**ACADEMIC DISCIPLINE OVERVIEW**

1. **Program data**

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| **1.1.** | **GRIGORE T. POPA UNIVERSITY OF MEDICINE AND PHARMACY IASI** |
| **1.2.**  | **FACULTY OF MEDICAL BIOENGINEERING**  |
| **1.3.** | **PROGRAMME:** Physio-kinetotherapy and rehabilitation |
| **1.4.**  | **STUDY FIELD:** Health |
| **1.5.** | **STUDY CYCLE**: UNDERGRADUATE |
| **1.6.** | **STUDY PROGRAMME:** INENGLISH |
| 1. **Subject data**
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| **2.1.** | **Subject:** Biomedical instrumentation for rehabilitation procedures, RE1202 |
| **2.2.** | **Module leader:** Prof. Radu George CIORAP, Ph-D |
| **2.3.** | **Seminar leader:** Asist.Prof. Doru ANDRIȚOI,Ph-D/ Asist.Prof. Cătălina LUCA, Ph-D |
| **2.4. Year of study** | **II** | **2.5. Semester in which is taught** | **I** | **2.6. Evaluation type** | Exam | **2.7. Subject status** | Mandatory/D.D. |

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

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| **3.1.Number of hours / week** | 4 | **3.2. Courses number of hours / week** | 2 | **3.3.Seminar / 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** | 25 |
| **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** | 5 |
| **Tutorship** | 2 |
| **Examinations** | 4 |
| **Other activities** |  |
| **3.8. Total hours of individual study** | 44 |
| **3.9. Total hours pes semester** | 100 |
| **3.10. Number of credits** | 4 |

1. **Preconditions (where applicable)**

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| **4.1.** of curriculum | Not necessary |
| **4.2.** of competences | Not necessary |

1. **Conditions (where applicable)**

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| **5.1.** for lectures | Not necessary |
| **5.2.** for seminars / practical classes |  |

1. **Specific competences acquired**

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| Professional competences (expressed as knowledge and abilities) | C4.1 The description of electrotherapy techniques, application parameters, indications, contraindications, the manner of functioning of the equipment that provides current and elecric derived energy forms.C4.2 Using the knowledge base for explanation and interpretation the electrotherapy procedures  |
| Transverse competences (of role, of professional development, personal) | C5.2 Using the knowledge base for choosing means and methods of functional assessment in different pathological situations C5.5 Monitoring, development and validation of new functional assessment scores |

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

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| **7.1.** General objective | Those providing basic knowledge and skills with which the student can use in biomedical instrumentation for recovery in the best conditions and maximum performance. |
| **7.2.** Specific objectives | Acquiring general knowledge on the measurement parameters and measurement normal body looked like biomedical signalsAcquiring general knowledge on specific medical instrumentation of rehabilitation in different conditions using different physical phenomena. |

1. **Contents**

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| **8.1. Lecture** | **Teaching methods** | **Observations** |
| Physical quantities, measurement of physical measurement errors, measurement methods; biosignals | Power Point presentation, Interactive sessions, practical examples | 2 hours |
| Physical foundations of electrotherapy. Fundamentals concerning electric and magnetic field | Power Point presentation, Interactive sessions, practical examples | 2 hours |
| Measuring chain for biomedical parameters; a functional structure | Power Point presentation, Interactive sessions, practical examples | 4 hours |
| Electrosecurity. Patient and user safety | Power Point presentation, Interactive sessions, practical examples | 2 hours |
| Biomedical instrumentation for recovery using DC | Power Point presentation, Interactive sessions, practical examples | 2 hours |
| Biomedical instrumentation for recovery using low frequency current | Power Point presentation, Interactive sessions, practical examples | 4 hours |
| Biomedical instrumentation for recovery using current medium frequency | Power Point presentation, Interactive sessions, practical examples | 2 hours |
| Biomedical instrumentation for recovery using high frequency current | Power Point presentation, Interactive sessions, practical examples | 2 hours |
| Using ultrasound in recovery; physical principles of action of ultrasound; Ultrasound equipment recovery | Power Point presentation, Interactive sessions, practical examples | 2 hours |
| Using magnetic fields in recovery; the action of magnetic field on the human body; The equipment for magnetic therapy | Power Point presentation, Interactive sessions, practical examples | 2 hours |
| Using light radiation in recovery; Apparatus for laser therapy: functional principle; Apparatus for IR and UV radiation therapy: functional principle | Power Point presentation, Interactive sessions, practical examples | 4 hours |
| **Bibliography****mandatory**1. Val Robertson, Alex Ward, John Low, Ann Reed, Electrotherapy Explained: Principles and Practice 4th Edition, Elsevier, 2006
2. George D. O’Clock, Electrotherapeutic Devices: Principles, Design, and Applications,Artech House Publishers; 1 edition, 2007

