Carol Davila" University of Medicine and Pharmacy
Quality Assurance Committee

DISCIPLINE FILE

1. Data about the programme

1.1.	**"CAROL DAVILA" UNIVERSITY OF MEDICINE AND PHARMACY**
1.2.	**FACULTY OF MEDICINE**
1.3.	**DEPARTMENT 7 PEDIATRICS**
1.4.	**DISCIPLINE MEDICAL GENETICS**
1.5.	**DOMAIN OF STUDY: HEALTH – Sectorally regulated within the European Union**
1.6.	**STUDY CYCLE: LICENCE**
1.7.	**STUDY PROGRAME: MEDICINE – ENGLISH MODULE**

2.2. Data about discipline

2.1.	**Name of the discpline in the educational plan: EPIGENETICS**				
2.2.	**Discipline code:**				
2.3.	**Discipline type (FD/SD/CD): CD**				
2.4.	**Discipline regimen (MD/OPD/): OPD**				
2.5.	**The holder of the course activities** **Assoc.Prof. Viorica Elena Radoi**				
2.6.	**The holder of the seminar activities :** **Assist.Prof. Monica Stoian**				
2.7. Year of study	**III**	**2.8. Semester**	**I**	**2.9. Type of evaluation (E/C)**	**E**

2. **Total estimated time (hours/semester of didactic activity an self preparation/study**

I. Academic training (teaching, practical application, assessment)						
3.1. Nr hours/week	**4**	**From which:**	**3.2. lecture**	**2**	**3.3. seminary/ laboratory**	**2**
3.4. Total hours of educational plan	**56**	**From which:**	**3.5. lecture**	**28**	**3.6. seminary/ laboratory**	**28**
Evaluation (nr. of hours) :						
II. Self preparation/study						
Time allocation						**56 hours**
Study of course materials, textbooks, books, study of the recommended minimal bibliography						20
Additional research in the library, research through the internet						10
Performing specific activities for preparing projects, laboratories, elaborating reviews or other tasks						5
Specific preparation activities for projects, laboratory work, assignments, and reports						15
Tutoring						3
Other activities						3
3.7. Total individual study hours						56

3.9. Total hours per semester (3.4.+ 3.7.)	112
3.10. Number of credits	

3. Preconditions (where applicable)

4.1. of curriculum	Medical Genetics
4.2. of competences	

4. Conditions (where applicable)

5.1. to conduct the lecture	PowerPoint presentations, use of multimedia systems, and projector
5.2. to conduct the seminar / laboratory	Equipped with the necessary apparatus for conducting practical activities

6. Learning outcomes

Knowledge	Skills	Responsibility and autonomy
Understanding the fundamental principles of the discipline, including the definition of epigenetics and its distinction from classical genetics, as well as the essential mechanisms regulating gene expression. Students will correlate these mechanisms with normal biological processes and analyze how environmental factors can influence epigenetic modifications. The course will facilitate comprehension of the clinical implications of epigenetics, emphasizing its role in the pathogenesis of diseases such as cancer, autoimmune, or neurodegenerative disorders. It will also introduce basic concepts of epigenetic therapies and their application in personalized medicine. Additionally, students will become familiar	Through participation in the Epigenetics course, students will develop the ability to correctly interpret experimental and clinical data of epigenetic relevance, analyze and correlate results from specialized studies with their pathophysiological implications, and critically evaluate the conclusions. They will acquire integrative and multidisciplinary thinking skills, linking epigenetic concepts with notions from genetics, molecular biology, physiology, and pathology, with direct applicability in personalized medicine. Students will also learn to use specialized scientific literature, identifying, selecting, and analyzing relevant international sources and formulating their own evidence-based conclusions. The course will stimulate an investigative attitude toward biomedical research, encouraging the identification of practically applicable study directions and the formulation of scientific questions and research methods. Furthermore, scientific communication skills will be enhanced, enabling students to present and argue complex topics in clear and precise language, while maintaining a solid ethical conduct in interpreting and using epigenetic	Upon completing the Epigenetics course, students will achieve a higher level of responsibility and autonomy in managing scientific information and medical practice related to epigenetic mechanisms. They will be capable of assuming their role as informed future professionals who understand the impact of epigenetic modifications on health and disease, demonstrating discernment in applying acquired knowledge in clinical contexts. Students will show initiative in independently deepening their understanding of scientific literature and continuously updating their knowledge to adapt to the rapid progress in the field. They will also display ethical and responsible conduct in using epigenetic data for diagnosis, prevention, or research, adhering to principles of confidentiality, scientific integrity, and respect for patients. The autonomy acquired will allow integration of epigenetic knowledge into medical reasoning and active participation in interdisciplinary teams, contributing to informed decision-making for patient benefit.

with the main analytical methods used in epigenetics, such as bisulfite sequencing, ChIP-Seq, and non-coding RNA analysis, developing the ability to critically interpret results from recent studies. Finally, the course will help students acquire an appropriate scientific vocabulary and the ability to use specialized terminology accurately and critically analyze relevant scientific literature.	data, in compliance with confidentiality and scientific integrity principles.	

