology. Relationship between donor and recipient. Host versus Graft (HvGR) and Graft versus Host Reaction (GvHR).
58. The tolerance to foreign antigens. Immunosuppression – significance for medicine.
59. Anthropogenesis – human paleontological history.
60. Biological and social nature of man. Human races.
61. Biology and genetics of populations. Phenotype, genotype and gene (allele) frequencies. Hardy – Weinberg law.
62. Hardy – Weinberg law. Factors affecting gene frequencies.

The syllabus is approved by:

- Department Council of the Biology Department
- Program board of the Faculty of Dental medicine
- Faculty Council

Protocol № 144 /05.05.2026

Protocol № 1/26.05.2026

Protocol № 2/27.05.2026

Programme developers:

(Assist. Prof. Dr Stoyan Stoyanov)

.....

(Assoc. Prof. Galina Yaneva, PhD)

Approved by Head of Department:

(Assoc. Prof. Galina Yaneva, PhD)