

SYLLABUS

Subject:	Genetics and Regenerative Medicine in Dentistry		
Study Programme:	<i>Dental Medicine</i>	Study Period:	<i>3. semester</i>
Evaluation:	<i>exam</i>	Subject Type:	<i>mandatory(compulsory)</i>
Content:	<i>2 lecture and 1 exercise hours /week</i>		<i>Total 42 hours</i>

Department: Department of Medical Biology

Week	Lectures	Practical Lessons
1.	Mutations I - classification of mutations, mechanisms of mutagenesis, gene (point) mutations	Gene expression – gene structure and function, transcription, translation, genetic code
2.	Mutations II - genomic instability; structural and numerical chromosome mutations	Mutations I – molecular basis of the mutation process, types of mutations: gene, chromosomal, and genomic mutations
3.	Mendelian inheritance - Mendel's laws of inheritance in human genetics, developmental anomalies of the orofacial region	Mutations II – Robertsonian translocations as a specific type of chromosomal mutation
4.	Gene linkage Heredity and sex Quantitative genetics - polygenic inheritance, heritability, multifactorial diseases	Mutations III – nomenclature and karyotype explanation
5.	Inheritance of blood group systems I. – ABO, H, Rh, MNS	Mendel's laws of inheritance – examples of Mendelian inheritance in humans
6.	Inheritance of blood group systems II. – Lewis, Secretor, Kell, Duffy. MHC (HLA)	Gene linkage – linkage group, crossing over and power of linkage
7.	Population genetics – Hardy-Weinberg law, panmixis, population equilibrium, inbreeding, genetic drift, eugenics, eugenics	Heredity and sex - chromosomal determination of sex, sex-linked inheritance, sex-limited and sex-influenced traits
8.	Genealogy and genetic counselling	Inheritance of blood group systems I – ABO system, Rh system, MNS, Lewis, haemolytic disease of the newborns

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9.	Oncogenetics and precision oncology 1st written test	Inheritance of blood group systems II – HLA antigens, gene interactions, epistasis and hypostasis
10.	Gene editing – genome editing technology	Population genetics – population genetics – the Hardy-Weinberg principle and its applications in population genetics
11.	Cell signaling Epigenetic in practice	Genealogy – pedigree analysis, construction of pedigree, autosomal and sex-linked inherited traits in pedigree, dominant and recessive inheritance
12.	Molecular biology methods in human genetics – NA isolation, electrophoresis, restriction endonucleases, PCR, NA hybridization, molecular cloning, DNA microarrays	Genetic counselling – purpose, aim and general characteristics of genetic counselling, prenatal diagnosis of genetic diseases
13.	Molecular biology methods in clinical practice 2nd written test	Molecular biology methods – PCR, electrophoresis, restriction endonucleases, DNA sequencing, hybridization of nucleic acids
14.	Definition of gene therapy, types of therapy, germline vs. somatic cell therapy and ethical issues	Evaluation of prerequisites and compensations