7. Course objectives (aligned with the learning outcomes)

7.1. General objective	To provide students with a comprehensive understanding of the fundamental principles of epigenetics. To explore the molecular mechanisms that regulate gene expression without altering DNA sequences. To examine the impact of epigenetic modifications on development, physiology, and disease. To develop students' ability to critically analyze current research and experimental approaches in epigenetics. To foster an understanding of the clinical and therapeutic applications of epigenetic knowledge.
7.2. Specific objective	To identify and describe the main epigenetic mechanisms, including DNA methylation, histone modifications, and non-coding RNAs. To explain how epigenetic modifications regulate gene expression in normal and pathological conditions. To analyze experimental methods used to study epigenetic changes. To evaluate the role of epigenetics in development, aging, and disease. To interpret scientific literature and case studies related to epigenetic research. To apply epigenetic concepts in designing potential therapeutic strategies.

8. Contents

8.1. Lecture	**Teaching methods**	**Observations**

Introduction to Epigenetics		**2h**
Epigenetic Mechanisms		
The Epigenome and Methods of Study		
Developmental Epigenetics		
Environmental Epigenetics		
Epigenetics in Cancer		
Epigenetics of Neurological and Psychiatric Disorders		
Epigenetics of Metabolic and Cardiovascular Diseases		
Epigenetics and the Immune System		
Epigenetics in Patient Diagnosis		
Epigenetic Therapy		
Nutri-Epigenetics and Lifestyle		
Emerging Technologies – Epigenetic CRISPR, AI, Big Data		
Epigenetics in the Medicine of the Future – Precision Medicine, Ethical and Social Implications		
Recent Bibliography		
8.2. Laboratory/ practical lesson	**Teaching methods**	**Observations**
1. Interactive discussion: genetics vs. epigenetics	PPTX+open discussions	2h
2.Simulation: interpretation of DNA methylation data	PPTX+open discussions	
3. Student presentations on histone modifications	PPTX+open discussions	
4. Debate on ethical and social implications of epigenetics in medicine	PPTX+open discussions	
5. Individual reports on epigenetics and environmental factors	PPTX+open discussions	
6. Discussion on methylation and cancer	PPTX+open discussions	
7. Discussion on methylation and neurological/psychiatric diseases	PPTX+open discussions	
8. Discussion on methylation and metabolic/cardiovascular diseases	PPTX+open discussions	
9. Discussion on methylation and autoimmune diseases	PPTX+open discussions	

10. Discussion: epigenetics in prenatal period	PPTX+open discussions	
11. Debate: “Are we ready for epigenetic therapy?”	PPTX+open discussions	
12–13. Case studies on imprinting disorders	PPTX+open discussions	
14.Final Evaluation		

Recent bibligraphy

- "Epigenetics" by S.C.P. Williams
- "Genes and Signals" by M. Ptashne and A. Gann
- "A Genetic Switch" by M. Ptashne
- "Epigenetics" - {Link: Centers for Disease Control and Prevention}

- **Gene expression and regulation:**
  - Takahashi K and Yamanaka S, "Induction of pluripotent stem cells from mouse embryonic and adult fibroblast cultures by defined factors," 2006
  - Graf T and Enver T, "Forcing cells to change lineages," 2009
  - "Genes and Signals" by M. Ptashne and A. Gann
  - Henikoff S and Shilatifard A, "Histone modification: cause or cog?" 2012
  - Grunstein M, "Histone function in transcription," 2008
- **Epigenetic mechanisms and chromatin structure:**
  - "Genetics, Epigenetic Mechanism" - {Link: National Institutes of Health}
  - "Epigenetics - World Cancer Report" - {Link: National Institutes of Health}
  - "Epigenetics" by C. H. Waddington

9. Evaluation

Activity type	**9.1. Evaluation criteria**	**9.2. Evaluation methods**	**9.3. Percentage in the final grade**
9.4. Lecture		Exam with 30 questions, each having a single choise answer	80%
9.5. Seminary/ practical activity			
9.5.1. Individual project (if applicable	-	-Projects	20%
9.6. Minimum performance standard 5			