

DISCIPLINE SHEET**ACADEMIC YEAR****2022- 2023****1. DATA ABOUT THE STUDY PROGRAM**

1.1 Institution of higher education	UNIVERSITY OF MEDICINE AND PHARMACY OF CRAIOVA
1.2 Faculty	MEDICINE
1.3 Department	2
1.4 Study Domain	HEALTH
1.5 Study cycle	LICENCE
1.6 Study program/ Qualification	Medicine

2. DATA ABOUT THE DISCIPLINE

2.1 DISCIPLINE NAME	BIOPHYSICS		
2.2. Discipline code	MED1103		
2.3 The holder of course activities	Osiac Eugen / Anoaica Paul Gabriel /Buzatu Ștefan		
2.4 The holder of seminar activities	Osiac Eugen / Anoaica Paul Gabriel /Buzatu Ștefan / Drăcea Sanda Amelia/Costache Andrei		
2.5.Academic degree	Prof./Assoc. Prof./Lecturer/Assistant Prof.		
2.6. Employment (base norm/associate)	Base norm		
2.7. Year of study	I	2.8. Semester	I
2.9. Course type (content)			CFD
2.10. Regime of discipline (compulsoriness)			

3. THE ESTIMATED TOTAL TIME (teaching hours per semester)

3.1 Number of hours per week	4	3.2 From which course	2	3.3 seminary/laboratory	2
3.4 Total hours in curriculum	56	3.5 From which course	28	3.6 seminary/laboratory	28
Time found distribution (hours)					
Study from manual, course support, bibliography, and notes					23
Additional documentation in the library, specialized electronic platforms and, on the field					16
Training seminars / labs, homework, reports, portfolios, and essays					14
Tutoring					2
Examinations					6
Other activities, counselling, student scientific programs					8
3.7 Total hours of individual study	69				
3.9 Total hours per semester	125				
3.10 Number of credits	5				

4. PREREQUISITES (where appropriate)

4.1 curriculum	
4.2 competency	

5. CONDITIONS (where appropriate)

5.1. of course deployment	Lecture Hall with projector / online
5.2. of seminary/ lab deployment	Biophysics Lab / online

6. SPECIFIC COMPETENCES ACCRUED

PROFESSIONAL COMPETENCES	C1. Identification the disease status and establishing the correct diagnosis. <ul style="list-style-type: none"> • Knowledge of physical concepts, theories and principles (mechanics, optics, electricity and magnetism, atomic and nuclear) used in relation to the functioning of living matter • Understanding how medical investigation methods can be performed with the help of physical principles and methods • Application of physical principles and methods to the description of the correct dynamics of the human body
	C5. To initiate and conduct a scientific research activity and / or a training activity inside the field of competence <ul style="list-style-type: none"> • Planning of physical and biophysical experiments and perform correct analysis of experimental data • Evaluation and integration of experimental data obtained by various physical methods specific to the medical field

TRANSVERSAL COMPETENCES	<p>CT1. Autonomy and responsibility</p> <ul style="list-style-type: none"> the acquisition of moral reference points, the formation of professional and civic attitudes, that will allow to the students to be fair, honest, helpful, understanding, nonconflictual, to cooperate and to be comprehensive in the face of suffering, to be available to help people, and to be interested in community development; to know, to respect and to contribute to the development of moral values and professional ethics; to learn how to recognize the problems when they arise, and provide solutions for solving them. <p>CT2. Social interaction</p> <ul style="list-style-type: none"> to recognize and to have respect for diversity and multiculturalism; to have or to learn how to develop teamwork skills; to communicate orally and in writing the manner of work requirements, the obtained results, to consult with the team; to engage themselves in voluntary activities, to know the essential problems of the community. <p>CT3. Personal and professional development</p> <ul style="list-style-type: none"> to have opening to lifelong learning, to be aware for self-study as a basis of personal autonomy and professional development; to derive the optimum and creative potential in their own collective activities; to know how to use information and communication technologies.
--------------------------------	--