selective1. John Low , Ann Reed , Physical Principles Explained (Physiotherapy Practice Explained) 1st Edition, Ed. Butterworth-Heinemann, 1994
2. Rory A Cooper, Hisaichi Ohnabe, Douglas A. Hobson, An Introduction to Rehabilitation Engineering, CRC Press, 2006
3. Roberto Merletti, Philip Parker (eds.), ELECTROMYOGRAPHY Physiology, Engineering, and Noninvasive Applications, IEEE Press - John Wiley & Sons, Inc., Hoboken, New Jersey, 2004
4. Northrop R. B., Noninvasive Instrumentation and Measurement in Medical Diagnosis, CRC Press 2002.
5. Prutchi, D., Norris, M. – „Design and development of Medical Electronic Instrumentation”, John Wilez & Sons Publication, 2005
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| **8.2. Seminar / practical classes** | **Teaching methods** | **Observations** |
| General elements of biomedical instrumentation; Methods and techniques for measuring biosignals | Explanatory text, practical examples | 2 hours |
| Fundamentals on the electric field and magnetic-circuit elements of electronic devices. Effects of current on human body | Explanatory text, practical examples | 2 hours |
| Measuring chain structure for biomedical parameters: electrodes and transducers | Explanatory text, practical examples | 2 hours |
| Measuring chain structure for biomedical parameters: amplification, primary processing | Explanatory text, practical examples | 2 hours |
| Measuring chain structure for biomedical parameters: viewing means | Explanatory text, practical examples | 2 hours |
| Galvanic current, Physical characteristics. Method of production | Explanatory text, practical examples | 2 hours |
| Low-frequency currents -1; Setting parameters for electrical stimulation | Explanatory text, practical examples | 2 hours |
| Low-frequency currents –2; Testing an electrical stimulation neuro-muscular device. | Explanatory text, practical examples | 2 hours |
| Low-frequency currents –3; Testing a TENS transcutaneous electrical nerve stimulation device  | Explanatory text, practical examples | 2 hours |
| Medium frequency currents Types of currents. Placing electrodes. Interferential currents | Explanatory text, practical examples | 2 hours |
| High frequency currents. Equipment: Operating technical characteristics. Treatment Capacitor field and coil field | Explanatory text, practical examples | 2 hours |
| Biomedical instrumentation for magnetic therapy | Explanatory text, practical examples | 2 hours |
| Biomedical instrumentation for ultrasound therapy. Testing an ultrasound therapy device | Explanatory text, practical examples | 2 hours |
| Biomedical instrumentation for laser therapy. Testing a device for laser therapy | Explanatory text, practical examples | 2 hours |
| **Bibliography****mandatory**1. Val Robertson, Alex Ward, John Low, Ann Reed, Electrotherapy Explained: Principles and Practice 4th Edition, Elsevier, 2006
2. George D. O’Clock, Electrotherapeutic Devices: Principles, Design, and Applications,Artech House Publishers; 1 edition, 2007

**selective**1. Prutchi, D., Norris, M. – „Design and development of Medical Electronic Instrumentation”, John Wilez & Sons Publication, 2005
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1. **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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| **Type of activity** | **Type of activity** | **Evaluation methods** | **Contribution to the final grade** |
| **Lecture** | Acquiring the theoretical notions and aspects presented in the course  | Written test | 50% |
| **Seminar/practical classes** | Theme of laboratory works | Oral exam | 40% |
| Assessing the activity carried out throughout the year | Verification and grading the works / projects | 10% |
| **Minimal performance standard:** |

**Date: Signature of head of discipline**

20.09.2019 Prof. Radu George CIORAP, Ph-D

**Department approval date**

30.09.2019

 **Signature of department director**

Lecturer Daniela-Viorelia Matei, Ph-D