|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **BIOPHYSICS MASTER’S DEGREE PROGRAM - Courses – ECTS Credits (Biyofizik YL)** | | | | | |
| FALL SEMESTER | | | | | |
| **Course Code** | **Course Name** | **ECTS** | **T+P+L** | **C/E** | **Language** |
| [522103201](#DERS522103201) | [BIOPHYSICAL METHODS IN MEDICINE](#DERS522103201) | 7,5 | 3+0+0 | ELECTIVE | TURKISH |
| **522103202** | [**INTRODUCTION TO BIOPHYSICS I**](#DERS522103202) | **7,5** | **3+0+0** | **COMPULSORY** | **TURKISH** |
| **522105203** | [**EXCITABLE CELLS AND BIOPOTENTIALS**](#DERS522105203) | **5** | **2+0+0** | **COMPULSORY** | **TURKISH** |
| 522103204 | [BIOELECTRICITY IN DIAGNOSIS AND TREATMENT](#DERS522103204) | 7,5 | 2+2+0 | ELECTIVE | TURKISH |
| 522103400 | **SEMINAR** | **7,5** | **0+1+0** | **COMPULSORY** | **TURKISH** |
| 522101700 | **SPECIALIZATION FIELD COURSE** | **5** | **3+0+0** | **COMPULSORY** | **TURKISH** |
| 522101200 | **MASTER'S THESIS** | **25** | **0+1+0** | **COMPULSORY** | **TURKISH** |
| **520111103** | **RESEARCH METHODS AND PUBLISHING ETHICS\*** | **7,5** | **3+0+3** | **COMPULSORY** | **TURKISH** |
|  | |  |  |  |  |
| Spring Semester | | | | | |
| [522104202](#DERS522104202) | [BIOMECHANICS I](#DERS522104202) | 7,5 | 3+0+0 | ELECTIVE | TURKISH |
| [**522104203**](#DERS522104203) | [**INTRODUCTION TO BIOPHYSICS II**](#DERS522104203) | **7,5** | **3+0+0** | **COMPULSORY** | **TURKISH** |
| [522104204](#DERS522104204) | [RADIATION BIOPHYSICS AND MEDICAL IMAGING METHODS](#DERS522104204) | 7,5 | 3+0+0 | ELECTIVE | TURKISH |
| [522104205](#DERS522104205) | [ELECTROPHYSIOLOGICAL STUDIES IN PERIPHERAL NERVES](#DERS522104205) | 7,5 | 2+2+0 | ELECTIVE | TURKISH |
| 522104206 | [SENSOR TECHNOLOGIES](#DERS522104206) | 7,5 | 3+0+3 | ELECTIVE | TURKISH |
| 522103400 | **SEMINAR** | **7,5** | **0+1+0** | **COMPULSORY** | **TURKISH** |
| 522101700 | **SPECIALIZATION FIELD COURSE** | **5** | **3+0+0** | **COMPULSORY** | **TURKISH** |
| 522101200 | **MASTER'S THESIS** | **25** | **0+1+0** | **COMPULSORY** | **TURKISH** |
| **520111103** | **RESEARCH METHODS AND PUBLISHING ETHICS\*** | **7,5** | **3+0+3** | **COMPULSORY** | **TURKISH** |
|  | |  |  |  |  |
|  | |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **COURSE CODE:** 522103201 |  | **DEPARTMENT: BIOPHYSICS** | | | |
| **COURSE NAME:** BIOPHYSICAL METHODS IN MEDICINE | | | | | |
| **INSTRUCTOR GIVING THE COURSE**  **Assoc. Prof. Dr. Seçkin TUNCER** | | **COURSE LANGUAGE**  **Turkish: X**  **English: ** | **Category of the Course** | | |
| Technical | Medical | Other (……) |
|  | |  |  | **X** |  |

**COURSE LEVEL**

|  |  |  |  |
| --- | --- | --- | --- |
| **SCIENTIFIC PREPARATION** | **MASTERS DEGREE** | **DOCTORATE** | **SPECIALIZED FIELD COURSE** |
| **** | **X** |  | **** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **SEMESTER** | **WEEKLY CLASS HOURS** | | | **COURSE** | | | |
| **Theoretical** | **Application** | **Laboratory** | **Credit** | **ETCS** | **TYPE** | |
| Spring ****  Fall **X** | 3 | - | - | 3 | 8 | MANDATORY ELECTIVE  **X ** | |
|  | | | | | | | |
| **EVALUATION CRITERIA** | | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | | | **Number** | **Percentage (%)** |
| Midterm Exam | | | **1** | **40** |
| Quiz | | |  |  |
| Homework | | | **1** | **20** |
| Project | | |  |  |
| Oral Exam | | |  |  |
| Other (………) | | |  |  |
| **Final Exam** | | | | **40** |
| **PREREQUISITE(S)** | | |  | | | | |
| **SHORT COURSE CONTENT** | | | Properties of a general biomedical instrumentation system. Transducers. Stimulators, Signal conditioners/analyzers. Monitoring/recording systems. The bioelectric events and related biophysical methods (ECG, EEG, EMG, EOG etc.). Detection of physiological events by impedance | | | | |
| **COURSE AIMS** | | | To teach the general concepts of medical instrumentation. To outline some representative examples of biophysical measurements and methods. | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | The attempt has been to introduce the commonality of measuring methods so that all who have taken such a course will be able to design special instruments that are not commercially available are required. | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | BioMedical Instrumentation System Concept. Transducers . Stimulators . Signal Regulators/Analyzers. Observation/Recording Systems. Biophysical Methods Used in Observing Bioelectric Signals | | | | |
| **TEXTBOOK** | | | **Geddes L.A., Baker L.E.:** Principles of Applied Biomedical Instrumentation, John Wiley & Sons, New York, 1989. | | | | |
| **OTHER REFERENCES** | | | **Strong P.:** Biophysical Measurements, Tektronix Inc., Beaverton, Oregon 1973.  **Webster J.G** (ed.):Medical Instrumentation. Houghton Mifflin Company. Boston, 1992.  **Pehlivan F.:** Biyofizik (2.Baskı), Hacettepe-Taş Kitapçılık, Ankara, 1997. | | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | |  | | | | |