7. DISCIPLINE OBJECTIVES (based on the grid of specific competences acquired)

7.1 The general objective of the discipline	Acquisition, application and understanding of physical processes and phenomena related to biological systems, mainly in the human body; proper use of principles and physical quantities for an efficient and safe handling of medical equipment and medical instrumentation by specialized staff during investigations and analysis in the health unit
7.2 The specific objectives of the discipline	<p>Upon completion of discipline student will be able to acquire:</p> <p>COGNITIVE ABILITIES, which will allow :</p> <ul style="list-style-type: none"> - Understand, explain, differentiate and analyze various phenomena and principles of physics (mechanics, optics, electricity and magnetism, atomic and nuclear) in relation to the functioning of living matter. - To analyze and give a correct interpretation to the biophysical and physical phenomena occurring in the regulation and use of equipments in medical practice - To compare and evaluate imaging methods in terms of physical interactions <p>PRACTICAL SKILLS</p> <ul style="list-style-type: none"> - Carry out practical work that corresponds with the use of physical principles in clinical laboratories, for medical investigation and treatment of diseases - To plan and carry out experimental work in biophysics as team - Explain and interpret analytical results; - Assess and integrate experimental data obtained by various methods specific to medical field <p>ATTITUDES</p> <ul style="list-style-type: none"> - To be open, to acquiring moral guidelines, training of professional and civic attitudes that enable students to be fair, honest, non-confrontational, cooperative and understanding in the face of suffering, available to help people interested in the developer community; - Learn to recognize when a problem arises and provide responsible solutions to solve them. - Recognize and have respect for diversity and multiculturalism; - Have or learn to develop teamwork skills; - To be open to lifelong learning - To be open to teamwork principles, - To understand the need for individual study as the basis of personal autonomy and professional development; - Exploit their potential to the optimum and creative collective activities; - Know how to use information and communication technology;

8. CONTENTS

8.1 Course (content units)	Hours
1. Importance of biophysics	1
2. Elements of atomic and molecular physics (structure, molecular interactions and bounds, applications in biophysics)	3
3. Elements of thermodynamics of living systems (principles, thermodynamic functions, thermodynamics of biological processes, metabolism, applications)	3
4. Dispersive systems (water, solutions: molecular structure, properties, applications)	1

5. Elements of biomechanics (forces, hydrodynamics, hemodynamics, acoustic, mechanical waves, applications in medicine and biophysics)	2
6. Biological membrane (organization and functions, structure, membrane models, mechanisms and communication of intercellular systems, membrane transport processes)	3
7. Biophysics of complex systems: receptors and analyzers (hearing and visual)	2
8. Bioelectricity and biomagnetism, therapeutic applications, properties of impulse transmission in nerve and muscle cells	3
9. Lasers and application in medicine	1
10. Ionizing and non-ionizing radiation: characteristics, interaction with living tissue, radiation protection, medical applications)	3
11. Physical principles of medical imaging (radiography, ultrasound, CT, MRI, scintigraphy, SPECT, PET)	6
TOTAL	28
BIBLIOGRAPHY	
1. P.G.Anoaica, S. Buzatu, A. Costache, A. Dracea, E.Osiac Biofizică, Editura Medicală Universitară 2021	
2. Paul Davidovits , Physics in Biology and Medicine, Academic Press, 2018	
3. Irving P. Herman , Physics of the human body, Springer, 2016	
4. R. Glaser , Biophysics, Springer Verlag Berlin 2012	
8.2 Practical work (topics / themes)	
1. Safety regulation in the laboratory, physical quantities, units	2
2. Measurements, experimental errors, statistical interpretation of experimental data	2
3. Thermodynamic measurements (specific heat, latent heat, heat capacity)	2
4. Determination of surface tension coefficient. Surfactant solutions	2
5. Viscosimeters (principles, methods, measurements)	2
6. Liquids refractive index measurements by refractometer	2
7. Determination of an optically active solution with polarimeter	3
8. Study of the osmotic pressure	2
9. Optical microscopy, laser radiation characteristics	3
10. Spectral analysis (principles, types, applications in medicine and biology)	2
11. Bioelectrical measurements (potentials, electrolysis, EKG principles)	2
12. Ultrasounds (propagation, reflection, attenuation coefficient)	4
TOTAL	28
BIBLIOGRAPHY	
1. P.G.Anoaica, S. Buzatu, A. Costache, A. Dracea, E.Osiac Biofizică, Editura Medicală Universitară 2021	
2. Paul Davidovits , Physics in Biology and Medicine, Academic Press, 2018	
3. Irving P. Herman , Physics of the human body, Springer, 2016	
4. R. Glaser , Biophysics, Springer Verlag Berlin 2012	

