**ACADEMIC DISCIPLINE OVERVIEW**

1. **Program data**

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| 1.1. Higher education institution | Grigore T. Popa University of Medicine and Pharmacy Iasi |
| 1.2. Faculty | Medical Bioengineering |
| 1.3. Department | Biomedical Sciences |
| 1.4. Field of study | Health |
| 1.5. The cycle of studies | Bachelor |
| 1.6. Study program / qualification | Balneo-physiokinetotherapy and rehabilitation – english language / Physiokinetotherapist |

**2. Discipline data**

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| 2.1. Name of the discipline / Code | | | | **Physiology. Pathophysiology** | | **RE1106** |
| 2.2. Teaching staff in charge with lectures | | | | **Associate Professor Constantin Munteanu, PhD**  **Lecturer Roxana Covali, MD, PhD** | | |
| 2.3. Teaching staff in charge with practical activities | | | | **Associate Professor Constantin Munteanu, PhD** | | |
| 2.4. Year of study | **I** | 2.5. Semester | **1** | 2.6. The type of assessment | **Exam, E1** | |
| 2.7. Discipline type | | **Mandatory** | | **Fundamental discipline** | | |

**3. Estimated total time (hours/semester of didactic activity)**

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| 3.1. Number of hours / week: | | 3.2. Courses number of hours / week | | 3.3. Seminars / practical classes  number of hours / week | | | |
| Semester 1 | **5** | **3** | | **2** | | | |
| Semester 2 |  |  | |  | | | |
| 3.4. Total number of learning hours: | **70** | 3.5. Of which: Courses | **42** | 3.6. Of which: Seminars / practical classes: | | | **28** |
| 3.7. Distribution of individual study time: | | | | | Hours sem. 1 | Hours sem. 2 | |
| Study time using course book materials, bibliography and hand notes | | | | | 25 |  | |
| Supplementary documentation in the library, using specialised platforms via internet and by field work | | | | | 15 |  | |
| Preparation time for seminars / practical classes, study themes, reviews, portfolio and essays | | | | | 25 |  | |
| Tutorship | | | | | 4 |  | |
| Examinations | | | | | 4 |  | |
| Other activities | | | | | 15 |  | |
| Total hours of individual study (*without examinations*) | | | | | **80** |  | |
| 3.8. Total hours per semester | | | | | **150** |  | |
| 3.9. Number of credits | | | | | **6** |  | |

**4. Preconditions (where applicable)**

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| 4.1. of curriculum | - |
| 4.2. of competences | - |

5. **Conditions (where applicable)**

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| 5.1. for lectures | Video logistic support |
| 5.2. for seminars / practical classes | Students need to wear protective equipment (white coats) |

**6. Specific competences acquired**

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| **Professional competencies** | **C1.1** | Description of concepts, theories, and fundamental terms of the human body’s physiological and pathological mechanism; identification of symptoms, clinical signs, and of the appropriate kinesiotherapeutic methods and techniques. |
| **C1.2** | Formulation of hypotheses and operationalization of key concepts in order to explain syndromes and/or diseases. Description of the properties, fundamental mechanisms and functional interrelationships that are established between the subsystems that make up the human body. |
| **C4.1** | Description of electrophysiology techniques, application parameters, indications, contraindications, the way the equipment that supplies the electric current and the forms of derived energy works. |
| **C5.4** | Critical interpretation of constantly updated functional and quality of life assessment scores according to international standards. Description of the mechanisms and ways of adapting the human body to the various demands from the internal and external environment. |

7**.** **Objectives of the study discipline (according to the grid of specific competences acquired)**

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| 7.1. General objective | - Understanding the functional algorithms and the mechanisms of the regulation of the human body systems and on a molecular, cellular, and tissue level, considering the independence and the interdependence of the body’s systems. |
| 7.2. Specific objectives | - the study of processes and normal constants of the superior organized biological structures, starting with the cells and cellular aggregates from the different tissue types and ending with the human body, the most evolve biological entity.  - acquisition of methods, means, and models for studying and research, both theoretical and experimental.  - defining, measuring, and interpreting functional parameters on different levels: molecule, tissue, system, and entire body. |

