



**MEDICAL UNIVERSITY**  
**“PROF. DR. PARASKEV STOYANOV” - VARNA**  
**FACULTY OF DENTAL MEDICINE**

*Approved with a Protocol of № 12/07.12.2022г.*

**Approved:**  
**DEAN:**

*/ Prof. Dr. Stefan Peev, DMD, PhD, DSc/*



**EDUCATIONAL PROGRAMME**  
**OF**

**“ Human biology, human genetics “**

**Specialty “DENTAL MEDICINE”**

**Educational-qualification degree “MASTER”**

**Professional qualification “PHYSICIAN IN DENTAL MEDICINE”**

	Semester	Horarium weekly	Total horarium
Lectures	I/II	2/1	45
Exercises	I/II	2/2	60
Total			105
Monitoring and evaluation forms	Current control		Exam – II semester
Credits ( ECTS )		3/4	7
Extracurricular employment			60

Lecturers: prof. Dobri Ivanov

Varna, 2022

## ANNOTATION:

The Program provides a distillation of the essential concepts in four parts: General Biology, Genetics, Immunology and Parasitology.

The aim of the course of human biology is to acknowledge the students with the basic areas of medical biology (origin of life and animal and human evolution, parasitism like biologic process, general and molecular biology, general and molecular genetics, basis of immunology), which are directly connected with some medical problems. In this way that branch of knowledge assures optimal base to realize the position of human within the whole community of organisms.

In the process of education with regards to the main accent, included in the curriculum, consisting of thematic units, the students should gain basic skills and knowledge through the active participation in lectures, seminars and practical exercises.

## PLAN OF TOPICS OF LECTURES AND PRACTICAL CLASSES

### Lectures I semester

<i>I semester</i>		
<i>№</i>	<i>Topic</i>	<i>Hours</i>
1	Introduction to general biology. The origin of life. Subject and methods of biology, its place in the system of natural sciences. Biology and medicine. Development of the concepts for nature of life. Theory of A. Oparin.	2
2	Evolution of invertebrates with medical significance. Taxonomy of invertebrates – basic types and classes. Parasitism and parasites. Parasitic and transmissive diseases.	2
3	Evolution of vertebrates. Taxonomy of vertebrates – general characteristic and some evidence from comparative anatomy. Atavisms and vestigial organs in man – nature and medical significance. Atavisms in skin, skeleton, uro-genital and cardio-vascular system	2
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
5	Molecular bases of inheritance. DNA and RNA. DNA model. Replications of DNA. RNA – structure, characteristics, types and functions.	2
6	Transcription, translation and genetic code. Transcription in prokaryotes and eukaryotes. Processing of the primary transcript. Alternative splicing.	2
7	Translation – nature and mechanisms. The genetic code – characteristics.	2
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

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
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
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
12	Inheritance and environment. Variability – types. Phenotype variability. Phenocopies and genocopies. Genotype variability–combinatory and mutational. Mutations – nature and classification.	2
13	Chromosomal organization of the genetic material. Different types of chromosomes and chromatin. Karyotype – definition, characteristics and evolution. Mapping of chromosomes.	2
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
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
	<b>Total hours</b>	<b>30</b>

## Lectures II semester

№	Topic	Hours
1	Immunity and immune system. The organism as an integrated system. Immunity – nature and types. Immune system – central and peripheral lymphoid organs.	2
2	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
3	Antibodies – structure, functions, characteristics, types. Classes of immunoglobulins in human. Interaction “antigen-antibody”.	2
4	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.	2
5	Histocompatibility and biological problems of transplantation. Genetic base of the histocompatibility – H-2 and HLA system. Genetic of the immune	2

	response. The immune tolerance. Immunologic suppression. Transplantation – definition and types. Genetic laws of transplantation.	
6	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
7	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
8	Genetic mechanisms of morphogenesis. Selective derepression of genes. Regeneration – definition and mechanisms.	1
	<b>Total hours</b>	<b>15</b>

#### Practical classes I semester

№	Topic	Hours
1	Microscope - rules for use. Types of microscopic preparations.	2
2	Evolution of invertebrates – parasites. Subphylum Sarcodina.	2
3	Subphylum Mastigophora – representatives with medical importance.	2
4	Phylum Sporozoa. Genus Plasmodium. Toxoplasma gondii.	2
5	Phylum Ciliophora. Phylum Coelenterata	2
6	Phylum Platyhelminthes (tapeworms). Class Trematoda.	2
7	Class Cestoda. Diphyllbothrium latum, Taenia solium, Taenia saginata, Echinococcus granulosus.	2
8	Phylum Nematelminthes (roundworms). Class Nematoda. Phylum Annelida.	2
9	Phylum Arthropoda – scorpions, spiders and ticks	2
10	Class Insecta. Part I – sucking lice, fleas, bed-bugs.	2
11	Class Insecta. Part II – mosquitoes, midges and flies.	2
12	Seminar. Summary of the material in parasitology.	2
13	Colloquium in parasitology – practical and theoretical part.	2
14	Evolution and classification of vertebrates. Atavisms in human.	2
15	Atavistic traits in humans	2
	<b>Total hours</b>	<b>30</b>

#### Practical classes II semester

№	Topic	Hours
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1	Bases of classic genetics	2
2	Cell – life and mitotic cycle. Cell division. Chromosomes.	2
3	Normal karyotype of animals and human	2
4	Variability. Gene mutations. Pharmacogenetics.	2
5	Chromosome and genome mutations. Inheritance and environment. Phenocopies and genocopies	2
6	Population genetics. Hardy-Weinberg law. Genealogy method.	2
7	Anthropometry. Basics of fingerprinting. Test in genetics	2
8	Immune system – organs and cells	2
9	Immunological reactions and current diagnostic methods	2
10	Alloantigens of human. Immunogenetics of blood groups	2
11	Transplantation immunity. Test in immunology	2
12	Reproduction of organisms. Gametogenesis. Fertilization	2
13	Ontogenesis. Embryonic development	2
14	Postembryonic development. Ageing and death. Sex chromatin	2
15	Regeneration. Explantation. Anabiosis	2
	<b>Total hours</b>	<b>30</b>

## MONITORING AND EVALUATION FORMS:

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

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

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

## REFERENCES:

1. Instant Notes in Genetics

Author(s) - Hugh Fletcher, Ivor Hickey, Paul Winter

ISBN: 9780415376198

ISBN-10: 041537619X

Publisher: Taylor and Francis

Publication Date: 26/10/2006

2. Instant Notes in Molecular Biology

Author(s) - Phil Turner, Alexander McLennan, Andy Bates, Michael White

ISBN: 9780415351676

ISBN-10: 0415351677



27. Factors and mechanisms of the morphogenesis. Genetic basis of embryogenesis.
28. Postembryonic period – direct development and metamorphosis, aging and death.
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.

**Department's council protocol № 106/18.11.2022**

PREPARED: .....  
/ ASSIST.PROF. SLAVOVA/

HEAD OF DEPARTMENT: .....  
/ ASSOC. PROF. YANEVA/