**ACADEMIC DISCIPLINE OVERVIEW**

1. **Data**

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| **1.1. Institute** | **University of Medicine and Pharmacy “Grigore T. Popa” Iasi** |
| **1.2. Faculty** | **Medical Bioengineering** |
| **1.3. Department** | **Biomedical Sciences** |
| **1.4. Study field** | **Health** |
| **1.5. Level of studies** | **UNDERGRADUATE** |
| **1.6. Study program / Qualification** | **Balneophysiokinetotherpy and recovery /** **License in Physiokinetotherapy** |

1. **Discipline data**

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| **2.1 Name of discipline** | **BIOMECHANICS RE1201** |
| **2.2 Lecturers** | **Asoc.Prof. Florin Munteanu, Ph-D** |
| **2.3 Seminar/laboratories assistants** | **Asoc.Prof. Florin Munteanu, Ph-D** |
| **2.4 Study year** | **2** | **2.5 Semester** | **I** | **2.6. Evaluation method** | **C1** |
| **2.7 Discipline status** | **Mandatory/ D.S.** |

1. **Total estimated duration (hours/semester)**

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| --- | --- | --- | --- | --- | --- |
| **3.1.Number of hours / week** | 4 | **3.2. Courses number of hours / week** | 2 | **3.3.Seminar / l practical classes** | 2 |
| **3.4. Total number of learning hours** | 56 | **3.5. Courses** | 28 | **3.6. Seminar / practical classes** | 28 |
| **3.7. Distribution of the available time** | Hours |
| **Study based on the manual, lecture support, bibliography and hand notes** | 16 |
| **Supplementary documentation in the library, using specialized platforms via internet and by field work** | 14 |
| **Preparation for seminars / practical classes, study themes, reviews, portfolio, and essays** | 14 |
| **Tutorship** | 2 |
| **Examinations** | 8 |
| **Other activities** |  |
| **3.8. Total hours of individual study** | 44 |
| **3.9. Total hours pes semester** | 100 |
| **3.10. Number of credits** | 4 |

1. **Prerequisites (as needed)**

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| **4.1 Curriculum** | **Anatomy, Physiology** |
| **4.2 Skills** | **Knowledge of appropriate parameters in techniques used to increase joint mobility, muscle strength, coordination, and balance. Knowledge of the concepts, theories and fundamental notions of physiological and pathological mechanisms of the human body** |

1. **Conditions (as needed)**

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| **5.1. Lectures** | **Video logistical support** |
| **5.2. Seminars/Laboratories** | **Equipment for measurement of biomechanical parameters** |

1. **Acquired skills**

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| **Professional skills** | **C1.1 Description of concepts, theories and fundamental notions of physiological and pathological mechanisms of the human body, identification of symptoms and clinical signs, identification of kinetotherapy methods and techniques.** **C1.2 Application of kinetotherapy programs in relation to functional diagnosis and physician's indications, and also carrying out secondary prophylaxis. Description of devices and equipment that present friction force couples; maintenance in order to enhance sustainability;****C1.3 Using the base knowledge for explaining and interpreting the opportunity of some programs tailored to the treatment area and type of pathology** |
| **Related skills** | **CT1. Identifying objectives to be achieved, available resources, conditions for completion of objectives, work stages, working time, deadlines and related risks****CT2. Identifying roles and responsibilities in a multidisciplinary team and application of techniques and effective work relationships within the team and in relation to the patient** |

1. **Course objectives (as in the cumulated competences chart)**

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| **7.1 General objective of the discipline** | * **Familiarizing students with specific biomechanical concepts of the human body**
 |
| **7.2 Specific objectives** | **- Knowledge of the biomechanical phenomena that occurs in the locomotor system** |

