

**DISCIPLINE SHEET**

**Name of the discipline: Molecular Biology**

**Owner of the course activities: Gabriela Anton**

The year of studies:

Number of hours per week/Check/Credits		
Course	Form of examination	Credits
2 hours	Exam	15

**A. OBJECTIVES OF THE COURSE** (The objectives are formulated in terms of professional skills)

General objective of the discipline	Acquisition of general, theoretical and practical knowledge regarding the molecular bases of biological activity
Specific objectives:	Acquiring some domain-specific notions (gene expression and its regulation) Acquiring some experimental approaches used in molecular biology Understanding the molecular basis of disease Possibility of genetic manipulation in therapy

**B. TERMS** (where applicable)

For conducting the course	
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**C. SPECIFIC ACQUIRED COMPETENCED** (Regards the competencies provided by the program of which discipline is a part)

Professional skills	Correlation of acquired theoretical and practical skills to design research studies Familiarization with specialized databases for fundamental and applied research in the field of medicine Developing the skills to independently use the gained knowledge for interdisciplinary approaches used to solve PhD topics The ability to critically interpret research results The ability to understand and assimilate new informations
Transversal skills	Ability to work independently and in a team Abilities to write academic reports and scientific papers Development of professional values and ethics Personal and professional continuous training

**D. CONTENT OF THE COURSEȚINUTUL DISCIPLINEI**

*a) Course*

Chapter	Content	No. hours
1. Control of gene expression	The structure, functions and expression of genes. Nucleic acids-proteins relationship. Regulatory components. Evaluation of gene expression	4
2. Nucleic acids hybridization	Dot/Southern/Northern blot, FISH. Types of molecular probes and their synthesis, the stringency of hybridization reactions,	2

	hybrids detection. Applications in research and clinical laboratory	
3. PCR ( <i>Polymerase Chain Reaction</i> )	PCR, components, primers design; <i>one step</i> si <i>two step</i> RT-PCR. Real-time PCR: formats, quantification methods, genotyping by melting curve analysis. Multiplex PCR. Applications in medical research and clinical laboratory	4
4. Proteome analysis	Western blot, SELDI-TOF-MS, protein microarray: principles, advantages and disadvantages, applications	4
5. Secquencing	DNA sequencing: Sanger method, limits, applications. NGS ( <i>Next-Generation Sequencing</i> ): method, steps, types ( <i>whole genome sequencing, whole exome, targeted pannels</i> ), platforms, limits. RNAseq. Applications.	4
6 Epigenetics	Epigenetic mechanisms of gene expression regulation: DNA methylation, post-translational modifications of histones, non-coding RNAs. Investigation methods, potential biomarkers in pathology. Epigenetic therapies.	6
7. Recombinant DNA technology (notions)	Vectors (autonomous replicons): Characteristics, types; insert: obtaining methods. Enzymes used in recombinant DNA technology. Selection of recombinants. Applications of DNA technology, limits.	4
8. Therapeutic strategies based on the use of viruses	Viral vectors and applications in the medical field. Viral oncolysis, virus-like particles, virosomes: applications and therapeutic limits.	2
<b>Total hours</b>		<b>30</b>

**E. EVALUATION** ( The methods, forms of evaluation and their weighting in establishing the final grade are specified. The minimum performance standards, related to competencies defined in point A. Objectives of the discipline, are indicated)

Type of activity	Evaluation criterias	Methods of evaluation	Weight of the final grade
Course	-Accuracy and quality of presentation of the exam subjects -Acquiring the course knowledge	Check by written exam	
Rezultatele evaluării disciplinei se exprimă prin următoarele calificative: „Foarte bine”; „Bine”; „Satisfăcător”; „Nesatisfăcător”. Calificativele „Foarte bine”, „Bine” și „Satisfăcător” permit studentului-doctorand să obțină creditele.			

#### F. METHODOLOGICAL REFERENCES

Lecture and dialogue. Use of modern teaching aids.

#### G. CORROBORATION OF THE COURSE CONTENT WITH THE EXPECTATIONS OF THE REPRESENTATIVES OF THE EPISTEMIC COMUNITY, PROFFESIONAL ASSOCIATIONS AND REPRESENTATIVE EMPLOYERS FROM THE FIELD RELATED TO THE PROGRAM

- The discipline provides fundamental and practical knowledge regarding the diagnosis and treatment of diseases, including gene therapy.
- The discipline provides PhD student the basic elements for the experimental parts of the thesis

#### H. BIBLIOGRAPHY

1. Frank Lee, Molecular Biology Web Book, Publisher: Web Books Publishing 2009
2. Molecular Biology of the Cell, 4th Edition; Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter; Publisher : Garland Science; 4th edition (March 1, 2002), ISBN-10: 0815332181, ISBN-13: 978-0815332183
3. Patricia Hernandez-Rodriguez, Polymerase Chain Reaction by Publisher: InTech 2012, ISBN-13: 9789535106128
4. Georgescu SE, Dudu A, Costache M, Tehnici de biologie moleculară. Principii și aplicații practice, 2016, ISBN: 978-606-16-0729-7
5. Anton G, Repanovici R (2003) - *Tehnologia clonarii genelor*, Ed.Academiei , ISBN 973-27-0989-8

**Course owner**

**Doctoral School Director**

**PhD Gabriela Anton, CS I**

