DISCIPLINE SHEET

1. Study programme

1.1.	"CAROL DAVILA" UNIVERSITY OF MEDICINE AND PHARMACY BUCHAREST
1.2.	FACULTY OF DENTISTRY
1.3.	DEPARTMENT of DENTISTRY I
1.4.	DISCIPLINE GENETICS
1.5.	STUDY DOMAIN: Health, sectoral regulated within the European Union
1.6.	STUDY LEVEL: I (Bachelor's degree) and II (Master's degree)
1.7.	STUDY PROGRAMME: DENTAL MEDICINE IN ENGLISH

2. Discipline

2.1.	Discipline name according to the study curriculum: GENETICS				
2.2.	Discipline code: MD02F12EN				
2.3.	Discipline type (FD/SD/CD): FD				
2.4.	Discipline optionality (COD/ED/FAD): COD				
2.5.	Lectures tenure: Prof. EMILIA MARIA MARGARITA SEVERIN				
2.6.	Practical classes / seminar tenure: Prof. CRISTINA-CRENGUȚA ALBU				
2.7. Year of study	II	2.8. Semester	IV	2.9. Evaluation (E/C/V)	E

3. Estimated total time (hours/ semester of teaching and training activity /individual study)

I. University training						
3.1. Number of hours per week	4	from which:	3.2. lecture	2	3.3. practical class/ seminar	2
3.4. Total hours in the study curriculum	56	from which:	3.5. lecture	28	3.6. practical class/ seminar	28
II. Preparation/ individual study						
Time distribution						hours
Study of lecture materials, textbooks, books, study of the minimum recommended bibliography						60
Additional documentation activity in the library, on online platforms						10
Specific preparation activities for projects, practical classes, preparation of assignments, reports						10
Preparation for presentations or evaluations, preparation for the final examination						10
Tutoring activity						2
Other activities						2
3.7. Total hours of individual study						94
3.8. Total hours per semester (3.4.+3.7.)						150
3.9. Number of credits						5

4. Prerequisites (where appropriate)

4.1. curriculum	Knowledge of: - Cell and Molecular Biology - Biochemistry - Histology - Embryology acquired through successful completion of the first-year courses.
4.2. proficiencies	- Correct use of the optical microscope

5. Conditions (where appropriate)

5.1. for lecture activity	- lecture hall with a minimum capacity of 125 seats, equipped with video projector, computer/laptop, and whiteboard; - course materials in ppt/pdf format, multimedia presentations, and educational videos; - compliance with university conduct rules (attendance, punctuality, appropriate behavior).
5.2. for practical class/ seminar activity	- laboratory equipped with video projection system, whiteboard, optical microscopes, teaching materials, and instruments specific to genetic investigations; - access to reagents and consumables required for practical work; - active student participation in practical activities, with strict adherence to safety and biosafety regulations.

6. Learning outcomes*

Knowledge	Skills	Responsibility and autonomy
C1. Describes the structure and organization of the human genome and identifies the main genes involved in the development of the craniofacial complex.	**A1.** Establishes the genetic diagnosis through karyotype analysis, recognizes genetic syndromes with craniofacial and oral involvement, and formulates appropriate genetic counseling.	**RA1.** Complies with safety and biosafety regulations during practical activities.
C2. Enumerates and classifies the main chromosomal abnormalities and recognizes genetic syndromes with craniofacial and oral involvement.	**A2.** Constructs the pedigree based on anamnesis, determines the mode of inheritance in monogenic diseases, and evaluates the recurrence risk for descendants.	**RA2.** Demonstrates ethical and responsible conduct in handling biological samples and genetic data.
C3. Enumerates and classifies genetic diseases.	**A3.** Solves paternity and kinship cases based on the analysis of erythrocyte and plasma genetic systems.	**RA3.** Collaborates effectively within an interdisciplinary team, assuming specific roles and responsibilities.