|  |  |  |
| --- | --- | --- |
|  | **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **DATE** | **TOPICS COVERED** |
| **1** |  | Characteristics of various biological signals |
| **2** |  | Fundamentals of biomedical instrumentation |
| **3** |  | Electrodes |
| **4** |  | Transducers |
| **5** |  | Transducers |
| **6** |  | Signal Conditioners (Amplifiers, Filters etc.) |
| **7** |  | Measuring, Monitoring and Recording systems |
| **8** |  | Stimulation and Stimulators |
| **9** |  | Biological Effects of Electric Currents |
| **10** |  | Electrical Dipole Potentials |
| **11** |  | Basic Principles of Electrocardiography |
| **12** |  | ECG recording and determining of Cardiac Vector |
| **13** |  | Electromyography |
| **14** |  | Electrooculography |
| **15** |  | Electrodermal Activity |
| **16** |  | Laser Doppler Flow |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONTRIBUTION OF THE LEARNING OUTCOMES OF THE COURSE TO THE LEARNING OUTCOMES OF THE MASTERS PROGRAM** | | **Contribution Level** | | |
| **NO** | **LEARNING OUTCOMES** | **1**  **Low** | **2**  **Mid** | **3**  **High** |
| LO 1 | Ability to Collect and Apply Information on Health Sciences |  | X |  |
| LO 2 | Ability to Scientific Inquiry and Hypothesis Formation |  |  | X |
| LO 3 | Ability to Literature Review and Evaluation |  | X |  |
| LO 4 | Ability to Design, Conduct, Analyze and Evaluate Experiments |  |  |  |
| LO 5 | Ability to Recognize and Use Experimental Tools and Equipment Appropriately |  |  | X |
| LO 6 | Ability to Work in an Interdisciplinary Team |  | X |  |
| LO 7 | Ability to Recognize Medical Problems, Ability to Formulate and Solve |  | X |  |
| LO 8 | Ability to Use Computer Effectively in Research and Data Analysis |  |  | X |
| LO 9 | Ability to Understand the Contribution of Experimental Studies to National and International Science |  | X |  |
| LO 10 | Effective Oral and Oral Communication/Presentation Skills |  | X |  |
| LO 11 | Ability to Understand and Apply Professional and Ethical Responsibility |  | X |  |
| LO 12 | Ability to Understand and Apply the Importance of Lifelong Learning |  | X |  |
| LO 13 | Ability to Recognize Basic Concepts in Medical Education |  | X |  |
| LO 14 | Ability to Approach Ethical Problems by Centering Basic Concepts |  | X |  |

|  |  |
| --- | --- |
| **Instructor of the Course**  **Assoc. Prof. Dr. Seçkin TUNCER**  **Signature** | **DATE**  25.03.2025 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **COURSE CODE:** **522103202** |  | **DEPARTMENT: BIOPHYSICS** | | | |
| **COURSE NAME:** INTRODUCTION TO BIOPHYSICS I | | | | | |
| **INSTRUCTOR GIVING THE COURSE**  **Assoc. Prof. Dr. Seçkin TUNCER** | | **COURSE LANGUAGE**  **Turkish: X**  **English: ** | **Category of the Course** | | |
| Technical | Medical | Other (……) |
|  | |  |  | **X** |  |

**COURSE LEVEL**

|  |  |  |  |
| --- | --- | --- | --- |
| **SCIENTIFIC PREPARATION** | **MASTERS DEGREE** | **DOCTORATE** | **SPECIALIZED FIELD COURSE** |
| **** | **X** |  | **** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **SEMESTER** | **WEEKLY CLASS HOURS** | | | **COURSE** | | | |
| **Theoretical** | **Application** | **Laboratory** | **Credit** | **ETCS** | **TYPE** | |
| Spring ****  Fall **X** | 3 | - | - | 3 | 7,5 | MANDATORY ELECTIVE  **X ** | |
|  | | | | | | | |
| **EVALUATION CRITERIA** | | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | | | **Number** | **Percentage (%)** |
| Midterm Exam | | | **1** | **50** |
| Quiz | | |  |  |
| Homework | | |  |  |
| Project | | |  |  |
| Oral Exam | | |  |  |
| Other (………) | | |  |  |
| **Final Exam** | | | | **50** |
| **PREREQUISITE(S)** | | |  | | | | |
| **SHORT COURSE CONTENT** | | | Biophysics and living systems. Basics of molecular biophysics. Bioenergetic. | | | | |
| **COURSE AIMS** | | | To give students the biophysics background they need for their professional work. | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | Understands the relation between physics and the life sciences.  Apply knowledge of mathematics and physics to the life sciences. | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | To have knowledge about the basic concepts of biophysics and the methods used by basic sciences to understand life. | | | | |
| **TEXTBOOK** | | | **Pehlivan F.:** Biyofizik (2.Baskı), Hacettepe-Taş Kitapçılık, Ankara, 1997.  **Esen F**.: Ders Notları, ESOGÜTF Biyofizik Anabilim Dalı. | | | | |
| **OTHER REFERENCES** | | | **Çelebi G:** BiyoMedical Fizik, (2.Baskı), Barış Yayınları, Fakülteler Kitabevi, İzmir, (1995).  **Fung Y.C.:** Biomechanics, Mechanical Properties of Living Tissues, Springer-Verlag, 1984.  **Hoppe W., Lohmann W., Markl H., Ziegler H. (eds):** Biophysics, Springer-Verlag, Berlin, 1983.  **Ruch T.C, Patton H.D**: Physiology and Biophysics (19.Edition), Saunders, 1966. | | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | |  | | | | |