9. CORROBORATING THE DISCIPLINE CONTENT WITH THE EXPECTATIONS OF EPISTEMIC COMMUNITY REPRESENTATIVES, PROFESSIONAL ASSOCIATIONS AND EMPLOYEE REPRESENTATIVES RELATING TO THIS PROGRAM

<ul style="list-style-type: none"> ▪ Biophysics and medical physics is a fundamental discipline ,mandatory for a student in his preparation for becoming a doctor. ▪ The knowledges, practical skills and the attitudes learned on this discipline are offering the basics of the physical processes applied to biological systems that will be studied in other disciplines and it is the basis for comprehension, understanding and learning of many medical attitude regarding the diagnosis and the recovery processes.

10. METHODOLOGICAL LANDMARKS

Types of activity	<p>Teaching Techniques / learning materials and resources: lectures, interactive group work, learning problems / projects etc. Lectures, analysis, synthesis, comparison, generalization, learning in order to achieve interactive feedback, explaining the problems highlighted by students, consultations, multimedia presentations.</p> <p>In case of special situations (alert states, emergency states, other types of situations that limit the physical presence of students) the activity can be carried out online using computer platforms approved by the faculty / university. The online education process will be adapted accordingly to ensure the fulfilment of all the objectives provided in the discipline sheet.</p>
-------------------	--

Course	lectures, interactive group work, learning problems / for online activities lectures will be adapted using computer platform of the university
Practical work	experiments, interactive group work, learning problems / for online activities practical work will be adapted using computer platform of the university including video description of the experiments
Individual study	Before each lecture/practical work

11. RECOVERY PROGRAM					
Absences recoveries	No. absences that can recover	Location of deployment	Period	In charge	Scheduling of topics
	3	Biophysics lab / online	Last two weeks	Practical work holder	According to the internal schedule
Schedule consultations / Students' Scientific Program	2hours/week	Biophysics lab / online	Last two weeks	Practical work holder	According to the internal schedule
Program for students poorly trained	4 hours/sem.	Biophysics lab / online	Last two weeks	Practical work holder	According to the internal schedule
12. ASSESSMENT					
Activity	Types of assesment		Method of evaluation	Percentage from final grade	
Lecture	Formative assesment during the semester Summative assesment during the exam		Written exam/ multichoice using online platform	75%	
Practical work	Formative assesment during the semester Periodic assesment during the semester, Summative assesment in the last week of the semester		During the last week of the semester (oral) / using online platform	15%	
Periodic assesment					
Assesment of individual activities				10%	
Minimum performance standard				at least 50% for each component of the evaluation	
13. GUIDANCE AND COUNSELLING PROGRAMS					
Professional guidance and counselling programs (2 hours/monthly)					
Scheduling the hours			Location	In charge	
Every first Friday of the month			Biophysics lab	Lecture holders	

Endorsement date in the department: 27.09.2022

Department Director,
Prof. Eugen OSIAC

Coordinator of study program,
Prof. Marius Eugen Ciurea

Discipline holder,
Prof. Eugen OSIAC