C4. Demonstrates knowledge of the principles and indications of genetic counseling, prenatal screening, and diagnosis, and describes their bioethical implications.	**A4.** Identifies craniofacial anthropometric landmarks used in cephalometry and calculates the main cephalometric indices.	**RA4.** Manages genetic information appropriately, respecting principles of confidentiality and bioethics.
C5. Enumerates and describes the main categories of genes involved in cancer development.	**A5.** Performs qualitative and quantitative analysis of digital-palmar dermatoglyphics.	**RA5.** Demonstrates critical thinking and scientific curiosity through formulating questions and continuously self-assessing academic performance.
C6. Recognizes the role of genetics in medical and dental practice.	**A6.** Applies the Hardy–Weinberg law and calculates gene and genotype frequencies in a population.	**RA6.** Respects the schedule and rules for teaching activities, demonstrating punctuality and academic discipline.

7. Discipline objectives (correlated with learning outcomes)

7.1. General objective	- to provide students with a solid foundation of fundamental knowledge in the field of human genetics and to integrate this knowledge into medical and dental practice, through understanding the mechanisms of heredity, recognizing genetic pathologies with craniofacial and oral involvement, and applying the principles of genetic counseling, prevention, and early diagnosis.
7.2. Specific objectives	- explain the fundamental principles of heredity and genetic variability and apply them in medical and dental practice; - use cytogenetic concepts for the analysis of clinical cases; - recognize and classify genetic syndromes with craniofacial and oral involvement and formulate appropriate genetic counseling; - apply methods of genetic analysis (pedigree construction) to identify hereditary diseases and congenital malformations; - adhere to the principles of confidentiality and bioethics in managing patients' genetic information; - develop critical thinking and self-assessment skills by integrating theoretical and practical concepts of genetics in an interdisciplinary context.

8. Contents

8.1. Lecture	**Teaching methods**	**Observations**
1. Introduction to Human Genetics: terminology, concepts, and general principles.	Interactive delivery of the course material according to the analytical syllabus, using multimedia resources and PowerPoint presentations.	
2. Structure and Functions of the DNA Molecule: primary and secondary structure, relationships between structure and function, alternative DNA conformations.		
3. The Human Genome: nuclear and mitochondrial DNA, RNA types, organization of DNA in the eukaryotic cell, euchromatin and heterochromatin.		

4. The Mitotic Chromosomes in Eukaryotes: cytogenetic analysis techniques, human karyotype, chromosomal heteromorphisms, indications for chromosomal analysis.		
5. Transmission of Hereditary Information: DNA replication.		
6. Human Chromosomes – Sex Chromosomes: sex determination and differentiation, disorders of sex development		
7. The Gene: structure, localization, classical vs. modern concepts, genes involved in craniofacial development, Human Genome Project		
8. Gene Interactions: allelic and non-allelic interactions, pleiotropy, genetic heterogeneity, phenocopy		
9. Gene Expression: transcription, genetic code, translation, regulation		
10. Genetic Diseases I: chromosomal disorders, monogenic diseases, exceptions to Mendelian inheritance.		
11. Genetic Diseases II: multifactorial and mitochondrial disorders, somatic genome diseases, cancer genetics		
12. Human Genetic Variability: sources of variability, mutations and their phenotypic consequences on oral health; genetic polymorphisms.		
13. Developmental Genetics: congenital anomalies, morphogenetic errors, teratogenesis		
14. Ecogenetics, Pharmacogenetics, and Pharmacogenomics: adverse drug reactions, genetic testing		

Recent bibliography:

1. Severin E. Taught Course. Bucuresti, 2025.
2. Cohn RD, Scherer SW, Hamosh A, editors. Thompson & Thompson Genetics and Genomics in Medicine. 9th ed. Philadelphia, PA: Elsevier; 2023.
3. Strachan T, Lucassen A. Genetics and Genomics in Medicine. 2nd Edition, CRC Press, Boca Raton London New York. ; 2022. ISBN 9781003044406.
4. Turnpenny PD, Ellard S, Cleaver R. Emery's Elements of Medical Genetics and Genomics. 16th ed. Philadelphia, PA: Elsevier; 2021. ISBN: 0702079669
5. Gil de Bona A, Karaaslan H, editors. Human Tooth and Developmental Dental Defects - Compositional and Genetic Implications [Internet]. IntechOpen; 2022. Available from: http://dx.doi.org/10.5772/intechopen.92497