|  |  |  |
| --- | --- | --- |
|  | **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **DATE** | **TOPICS COVERED** |
| **1** |  | Biophysics and living systems |
| **2** |  | Transport of energy in living systems |
| **3** |  | Basics of molecular biophysics |
| **4** |  | Intra- and intermolecular interactions |
| **5** |  | Biological macromolecules |
| **6** |  | Amino acids and proteins |
| **7** |  | Nücleic acids |
| **8** |  | Bioenergetic |
| **9** |  | Basics of thermodynamics |
| **10** |  | Free energy |
| **11** |  | Energy transport in biomolecules |
| **12** |  | Cellular biophysics |
| **13** |  | Molecular organization of cell membrane |
| **14** |  | Diffusion and osmosis through the cell membrane |
| **15** |  | Membrane Transport |
| **16** |  | Passive and active ionic flows |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONTRIBUTION OF THE LEARNING OUTCOMES OF THE COURSE TO THE LEARNING OUTCOMES OF THE MASTERS PROGRAM** | | **Contribution Level** | | |
| **NO** | **LEARNING OUTCOMES** | **1**  **Low** | **2**  **Mid** | **3**  **High** |
| LO 1 | Ability to Collect and Apply Information on Health Sciences |  |  | X |
| LO 2 | Ability to Scientific Inquiry and Hypothesis Formation |  |  | X |
| LO 3 | Ability to Literature Review and Evaluation |  |  | X |
| LO 4 | Ability to Design, Conduct, Analyze and Evaluate Experiments |  | **X** |  |
| LO 5 | Ability to Recognize and Use Experimental Tools and Equipment Appropriately |  | **X** |  |
| LO 6 | Ability to Work in an Interdisciplinary Team |  |  | X |
| LO 7 | Ability to Recognize Medical Problems, Ability to Formulate and Solve |  |  | X |
| LO 8 | Ability to Use Computer Effectively in Research and Data Analysis |  | **X** |  |
| LO 9 | Ability to Understand the Contribution of Experimental Studies to National and International Science |  |  | X |
| LO 10 | Effective Oral and Oral Communication/Presentation Skills |  |  | X |
| LO 11 | Ability to Understand and Apply Professional and Ethical Responsibility |  |  | X |
| LO 12 | Ability to Understand and Apply the Importance of Lifelong Learning |  |  | X |
| LO 13 | Ability to Recognize Basic Concepts in Medical Education |  |  | X |
| LO 14 | Ability to Approach Ethical Problems by Centering Basic Concepts |  |  | X |

|  |  |
| --- | --- |
| **Instructor of the Course**  **Assoc. Prof. Dr. Seçkin TUNCER**  **Signature** | **DATE**  25.03.2025 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **COURSE CODE:** **522105203** |  | **DEPARTMENT: BIOPHYSICS** | | | |
| **COURSE NAME:** EXCITABLE CELLS AND BIOPOTENTIALS | | | | | |
| **INSTRUCTOR GIVING THE COURSE**  **Assoc. Prof. Dr. Seçkin TUNCER** | | **COURSE LANGUAGE**  **Turkish: X**  **English: ** | **Category of the Course** | | |
| Technical | Medical | Other (……) |
|  | |  |  | **X** |  |

**COURSE LEVEL**

|  |  |  |  |
| --- | --- | --- | --- |
| **SCIENTIFIC PREPARATION** | **MASTERS DEGREE** | **DOCTORATE** | **SPECIALIZED FIELD COURSE** |
| **** | **X** |  | **** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **SEMESTER** | **WEEKLY CLASS HOURS** | | | **COURSE** | | |
| **Theoretical** | **Application** | **Laboratory** | **Credit** | **ETCS** | **TYPE** |
| Spring ****  Fall **X** | 2 | - | - | 2 | 5 | MANDATORY ELECTIVE  **X ** |

|  |  |  |  |
| --- | --- | --- | --- |
| **EVALUATION CRITERIA** | | | |
| **SEMESTER ACTIVITIES** | **Type of activity** | **Number** | **Percentage (%)** |
| Midterm Exam | **1** | **50** |
| Quiz |  |  |
| Homework |  |  |
| Project |  |  |
| Oral Exam |  |  |
| Other (………) |  |  |
| **Final Exam** | | **50** |
| **PREREQUISITE(S)** |  | | |
| **SHORT COURSE CONTENT** | Excitable Cell Membranes and Biopotentials | | |
| **COURSE AIMS** | The purpose of this course is to present the basic knowledge associated with excitable biological membranes. | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | Students should be able to apply the fundamental principles given here to the second part of this course, for a deeper understanding of “excitability” as a whole. | | |
| **LEARNING OUTCOMES OF THE COURSE** | To study the electrical events occurring in cell membranes and to have knowledge about different biopotentials. | | |
| **TEXTBOOK** | **Pehlivan F:** Biyofizik (2.Baskı), Hacettepe-Taş Kitapçılık, Ankara, 1997. | | |
| **OTHER REFERENCES** | **Guyton A C and Hall J E:** Tıbbi Fizyoloji (11. Basım) Yüce yayımları ve NobelTıp Kitabevleri, İstanbul 2007. | | |
| **TOOLS AND EQUIPMENTS REQUIRED** |  | | |

|  |  |  |
| --- | --- | --- |
|  | **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **DATE** | **TOPICS COVERED** |
| **1** |  | Introduction to Excitable Cells |
| **2** |  | Resting Membrane Potential |
| **3** |  | Action Potential |
| **4** |  | Structure of Skeletal Muscle |
| **5** |  | Skeletal Muscle and Electrical Activity |
| **6** |  | Excitation-Contraction Coupling |
| **7** |  | Muscle Contraction and Energy |
| **8** |  | Neuromuscular Junction |
| **9** |  | Mechanical Properties of Skeletal Muscle |
| **10** |  | Electromyography |
| **11** |  | MID-TERM |
| **12** |  | Structure of Smoot Muscle |
| **13** |  | Smooth Muscle and Electrical Activity |
| **14** |  | Structure of Cardiac Muscle |
| **15** |  | Cardiac Muscle and Electrical Activity |
| **16** |  | Electrocardiography |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONTRIBUTION OF THE LEARNING OUTCOMES OF THE COURSE TO THE LEARNING OUTCOMES OF THE MASTERS PROGRAM** | | **Contribution Level** | | |
| **NO** | **LEARNING OUTCOMES** | **1**  **Low** | **2**  **Mid** | **3**  **High** |
| LO 1 | Ability to Collect and Apply Information on Health Sciences |  |  | X |
| LO 2 | Ability to Scientific Inquiry and Hypothesis Formation |  |  | X |
| LO 3 | Ability to Literature Review and Evaluation |  |  | X |
| LO 4 | Ability to Design, Conduct, Analyze and Evaluate Experiments |  | **X** |  |
| LO 5 | Ability to Recognize and Use Experimental Tools and Equipment Appropriately | **X** |  |  |
| LO 6 | Ability to Work in an Interdisciplinary Team |  | **X** |  |
| LO 7 | Ability to Recognize Medical Problems, Ability to Formulate and Solve |  |  | X |
| LO 8 | Ability to Use Computer Effectively in Research and Data Analysis |  | **X** |  |
| LO 9 | Ability to Understand the Contribution of Experimental Studies to National and International Science |  | **X** |  |
| LO 10 | Effective Oral and Oral Communication/Presentation Skills |  |  | X |
| LO 11 | Ability to Understand and Apply Professional and Ethical Responsibility |  |  | X |
| LO 12 | Ability to Understand and Apply the Importance of Lifelong Learning |  |  | X |
| LO 13 | Ability to Recognize Basic Concepts in Medical Education |  |  | X |
| LO 14 | Ability to Approach Ethical Problems by Centering Basic Concepts |  |  | X |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Instructor of the Course**  **Assoc. Prof. Dr. Seçkin TUNCER**  **Signature** | | | **DATE**  25.03.2025 | | | |
|  | | |  | | | |
|  | | |  | | | |
| **COURSE CODE:** 522103204 | |  | **DEPARTMENT: BIOPHYSICS** | | | | | |
| **COURSE NAME:** BIOELECTRICITY IN DIAGNOSIS AND TREATMENT | | | | | | | | |
| **INSTRUCTOR GIVING THE COURSE**  **Assoc. Prof. Dr. Seçkin TUNCER** | | | **COURSE LANGUAGE**  **Turkish: X**  **English: ** | | **Category of the Course** | | | |
| Technical | Medical | Other (……) | |
|  | | |  | |  | **X** |  | |