**8. Contents**

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| **8.1. Lectures** | | **Teaching methods** | **Observations** |
| 1 | Elements of cellular and molecular physiology. Electrical membrane phenomena. Ionic channels. | Video presentations, interactive discussions | 2 hours |
| 2 | Membrane action and resting potential. Primary and secondary messengers. | Video presentations, interactive discussions | 2 hours |
| 3 | Movement, posture, and locomotor function development. Morpho-physiological elements of bone and joint. Skeletal system functions. Articular statics and dynamics | Video presentations, interactive discussions | 2 hours |
| 4 | The properties of the muscle fiber. Permeability and electrical polarity. Excitability. Contractility. Elasticity. Tonicity. | Video presentations, interactive discussions | 2 hours |
| 5 | Specifics of muscle contraction in the body. Types of muscle contraction. Muscle strength. Muscle fatigue. | Video presentations, interactive discussions | 2 hours |
| 6 | Muscle metabolism. Oxygen consumption and energy substrate. | Video presentations, interactive discussions | 2 hours |
| 7 | Trophic muscle activity. Motor activity, motor abilities, dynamic stereotype. | Video presentations, interactive discussions | 2 hours |
| 8 | Physiology of the peripheric nervous system. The reflex action and the physiology of the reflexes. Myotatic reflexes. | Video presentations, interactive discussions | 2 hours |
| 9 | Physiology of the central nervous system. Sleep and wake, praxic cortical activity. | Video presentations, interactive discussions | 2 hours |
| 10 | Properties of the myocardium. Electrical activity at the heart level. | Video presentations, interactive discussions | 2 hours |
| 11 | Mechanical activity of the heart. Cardiac debit and its physiological variations.Regulation of heart activity | Video presentations, interactive discussions | 2 hours |
| 12 | Elements of vascular physiology | Video presentations, interactive discussions | 2 hours |
| 13 | Pulmonary ventilation. Haematosis. | Video presentations, interactive discussions | 2 hours |
| 14 | Transport of respiratory gases. Tissue and cellular breathing. Respiratory regulation. Phonation. | Video presentations, interactive discussions | 2 hours |
| 1 | Physiopathology of cell alteration: necrosis, steatosis, atrophy, amyloid degeneration, calcifications | Interactive lecture, discussions, explanations | 2 hours |
| 2 | Physiopathology of inflammation: hyperemia, exsudation, white cell migration, chronic inflammation, organizing | Interactive lecture, discussions, explanations | 2 hours |
| 3 | Physiopathology of acute infections: body protective barrier, bacteremia, septicemia. Physiopathology of chronic infection: cell alterations induced by bacteria and viruses | Interactive lecture, discussions, explanations | 2 hours |
| 4 | Physiopathology of the compact bone. Physiopathology of the cancellous bone. Physiopathology of ligaments and tendons | Interactive lecture, discussions, explanations | 2 hours |
| 5 | Physiopathology of the skeletal muscle and cardiac muscle. Physiopathology of circulatory changes: thrombosis, embolism, infarction | Interactive lecture, discussions, explanations | 2 hours |
| 6 | Physiopathology of the peripheral nerves. Physiopathology of healing in striated muscles, peripheral nerves, central nervous system neurons, bones, fractures | Interactive lecture, discussions, explanations | 2 hours |
| 7 | Physiopathology of physical effort | Interactive lecture, discussions, explanations | 2 hours |