1. **Contents**

**8. 1. Course**

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|  | **Teaching methods** | **Obs** |
| 1. **Introduction to Biomechanics (force, work, anthropometric parameters, joint movements)**
2. **Hip biomechanics**
3. **Knee biomechanics**
4. **Ankle biomechanics, foot biomechanics**
5. **Spine biomechanics**
6. **Shoulder biomechanics**
7. **Elbow biomechanics**
8. **Hand joint biomechanics, hand biomechanics**
9. **Tissue biomechanics (tendon, bone, cartilage, ligament)**
10. **Intervertebral disc biomechanics**
11. **Gait analysis**
12. **Postural biomechanics. Biomechanics of complex motor skills (speed, strength, resistance, expansion)**
13. **Biomechanics of physical exercise (walking, jumping, running)**
14. **Biomechanics in rehabilitation and human performance**
 | **Interactive lecture, Discussions, Explanations.** | **2 hours****2 hours****2 hours****2 hours****2 hours****2 hours****2 hours****2 hours****2 hours****2 hours****2 hours****2 hours****2 hours****2 hours** |

**8.2. Laboratory**

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| 1. **Biomechanical systems, kinetic factors**
2. **Levers, joint mobility**
3. **Biomechanics of locomotor couples.**
4. **Active-passive movements and kinetic parameters**
5. **Assessment of quality and quantity of movement. Muscle tests.**
6. **Postural mechanics. Monitoring techniques. Postural features Podology elements. Static and dynamic plantar pressure. Gait analysis techniques**
7. **Biomechanical principles of the hip joint. Normal hip, pathological hip.**
8. **Biomechanical principles of the knee joint. Normal knee, pathological knee.**
9. **Biomechanical principles of the ankle joint. Normal ankle, pathological ankle.**
10. **Biomechanical principles of the leg joints. Normal foot, pathological foot.**
11. **Biomechanical principles of the spine. Normal and pathological spine.**
12. **Biomechanical principles of the shoulder joint. Normal shoulder, pathological shoulder.**
13. **Biomechanical principles applied to the forearm. Normal forearm, pathological forearm.**
14. **Elements of functional biomechanics**
 | **Identification and analysis of kinetic parameters****Lever types, identification of lever type at various levels of locomotor system****Identification of muscle force couples, observations, conclusions****Active and passive tensions in muscles, concentric and eccentric muscle action****Work preparation , muscle-tendon assembly functioning, observations, conclusions****Work preparation, postural models, observations, conclusions** **Work preparation, joint model, observations, conclusions****Work preparation, joint model, observations, conclusions****Work preparation, joint model, observations, conclusions****Work preparation, joint model, observations, conclusions****Work preparation, joint model, observations, conclusions****Work preparation, joint model, observations, conclusions****Work preparation, joint model, observations, conclusions****Functioning of locomotor system segments and inter-segment influence** | **2 hours****2 hours****2 hours****2 hours****2 hours****2 hours****2 hours****2 hours****2 hours****2 hours****2 hours****2 hours****2 hours****2 hours** |

**Bibliography**

**mandatory**

1. **Munteanu Fl. Botez. P – Biomecanica aparatului locomotor (vol I), Editura Venus, 2006**

**selective**

1. **Mow V. C., Hayes C. W. –Basic Orthopaedic Biomechanics – Second Edition, Lippincott-Raven Publishers, New York, 1997;**
2. **Dominique Poitout eds – Biomechanics and Biomaterials in Orthopedics – Springer-Verlag, London, 2004;**
3. **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. |

1. **Evaluation**

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| **10.1. Activity type** | **10.2. Evaluation criteria** | **10.3. Evaluation method** | **10.3 Percentage of the final grade** |
| **10.4 Lecture** | **Learning concepts and theoretical notions presented in the course** | **Written exam****Oral exam** | **50%****40%** |
| **10.5 Seminar/laboratory** | **Activities carried out in the laboratory and quality of conducted essays** | **Practical exam** | **10%** |
| **10.6 Minimal standards**  |
| **Minimum course passing condition:****- Knowing the biomechanical behavior of tissues.****- Knowledge of kinematics and dynamics of the bearing joints.** |

**Date, Course holder signature,**

20. 09.2019 Assoc. Prof. Florin Munteanu, Ph-D

**Department approval date**

30. 09. 2019 **Head of the Departament Signature**

 Lecturer Matei Daniela Viorelia, Ph-D