**COURSE LEVEL**

|  |  |  |  |
| --- | --- | --- | --- |
| **SCIENTIFIC PREPARATION** | **MASTERS DEGREE** | **DOCTORATE** | **SPECIALIZED FIELD COURSE** |
| **** | **X** |  | **** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **SEMESTER** | **WEEKLY CLASS HOURS** | | | **COURSE** | | | |
| **Theoretical** | **Application** | **Laboratory** | **Credit** | **ETCS** | **TYPE** | |
| Spring ****  Fall **X** | 2 | 2 | - | 3 | 8 | MANDATORY ELECTIVE  ** X** | |
|  | | | | | | | |
| **EVALUATION CRITERIA** | | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | | | **Number** | **Percentage (%)** |
| Midterm Exam | | | **1** | **40** |
| Quiz | | |  |  |
| Homework | | | **1** | **20** |
| Project | | |  |  |
| Oral Exam | | |  |  |
| Other (………) | | |  |  |
| **Final Exam** | | | | **40** |
| **PREREQUISITE(S)** | | |  | | | | |
| **SHORT COURSE CONTENT** | | | Biopotentials observed for diagnosis; Electromiyography (EMG), Electroneurography (ENG), Electroensaphalography (EEG), Electrocardiography (ECG) and electrical applications for treatment; Iontophoresis, Transcutanous Electrical Nerve Stimulation (TENS), Pulsed Electromagnetic Field Theraphy (PEMF). | | | | |
| **COURSE AIMS** | | | The purpose of this course is to recognize biopotentials observed for diagnosis and electrical applications used treatment, learning their properties and their usage. | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | It is expected that the electrical methods used in diagnosis and treatment and the purpose of the application will be understood. | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | To have knowledge about biopotentials observed for diagnostic purposes. | | | | |
| **TEXTBOOK** | | | Esen H, Esen F: BİYOFİZİK Yöntemler, Biyolojik Etkiler, Önlemler, Ankara Nobel Tıp Kitabevleri, 2017. ISBN: 978-605-9215-38-1 | | | | |
| **OTHER REFERENCES** | | | Pehlivan F.: Biyofizik (8.Baskı), Pelikan Kitabevi, Ankara, 2015. | | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | |  | | | | |

|  |  |  |
| --- | --- | --- |
|  | **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **DATE** | **TOPICS COVERED** |
| **1** |  | Bioelectric concept and sources |
| **2** |  | Dipole and its potential in any point of volume conductor |
| **3** |  | Biopotentials observed/recorded for diagnosis |
| **4** |  | Electromiyography (EMG) |
| **5** |  | Electroneurography (ENG) |
| **6** |  | Electroensaphalography (EEG) |
| **7** |  | Electrocardiography (ECG) |
| **8** |  | MID-TERM EXAM |
| **9** |  | Electrooculography (EOG) and others |
| **10** |  | Use of electricity for treatment |
| **11** |  | Iontophoresis |
| **12** |  | Transcutanous Electrical Nerve Stimulation (TENS) |
| **13** |  | Pulsed Electromagnetic Field Theraphy (PEMF) |
| **14** |  | Treatment of musculoskeletal and urinary disorders |
| **15** |  | Effect of electricity on tissue regeneration |
| **16** |  | FINAL EXAM |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONTRIBUTION OF THE LEARNING OUTCOMES OF THE COURSE TO THE LEARNING OUTCOMES OF THE MASTERS PROGRAM** | | **Contribution Level** | | |
| **NO** | **LEARNING OUTCOMES** | **1**  **Low** | **2**  **Mid** | **3**  **High** |
| LO 1 | Ability to Collect and Apply Information on Health Sciences |  |  | X |
| LO 2 | Ability to Scientific Inquiry and Hypothesis Formation |  |  | X |
| LO 3 | Ability to Literature Review and Evaluation |  |  | X |
| LO 4 | Ability to Design, Conduct, Analyze and Evaluate Experiments |  | X |  |
| LO 5 | Ability to Recognize and Use Experimental Tools and Equipment Appropriately | X |  |  |
| LO 6 | Ability to Work in an Interdisciplinary Team |  |  | X |
| LO 7 | Ability to Recognize Medical Problems, Ability to Formulate and Solve |  |  | X |
| LO 8 | Ability to Use Computer Effectively in Research and Data Analysis | X |  |  |
| LO 9 | Ability to Understand the Contribution of Experimental Studies to National and International Science |  |  | X |
| LO 10 | Effective Oral and Oral Communication/Presentation Skills |  |  | X |
| LO 11 | Ability to Understand and Apply Professional and Ethical Responsibility |  |  | X |
| LO 12 | Ability to Understand and Apply the Importance of Lifelong Learning |  |  | X |
| LO 13 | Ability to Recognize Basic Concepts in Medical Education |  |  | X |
| LO 14 | Ability to Approach Ethical Problems by Centering Basic Concepts |  |  | X |

|  |  |
| --- | --- |
| **Instructor of the Course**  **Assoc. Prof. Dr. Seçkin TUNCER**  **Signature** | **DATE**  25.03.2025 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **COURSE CODE:** 522104202 |  | **DEPARTMENT: BIOPHYSICS** | | | |
| **COURSE NAME:** BIOMECHANICS I | | | | | |
| **INSTRUCTOR GIVING THE COURSE**  **Assoc. Prof. Dr. Seçkin TUNCER** | | **COURSE LANGUAGE**  **Turkish: X**  **English: ** | **Category of the Course** | | |
| Technical | Medical | Other (……) |
|  | |  |  | **X** |  |