8.2. Practical classes/ seminar	**Teaching methods**	**Observations**
Human Cytogenetics: **1.** Human Chromosomes and the Normal Karyotype	Interactive lectures, PowerPoint presentations, educational videos, demonstrations and practical applications, individual and group exercises, case studies, interpretation of genetic	
2. Meiosis and Human Meiotic Chromosomes		
3. Chromosomal Abnormalities: classification, mechanisms, examples		
4. Chromosomal Pathology with Craniofacial Involvement (Chromosomal Syndromes)		
5. Sex Chromosomes and Sex Chromatin		
Human Heredity: **6.** Mendelian Laws of Inheritance – Practical Applications		

7. Modes of Transmission of Monogenic Traits: Pedigree Method (construction and interpretation), Family Studies	test results, and problem-solving activities.	
8. Simple Human Traits I: Blood Group Genetics; Hemoglobin Genetic Systems		
9. Simple Human Traits II: PTC Tasting Ability; Salivary Secretor Status		
10. Quantitative Human Traits I: Cephalometry in Dental Medicine; Constitutional Types in Genetic Pathology		
11. Quantitative Human Traits II: Identity and Individuality; Dermatoglyphics in Medical Genetics		
Integration of Genetics into Medical Practice: **12.** Genetic Consultation and Counseling; Prenatal Screening and Diagnosis		
Human Population Evolution: **13.** Human Population Genetics – Hardy–Weinberg Law (applications and problems)		
14. Final Conclusions, Consultations, and Make-up session		

Recent bibliography:

1. Albu CC. Practical works in genetics [presentations in pdf and pptx format]. Bucharest; 2025.
2. Albu CC. Cytogenetics in Dentistry: From Chromosomes to Clinical Applications, Sara Book Publication, Ahmedabad, Gujarat, 2025. ISBN: 978-93-91478-98-8.
3. Cohn RD, Scherer SW, Hamosh A, editors. Thompson & Thompson Genetics and Genomics in Medicine. 9th ed. Philadelphia, PA: Elsevier; 2023.
4. McPherson RA, Pincus MR. Henry's Clinical Diagnosis and Management by Laboratory Methods. 24 ed. Elsevier - Health Sciences Division; *2022.* ISBN 9780323673204

9. Assessment

Activity type	9.1. Evaluation criteria	9.2. Evaluation methods	9.3. Percentage of final grade
9.4. Lecture	- Accuracy and depth of knowledge; - Ability to correlate and synthesize information; - Coherence of reasoning and argumentation; - Correct use of specialized terminology.	**Written examination:** multiple-choice test **Ongoing assessments during the semester:** two control tests (multiple-choice), covering course and practical topics.	**50%** **20%**
9.5. Practical classes/ seminar	- Attendance, punctuality, professional conduct, and active participation; - Level of theoretical preparation demonstrated during practical activities; - Compliance with laboratory protocols; - Correct interpretation of results obtained;	**Practical assessment:** oral examination **Ongoing assessments during the semester:** oral evaluations and formative checks; student attitude in the laboratory assessed by attendance, punctuality, conduct, preparation, practical skills, and creativity.	**20%** **10%**

	- Ability to apply theoretical knowledge in practice.		
9.5.1. Individual project (if any)	-	-	-
Minimum performance standard			
To successfully complete the course, students must demonstrate that they have acquired: Minimum theoretical knowledge (C): - C1. Describe the laws and mechanisms of human heredity and variability. - C2. Explain the genotype–phenotype relationship and the role of genetic factors in the occurrence of congenital anomalies and hereditary diseases with oral and craniofacial involvement. Minimum practical skills and competences (A): - A1. Correctly use basic laboratory methods. - A2. Accurately interpret simple results obtained from genetic investigations. Responsibility and autonomy (RA): - RA1. Comply with safety, biosafety, and ethical standards in handling biological samples and genetic data. - RA2. Demonstrate responsible professional conduct during lectures and practical activities.			