**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 | **Ergophysiology** | **RE1115** |
| 2.2. Teaching staff in charge with lectures | **Associate Professor Daniela-Viorelia Matei, MD, PhD** |
| 2.3. Teaching staff in charge with practical activities | **Assistant Professor Onita Cristiana, PhD candidate** |
| 2.4. Year of study | **I** | 2.5. Semester | **2** | 2.6. The type of assessment | **Exam, E2** |
| 2.7. Discipline type | **Mandatory** | **Specialty 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 |  |  |  |
| Semester 2 | **2** | **1** | **1** |
| 3.4. Total number of learning hours: | **28** | 3.5. Of which: Courses | **14** | 3.6. Of which: Seminars / practical classes: | **14** |
| 3.7. Distribution of individual study time: | Hours sem. 1 | Hours sem. 2 |
| Study time using course book materials, bibliography and hand notes |  | 14 |
| Supplementary documentation in the library, using specialised platforms via internet and by field work |  | 4 |
| Preparation time for seminars / practical classes, study themes, reviews, portfolio and essays |  | 4 |
| Tutorship |  | 2 |
| Examinations |  | 2 |
| Other activities |  |  |
| Total hours of individual study (*without examinations*) |  | **22** |
| 3.8. Total hours per semester |  | **50** |
| 3.9. Number of credits |  | **2** |

**4. Preconditions (where applicable)**

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| 4.1. of curriculum | Physiology, Biochemistry, Biophysics |
| 4.2. of competences | Integration of the notions of physiology, biochemistry, biophysics to explain physiological processes and mechanisms to adapt to the environment. |

5. **Conditions (where applicable)**

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| 5.1. for lectures | Video logistics support. |
| 5.2. for seminars / practical classes | Students will have protective equipment |

**6. Specific competences acquired**

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| **Professional competencies** | **C1.2** | Formulation of hypotheses and operationalization of key concepts in order to explain the ways of adaptation of the human body during physical and mental effort |
| **C1.4** | Use of appropriate parameters in techniques to increase joint mobility, muscle strength, coordination and balanceKnowing the immediate and late adaptations of somatic and vegetative functions during physical effort. |

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

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| 7.1. General objective | - Acquisition of theoretical and practical knowledge on general adaptation and structures involved in effort- Understanding specific muscular adaptation and their relationship with the type of effort. |
| 7.2. Specific objectives | - Knowledge on the biological factors responsible for the individual differences of: strength, effort potential, endurance, speed of movement.- Knowledge of the metabolic processes behind musuclar activity and their responses to specific types of physical activity.- Knwoledge of the cardiovascular and respiratory responses during physical effort, as well as the limitations with regards to physical effort capacity. - Knowledge of the methabolic basisc of the oxygen supply and it’s relationship to physical performance. |

**8. Contents**

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| **8.1. Lectures** | **Teaching methods** | **Observations** |
| 1 | Definition, content, concepts, principles, objectives, methodologies, significance, perspective, future development directions on adaptation to effort.Interrelation body-physical effort. Physical effort: definition, significance, stress factor. Parameters of physical effort. Classification of physical efforts, adaptation types.  | Video presentations, interactive discussions, presentations | 2 hours |
| 2 | Type of physical activity. Muscular excitability. Influence of physical effort on muscular excitability. Muscular contractility. Types of contractions. | Video presentations, interactive discussions, presentations | 2 hours |
| 3 | Energy sources for human physical activity: Alactacida anaerobic energy source (fosfagen system), Lactacid anaerobic energy source (Glycogen system - lactic Acid), Aerobic energy source. Power and ability metabolic processes of energy production  | Video presentations, interactive discussions, presentations | 2 hours |
| 4 | Changes of the blood panel during effort: morphological and biochemical modifications, immediate and delayed. Hydro mineral balance during effort and rest. | Video presentations, interactive discussions, presentations | 2 hours |
| 5 | Respiratory changes during effort: factors limiting effort, stages of gas exchange, nervous and humoral respiration regulation; Effort effects on ventilation rate; apnea (moderately aerobic effort), hyperventilation (intensely aerobic-anaerobic effort);Alveolocapillary diffusion during effort; ventilation coefficient; distribution of ventilation and pulmonary capillary diffusion; hemoglobin dissociation curve. | Video presentations, interactive discussions, presentations | 2 hours |
| 6 | Cardiovascular adaptation to effort. Relevant issues in cardiovascular adjustment; Heart rate, cardiac performance indexes.Cardiovascular adaptation to effort. Increase of oxygen transport. Arteriovenous difference increase. Arterial pressure. Cardiovascular functional reserves.  | Video presentations, interactive discussions, presentations | 2 hours |
| 7 | Neuroendocrine systems adjustment to effort. Adaptation of the somatic and vegetative nervous system to exercise.Hypophyses’ hormones; medulla suprarenal hormones; thyroid hormones; pancreatic hormones adaptation to exercise | Video presentations, interactive discussions, presentations | 2 hours |

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| **8.2. Practical activities - practical class**  | **Teaching methods** | **Observations** |
| 1 | Types of effort. Physiological peculiarities of maximum efforts. Evaluation. Physiological peculiarities of medium intensity efforts. | Interactive discussions, presentations, practical exercises | 2 hours |
| 2 | The influence of exercise on muscle excitability and contractility. | 2 hours |
| 3 | Neuromuscular functional assessment Neuromuscular fatigue. | 2 hours |
| 4 | Cardiovascular changes during exercise. Stress tests. | 2 hours |
| 5 | Changes in the respiratory system during exercise  | 2 hours |
| 6 | Adaptation of the neuroendocrine system to effort | 2 hours |
| 7 | Assessment of the body's post-exercise recovery capacity | 2 hours |

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| **8.3. Bibliography:** |
| ***Mandatory:*** |
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| 1. Course support and practical works posted on the e-learning platform UMF "Grigore T. Popa" Iasi
2. Scott Powers, Edward Howley, John Quindry. Exercise Physiology: Theory and Application to Fitness and Performance 11th Edition, 2020. ISBN-13: 978-1260237764
3. William D. McArdle, [Frank I. Katch](https://www.amazon.com/Frank-I.-Katch/e/B000APOYDE/ref%3Ddp_byline_cont_book_2), [Victor L. Katch](https://www.amazon.com/Victor-L.-Katch/e/B001IGUNSO/ref%3Ddp_byline_cont_book_3). Exercise Physiology: Energy, Nutrition, and Human Performance Fifth Editio, 2016 - ISBN-13: 978-0781725446; ISBN-10: 0781725445
4. Sardaru D, Onu I, Matei D. Evaluarea amplitudinilor articulare, Ed Gr T. Popa, Iasi 2021.
5. Adams G, Beam W. Exercise Physiology Laboratory Manual, Mc Graw-Hill Humanities, 2010.
 |
| ***Elective:***1. Handbook of practical physiology-S.Slatineanu- Editura "Gr. T. Popa" UMF Iaşi, 2012
2. Florin Topoliceanu, Ana Stratone, Florin Filip, Ciofea R, Zaharia Dan, Ciorap R, Matei Daniela - Aplicații computerizate în explorarea paraclinică, Edit PIM Iasi, 2006, ISBN 973-716-318-4.
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**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:* Knowledge of the physiological mechanism of muscular contraction and of the ways the heart adapts to effort.
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| Date | Holder of course / signature, | Holder of practical activities / signature, |
| 12.09.2024 | Associate Professor Daniela-Viorelia Matei, MD, PhD | Assistant Professor Onita Cristiana, PhD candidate  |

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