**COURSE LEVEL**

|  |  |  |  |
| --- | --- | --- | --- |
| **SCIENTIFIC PREPARATION** | **MASTERS DEGREE** | **DOCTORATE** | **SPECIALIZED FIELD COURSE** |
| **** |  | **X** | **** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **SEMESTER** | **WEEKLY CLASS HOURS** | | | **COURSE** | | | |
| **Theoretical** | **Application** | **Laboratory** | **Credit** | **ETCS** | **TYPE** | |
| Spring **X**  Fall **** | 3 | - | - | 3 | 7,5 | MANDATORY ELECTIVE  ** X** | |
|  | | | | | | | |
| **EVALUATION CRITERIA** | | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | | | **Number** | **Percentage (%)** |
| Midterm Exam | | | **1** | **40** |
| Quiz | | |  |  |
| Homework | | | **1** | **20** |
| Project | | |  |  |
| Oral Exam | | |  |  |
| Other (………) | | |  |  |
| **Final Exam** | | | | **40** |
| **PREREQUISITE(S)** | | |  | | | | |
| **SHORT COURSE CONTENT** | | | Basic concepts of biomechanics. Components of force. Static. Dynamics. Work and energy for the living systems. Elasticity. Stress and strain. Viscoelasticity. | | | | |
| **COURSE AIMS** | | | To familiarize the students with the biomechanical properties of various tissues  to teach basic biomechanical concepts and their applications. | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | To understand the importance of biomechanical properties of various tissues and to gain the ability to use what they have learned to understand the problems that will arise in these systems. | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | To have knowledge about the functional structure of various tissues by applying the basic concepts and laws of biomechanics to living systems. | | | | |
| **TEXTBOOK** | | | **Pehlivan F.:** Biyofizik (2.Baskı), Hacettepe-Taş Kitapçılık, Ankara, 1997.  **Esen F**.: Ders Notları, OGÜTF Biyofizik Anabilim Dalı. | | | | |
| **OTHER REFERENCES** | | | **Çelebi G:** BiyoMedical Fizik, (2.Baskı), Barış Yayınları, Fakülteler Kitabevi, İzmir, (1995).  **Fung Y.C.:** Biomechanics, Mechanical Properties of Living Tissues, Springer-Verlag, 1984.  **Hoppe W., Lohmann W., Markl H., Ziegler H. (eds):** Biophysics, Springer-Verlag, Berlin, 1983.  **Ruch T.C, Patton H.D**: Physiology and Biophysics (19.Edition), Saunders, 1966. | | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | |  | | | | |

|  |  |  |
| --- | --- | --- |
|  | **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **DATE** | **TOPICS COVERED** |
| **1** |  | Basic concepts of biomechanics. Vectors. |
| **2** |  | Some specific forces: Contact force. Muscle force.  Compression, tension and friction force. |
| **3** |  | Components of force. |
| **4** |  | Static. Newton’s I. Law. Torque. |
| **5** |  | Bending moment and shear force. |
| **6** |  | Functional adaptation of bone |
| **7** |  | Dynamics. Newton’s II. Law. |
| **8** |  | Work and energy for the living systems. |
| **9** |  | Biomechanics of walking. |
| **10** |  | Energy expenditure during walking. |
| **11** |  | Elasticity. Stress and strain. |
| **12** |  | Bone, cartilage, muscles. |
| **13** |  | Tendons and ligaments |
| **14** |  | Energy expenditure during various physical activities. |
| **15** |  | Viscoelasticity |
| **16** |  | Viscoelastic Models. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONTRIBUTION OF THE LEARNING OUTCOMES OF THE COURSE TO THE LEARNING OUTCOMES OF THE MASTERS PROGRAM** | | **Contribution Level** | | |
| **NO** | **LEARNING OUTCOMES** | **1**  **Low** | **2**  **Mid** | **3**  **High** |
| LO 1 | Ability to Collect and Apply Information on Health Sciences |  |  | X |
| LO 2 | Ability to Scientific Inquiry and Hypothesis Formation |  |  | X |
| LO 3 | Ability to Literature Review and Evaluation |  |  | X |
| LO 4 | Ability to Design, Conduct, Analyze and Evaluate Experiments |  | **X** |  |
| LO 5 | Ability to Recognize and Use Experimental Tools and Equipment Appropriately | **X** |  |  |
| LO 6 | Ability to Work in an Interdisciplinary Team |  |  | X |
| LO 7 | Ability to Recognize Medical Problems, Ability to Formulate and Solve |  |  | X |
| LO 8 | Ability to Use Computer Effectively in Research and Data Analysis | **X** |  |  |
| LO 9 | Ability to Understand the Contribution of Experimental Studies to National and International Science |  |  | X |
| LO 10 | Effective Oral and Oral Communication/Presentation Skills |  |  | X |
| LO 11 | Ability to Understand and Apply Professional and Ethical Responsibility |  |  | X |
| LO 12 | Ability to Understand and Apply the Importance of Lifelong Learning |  |  | X |
| LO 13 | Ability to Recognize Basic Concepts in Medical Education |  |  | X |
| LO 14 | Ability to Approach Ethical Problems by Centering Basic Concepts |  |  | X |

|  |  |
| --- | --- |
| **Instructor of the Course**  **Assoc. Prof. Dr. Seçkin TUNCER**  **Signature** | **DATE**  25.03.2025 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **COURSE CODE:** 522104203 |  | **DEPARTMENT: BIOPHYSICS** | | | |
| **COURSE NAME:** INTRODUCTION TO BIOPHYSIC II | | | | | |
| **INSTRUCTOR GIVING THE COURSE**  **Assoc. Prof. Dr. Seçkin TUNCER** | | **COURSE LANGUAGE**  **Turkish: X**  **English: ** | **Category of the Course** | | |
| Technical | Medical | Other (……) |
|  | |  |  | **X** |  |