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| **8.2. Practical activities - practical class** | | **Teaching methods** | **Observations** |
| 1 | Elements of molecular and cellular physiology; neuromuscular synapses. | Practical demonstration,  Interactive discussions | 2 hours |
| 2 | Stages of the excitation-contraction mechanism; typology of muscular activity. | Practical demonstration,  Interactive discussions | 2 hours |
| 3 | Striated muscle properties: elasticity, firmness, contractility, excitability. | Practical demonstration,  Interactive discussions | 2 hours |
| 4 | The working muscle. muscle fatigue. Dynamometry. | Practical demonstration,  Interactive discussions | 2 hours |
| 5 | Evaluation of muscular labor. Ergometry. | Practical demonstration,  Interactive discussions | 2 hours |
| 6 | Neuro-muscular physiology component. | Practical demonstration,  Interactive discussions | 2 hours |
| 7 | Physiology of the peripheric nervous system. The reflex action and the physiology of the reflexes. Myotatic reflexes. | Practical demonstration,  Interactive discussions | 2 hours |
| 8 | Physiology of the central nervous system. Sleep and wake activity. | Practical demonstration,  Interactive discussions | 2 hours |
| 9 | Superior nervous activity; psychological and psychometric evaluation | Practical demonstration,  Interactive discussions | 2 hours |
| 10 | Electrical activity at heart level. Electrocardiography. Analysis of the EKG. | Practical demonstration,  Interactive discussions | 2 hours |
| 11 | Phonic activity of the heart. Analysis and interpretation of the phonocardiogram. | Practical demonstration,  Interactive discussions | 2 hours |
| 12 | Measuring blood pressure directly and indirectly | Practical demonstration,  Interactive discussions | 2 hours |
| 13 | Mechanics of human ventilation: volumes and pulmonary capacities. | Practical demonstration,  Interactive discussions | 2 hours |
| 14 | Ventilatory debits, flux-volume pressure-volume curves | Practical demonstration,  Interactive discussions | 2 hours |

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| **8.3. Bibliography:** |
| ***Mandatory:*** |
| Course materials and practical works posted on the e-learning platform of UMF IasiYuan, J., Barret, K. Ganong’s Review of Medical Physiology, Elsevier, 2019.Guyton A. G., Hall, J.E. , Hall, M.E. Medical Physiology. Elsevier, 2021.Kapandji, A.I. Physiology of the limbs. Jessica Kingsley Publishers, 2019.Huether S, McCance KL. Understanding Pathophysiology. Mosby, 6th Edition, 1160 pages, 2017Amadon, A.M. Atlas of physiology and anatomy of the human body, Legare Street PR, 2022 |
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| ***Elective:*** |
| 1. Rhoades, R. Medical physiology. Lipincott Williams and Wilkins, 2017. 2. Handbook of practical physiology-S.Slatineanu- Editura "Gr. T. Popa" UMF Iaşi, 2012 3. Physiopathologie, Magda Bădescu, Oana Bădulescu, Codruţa Bădescu, Editura "Gr. T. Popa" UMF Iaşi, 2015 4. Covali, R. Lucrari practice de Fiziopatologie, Editura Stef, Iasi, 2018. |

**9. *Correlation of the discipline contents with the expectations of the epistemic community, professional associations, and representative employers from the afferent program field***

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| Knowledge and abilities are established as didactic objectives and specified as such in the analytic programs that are revised yearly. After their analysis by the study discipline staff, these are discussed and approved in the Curricular Committee, towards curricular harmonization among the various study disciplines. Along this entire process systematic evaluation is performed, directly if possible, regarding the correspondence of the contents to the expectations of the academic community and of the representatives of the social community, professional associations, and employers. |

**10. Evaluation**

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| Type of activity | Assessment criteria | Evaluation methods | Contribution to the final grade |
| Lectures | Acquiring theoretical notions and presented in the course | Written exam.  MCQ Examination | 80 % |
| Practical activities | Activities carried out in laboratory and conducted quality essays. | Colloquium practical activity | Admitted/ Rejected |
| Individual study | Preparation time for seminars / practical classes, study themes, reviews, portfolio and essays.  Individual study using coursebook materials, bibliography and hand notes, documentation in the library, using specialised platforms via internet and by field work. | Tests during the semester | 20 % |
| Minimal performance standard:   * Knowing the basic notions of physiological mechanisms of the human body * Knowing the basic notions of muscle and bone pathology | | | |

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| Date | Holder of course / signature, | Holder of practical activities / signature, |
| 13.09.2024 | Associate Professor Constantin Munteanu, PhD    Lecturer Roxana Covali, MD, PhD | Associate Professor Constantin Munteanu, PhD |

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| Date of approval in the Department Council/Teaching Council, | | |
| 19.09.2024 |  | Department director / signature, |
|  |  | Associate Professor Daniela-Viorelia Matei, MD, PhD |