**COURSE LEVEL**

|  |  |  |  |
| --- | --- | --- | --- |
| **SCIENTIFIC PREPARATION** | **MASTERS DEGREE** | **DOCTORATE** | **SPECIALIZED FIELD COURSE** |
| **** | **X** |  | **** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **SEMESTER** | **WEEKLY CLASS HOURS** | | | **COURSE** | | | |
| **Theoretical** | **Application** | **Laboratory** | **Credit** | **ETCS** | **TYPE** | |
| Spring **X**  Fall **** | 3 | - | - | 3 | 7,5 | MANDATORY ELECTIVE  **X ** | |
|  | | | | | | | |
| **EVALUATION CRITERIA** | | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | | | **Number** | **Percentage (%)** |
| Midterm Exam | | | **1** | **40** |
| Quiz | | |  |  |
| Homework | | | **1** | **20** |
| Project | | |  |  |
| Oral Exam | | |  |  |
| Other (………) | | |  |  |
| **Final Exam** | | | | **40** |
| **PREREQUISITE(S)** | | |  | | | | |
| **SHORT COURSE CONTENT** | | | Membrane potential. Transport through channels. Transmission between cells. Biological control. Biopotentials. | | | | |
| **COURSE AIMS** | | | To give students the biophysics background they need for their professional work. | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | To comprehend the importance of physics and mathematics in understanding living things. | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | To have knowledge about the tools and methods that biophysics uses to understand vitality at the cell, tissue and organ level. | | | | |
| **TEXTBOOK** | | | **Pehlivan F.:** Biyofizik (2.Baskı), Hacettepe-Taş Kitapçılık, Ankara, 1997.  **Esen F**.: Ders Notları, ESOGÜTF Biyofizik Anabilim Dalı. | | | | |
| **OTHER REFERENCES** | | | **Çelebi G:** BiyoMedical Fizik, (2.Baskı), Barış Yayınları, Fakülteler Kitabevi, İzmir, (1995).  **Fung Y.C.:** Biomechanics, Mechanical Properties of Living Tissues, Springer-Verlag, 1984.  **Hoppe W., Lohmann W., Markl H., Ziegler H. (eds):** Biophysics, Springer-Verlag, Berlin, 1983.  **Ruch T.C, Patton H.D**: Physiology and Biophysics (19.Edition), Saunders, 1966. | | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | |  | | | | |

|  |  |  |
| --- | --- | --- |
|  | **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **DATE** | **TOPICS COVERED** |
| **1** |  | Membrane potential |
| **2** |  | Electrical equivalent circuit of cell membrane |
| **3** |  | Passive model of the cell membrane and cable theory |
| **4** |  | Excitable cells |
| **5** |  | Active propagation of the electrical signals and action potential |
| **6** |  | Hodgkin-Huxley type of equation |
| **7** |  | Transport through channels |
| **8** |  | Impulse propagation in the axonal membranes |
| **9** |  | Transmission between cells |
| **10** |  | Biological control |
| **11** |  | Control systems in the human body |
| **12** |  | Control of body temperature |
| **13** |  | Biopotentials |
| **14** |  | Bioelectrical measuring systems |
| **15** |  | Stimulators |
| **16** |  | Biological effects of electrical currents |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONTRIBUTION OF THE LEARNING OUTCOMES OF THE COURSE TO THE LEARNING OUTCOMES OF THE MASTERS PROGRAM** | | **Contribution Level** | | |
| **NO** | **LEARNING OUTCOMES** | **1**  **Low** | **2**  **Mid** | **3**  **High** |
| LO 1 | Ability to Collect and Apply Information on Health Sciences |  |  | X |
| LO 2 | Ability to Scientific Inquiry and Hypothesis Formation |  |  | X |
| LO 3 | Ability to Literature Review and Evaluation |  |  | X |
| LO 4 | Ability to Design, Conduct, Analyze and Evaluate Experiments |  | **X** |  |
| LO 5 | Ability to Recognize and Use Experimental Tools and Equipment Appropriately |  | **X** |  |
| LO 6 | Ability to Work in an Interdisciplinary Team |  |  | X |
| LO 7 | Ability to Recognize Medical Problems, Ability to Formulate and Solve |  |  | X |
| LO 8 | Ability to Use Computer Effectively in Research and Data Analysis |  | **X** |  |
| LO 9 | Ability to Understand the Contribution of Experimental Studies to National and International Science |  |  | X |
| LO 10 | Effective Oral and Oral Communication/Presentation Skills |  |  | X |
| LO 11 | Ability to Understand and Apply Professional and Ethical Responsibility |  |  | X |
| LO 12 | Ability to Understand and Apply the Importance of Lifelong Learning |  |  | X |
| LO 13 | Ability to Recognize Basic Concepts in Medical Education |  |  | X |
| LO 14 | Ability to Approach Ethical Problems by Centering Basic Concepts |  |  | X |

|  |  |
| --- | --- |
| **Instructor of the Course**  **Assoc. Prof. Dr. Seçkin TUNCER**  **Signature** | **DATE**  25.03.2025 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **COURSE CODE:** 522104204 |  | **DEPARTMENT: BIOPHYSICS** | | | |
| **COURSE NAME:** RADIATION BIOPHYSICS AND MEDICAL IMAGING METHODS | | | | | |
| **INSTRUCTOR GIVING THE COURSE**  **Assoc. Prof. Dr. Seçkin TUNCER** | | **COURSE LANGUAGE**  **Turkish: X**  **English: ** | **Category of the Course** | | |
| Technical | Medical | Other (……) |
|  | |  |  | **X** |  |

**COURSE LEVEL**

|  |  |  |  |
| --- | --- | --- | --- |
| **SCIENTIFIC PREPARATION** | **MASTERS DEGREE** | **DOCTORATE** | **SPECIALIZED FIELD COURSE** |
| **** | **X** |  | **** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **SEMESTER** | **WEEKLY CLASS HOURS** | | | **COURSE** | | | |
| **Theoretical** | **Application** | **Laboratory** | **Credit** | **ETCS** | **TYPE** | |
| Spring **X**  Fall **** | 2 | - | - | 2 | 6 | MANDATORY ELECTIVE  ** X** | |
|  | | | | | | | |
| **EVALUATION CRITERIA** | | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | | | **Number** | **Percentage (%)** |
| Midterm Exam | | | **1** | **40** |
| Quiz | | |  |  |
| Homework | | |  |  |
| Project | | |  |  |
| Oral Exam | | |  |  |
| Other (………) | | |  |  |
| **Final Exam** | | | | **60** |
| **PREREQUISITE(S)** | | |  | | | | |
| **SHORT COURSE CONTENT** | | | Radiation and life, Electromagnetic waves and biological effects, Laser, X-ray, X-ray scattering and absorption, X-ray properties, Radioactivity, Radiation absorption and effects, Ionizing radiation, Ultrasonic radiation, X-ray imaging techniques, Computed tomography, Magnetic Resonance Imaging (MRI), Nuclear Medicine imaging techniques, Positron Emission Tomography (PET), Ultrasonic Imaging (USG) and other imaging methods. | | | | |
| **COURSE AIMS** | | | To recognize the concept of radiation and electromagnetic wave spectrum, to learn the basic principles of methods used for diagnosis / treatment in medicine. | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | Thanks to the information given, it is expected to comprehend the basic principles of medical imaging methods used in diagnosis and treatment. | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | To have knowledge about the Basic Concepts of Radiation Biophysics, Basic Principles of Imaging Methods. | | | | |
| **TEXTBOOK** | | | Esen H, Esen F: BİYOFİZİK Yöntemler, Biyolojik Etkiler, Önlemler, Ankara Nobel Tıp Kitabevleri, 2017. ISBN: 978-605-9215-38-1 | | | | |
| **OTHER REFERENCES** | | | Pehlivan F.: Biyofizik (8.Baskı), Pelikan Kitabevi, Ankara, 2015. | | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | |  | | | | |

|  |  |  |
| --- | --- | --- |
|  | **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **DATE** | **TOPICS COVERED** |
| **1** |  | Radiation and life |
| **2** |  | Electromagnetic waves, biological effects and applications |
| **3** |  | Laser and biological effects |
| **4** |  | X-rays, scattering-absorption mechanisms and properties |
| **5** |  | Radioactivity |
| **6** |  | Absorption of radiation and ionizing radiation |
| **7** |  | Ultrasonography and biological effects of ultrasound |
| **8** |  | MID-TERM EXAM |
| **9** |  | X-ray imaging techniques |
| **10** |  | Computed Tomography (CT) |
| **11** |  | Magnetic Resonance Imaging (MRI) |
| **12** |  | Nuclear medicine imaging techniques |
| **13** |  | Positron Emission Tomography (PET) |
| **14** |  | Ultrasonic Imaging (USG) |
| **15** |  | Other imaging methods |
| **16** |  | FINAL EXAM |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONTRIBUTION OF THE LEARNING OUTCOMES OF THE COURSE TO THE LEARNING OUTCOMES OF THE MASTERS PROGRAM** | | **Contribution Level** | | |
| **NO** | **LEARNING OUTCOMES** | **1**  **Low** | **2**  **Mid** | **3**  **High** |
| LO 1 | Ability to Collect and Apply Information on Health Sciences |  |  | X |
| LO 2 | Ability to Scientific Inquiry and Hypothesis Formation |  |  | X |
| LO 3 | Ability to Literature Review and Evaluation |  |  | X |
| LO 4 | Ability to Design, Conduct, Analyze and Evaluate Experiments |  | X |  |
| LO 5 | Ability to Recognize and Use Experimental Tools and Equipment Appropriately | X |  |  |
| LO 6 | Ability to Work in an Interdisciplinary Team |  |  | X |
| LO 7 | Ability to Recognize Medical Problems, Ability to Formulate and Solve |  |  | X |
| LO 8 | Ability to Use Computer Effectively in Research and Data Analysis | X |  |  |
| LO 9 | Ability to Understand the Contribution of Experimental Studies to National and International Science |  |  | X |
| LO 10 | Effective Oral and Oral Communication/Presentation Skills |  |  | X |
| LO 11 | Ability to Understand and Apply Professional and Ethical Responsibility |  |  | X |
| LO 12 | Ability to Understand and Apply the Importance of Lifelong Learning |  |  | X |
| LO 13 | Ability to Recognize Basic Concepts in Medical Education |  |  | X |
| LO 14 | Ability to Approach Ethical Problems by Centering Basic Concepts |  |  | X |

|  |  |
| --- | --- |
| **Instructor of the Course**  **Assoc. Prof. Dr. Seçkin TUNCER**  **Signature** | **DATE**  25.03.2025 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **COURSE CODE:** 522104205 |  | **DEPARTMENT: BIOPHYSICS** | | | |
| **COURSE NAME:** ELECTROPHYSIOLOGICAL STUDIES IN PERIPHERAL NERVES | | | | | |
| **INSTRUCTOR GIVING THE COURSE**  **Assoc. Prof. Dr. Seçkin TUNCER** | | **COURSE LANGUAGE**  **Turkish: X**  **English: ** | **Category of the Course** | | |
| Technical | Medical | Other (……) |
|  | |  |  | **X** |  |

**COURSE LEVEL**

|  |  |  |  |
| --- | --- | --- | --- |
| **SCIENTIFIC PREPARATION** | **MASTERS DEGREE** | **DOCTORATE** | **SPECIALIZED FIELD COURSE** |
| **** | **X** |  | **** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **SEMESTER** | **WEEKLY CLASS HOURS** | | | **COURSE** | | | |
| **Theoretical** | **Application** | **Laboratory** | **Credit** | **ETCS** | **TYPE** | |
| Spring **X**  Fall **** | 2 | 2 | - | 3 | 8 | MANDATORY ELECTIVE  ** X** | |
|  | | | | | | | |
| **EVALUATION CRITERIA** | | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | | | **Number** | **Percentage (%)** |
| Midterm Exam | | | **1** | **40** |
| Quiz | | |  |  |
| Homework | | | **1** | **20** |
| Project | | |  |  |
| Oral Exam | | |  |  |
| Other (………) | | |  |  |
| **Final Exam** | | | | **40** |
| **PREREQUISITE(S)** | | |  | | | | |
| **SHORT COURSE CONTENT** | | | Compound action potential and propagation, Characteristics of nerve conduction, potentials in volume conductor, Basic principles of electroneurography (ENG) and electromyography (EMG), Measurement of nerve conduction velocity, In vitro recording from peripheral nerves, Nerve conduction velocity distribution: “Collision” method and backward problem, concept of neurodensability, Weiss's law, reobase and chronaxy concepts, measurement of neuroexcitability: threshold tracking method | | | | |
| **COURSE AIMS** | | | To be able to understand and apply the studies related to conduction and excitability in peripheral nerves. | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | It is expected to understand the basic principles of conduction and excitability measurement methods in peripheral nerves. | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | To have knowledge about the compound action potential and its propagation, the concept of neuroexcitability and conduction in peripheral nerves. | | | | |
| **TEXTBOOK** | | | Pehlivan F.: Biyofizik (8.Baskı), Pelikan Kitabevi, Ankara, 2015. | | | | |
| **OTHER REFERENCES** | | | Joel A. DeLisa, Manual of Nerve Conduction Velocity and Clinical Neurophysiology, Raven Press, 1994.  Jun Kimura, Electrodiagnosis in Diseases of Nerve and Muscle: Principles and Practice (4 ed.) Oxford University Press, 1983. | | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | |  | | | | |

|  |  |  |
| --- | --- | --- |
|  | **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **DATE** | **TOPICS COVERED** |
| **1** |  | Propagation of action potential |
| **2** |  | Compound action potential and properties |
| **3** |  | Propagation of compound action potential in peripheral nerves |
| **4** |  | Characteristics of nerve conduction |
| **5** |  | Potential in a volume conductor |
| **6** |  | Nerve-muscle junction and excitation-contraction coupling |
| **7** |  | Basic principles of Electroneurography (ENG) and Electromyography (EMG) |
| **8** |  | MID-TERM EXAM |
| **9** |  | Measurement of nerve conduction velocity |
| **10** |  | In vitro recording from peripheral nerves |
| **11** |  | Determination of nerve conduction velocity distribution: “Collision” method |
| **12** |  | Determination of nerve conduction velocity distribution: backward problem |
| **13** |  | The concept of neuroexcitability |
| **14** |  | Weiss law, reobase and chronaxie concepts |
| **15** |  | Measurement of neuroexcitability: Threshold tracking method |
| **16** |  | FINAL EXAM |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONTRIBUTION OF THE LEARNING OUTCOMES OF THE COURSE TO THE LEARNING OUTCOMES OF THE MASTERS PROGRAM** | | **Contribution Level** | | |
| **NO** | **LEARNING OUTCOMES** | **1**  **Low** | **2**  **Mid** | **3**  **High** |
| LO 1 | Ability to Collect and Apply Information on Health Sciences |  |  | X |
| LO 2 | Ability to Scientific Inquiry and Hypothesis Formation |  |  | X |
| LO 3 | Ability to Literature Review and Evaluation |  |  | X |
| LO 4 | Ability to Design, Conduct, Analyze and Evaluate Experiments |  | X |  |
| LO 5 | Ability to Recognize and Use Experimental Tools and Equipment Appropriately | X |  |  |
| LO 6 | Ability to Work in an Interdisciplinary Team |  |  | X |
| LO 7 | Ability to Recognize Medical Problems, Ability to Formulate and Solve |  |  | X |
| LO 8 | Ability to Use Computer Effectively in Research and Data Analysis | X |  |  |
| LO 9 | Ability to Understand the Contribution of Experimental Studies to National and International Science |  |  | X |
| LO 10 | Effective Oral and Oral Communication/Presentation Skills |  |  | X |
| LO 11 | Ability to Understand and Apply Professional and Ethical Responsibility |  |  | X |
| LO 12 | Ability to Understand and Apply the Importance of Lifelong Learning |  |  | X |
| LO 13 | Ability to Recognize Basic Concepts in Medical Education |  |  | X |
| LO 14 | Ability to Approach Ethical Problems by Centering Basic Concepts |  |  | X |

|  |  |
| --- | --- |
| **Instructor of the Course**  **Assoc. Prof. Dr. Seçkin TUNCER**  **Signature** | **DATE**  25.03.2025 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **COURSE CODE:** 522104206 |  | **DEPARTMENT: BIOPHYSICS** | | | |
| **COURSE NAME:** SENSOR TECHNOLOGIES | | | | | |
| **INSTRUCTOR GIVING THE COURSE**  **Assoc. Prof. Dr. Malik KAYA** | | **COURSE LANGUAGE**  **Turkish: X**  **English: ** | **Category of the Course** | | |
| Technical | Medical | Other (……) |
|  | |  |  | **X** |  |

**COURSE LEVEL**

|  |  |  |  |
| --- | --- | --- | --- |
| **SCIENTIFIC PREPARATION** | **MASTERS DEGREE** | **DOCTORATE** | **SPECIALIZED FIELD COURSE** |
| **** | **X** |  | **** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **SEMESTER** | **WEEKLY CLASS HOURS** | | | **COURSE** | | | |
| **Theoretical** | **Application** | **Laboratory** | **Credit** | **ETCS** | **TYPE** | |
| Spring **X**  Fall **** | 3 | - | - | 3 | 7,5 | MANDATORY ELECTIVE  ** X** | |
|  | | | | | | | |
| **EVALUATION CRITERIA** | | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | | | **Number** | **Percentage (%)** |
| Midterm Exam | | | **1** | **40** |
| Quiz | | |  |  |
| Homework | | |  |  |
| Project | | |  |  |
| Oral Exam | | |  |  |
| Other (………) | | |  |  |
| **Final Exam** | | | | **60** |
| **PREREQUISITE(S)** | | |  | | | | |
| **SHORT COURSE CONTENT** | | | Intoduction to sensors, working principles of sensors, sensor types, their special applicaitons in different area and sensor future. | | | | |
| **COURSE AIMS** | | | The students must comprehend the basic knowledges in the field of sensors and their special application fields and will have knowledge on sensor future. | | | | |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | Students taking this course:  - Have basic knowledge about sensors,  - Analyze the working principles of sensors,  - Effectively select and  apply the most suitable sensor type according to the area to be studied,  - Understand how to apply sensors in basic areas,  - Explain the future of sensor technology. | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | To have basic knowledge about sensors, types of sensors and special application areas. | | | | |
| **TEXTBOOK** | | | Jon S. Wilson, Sensor Technology Handbook, 2005, Elsevier. | | | | |
| **OTHER REFERENCES** | | | Michael J. McGrath and Cliodhna Ni Scanaill, Sensor Technologies Healtcare, Wellness and Environmental Applications, 2013, Apres Open. | | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | |  | | | | |

|  |  |  |
| --- | --- | --- |
|  | **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **DATE** | **TOPICS COVERED** |
| **1** |  | Intoduction to sensors |
| **2** |  | Basic working principles of the senors |
| **3** |  | Sensor fabrication techniques |
| **4** |  | Type of sensors |
| **5** |  | Sensor applicaiton areas |
| **6** |  | Sensors in the structural health monitoring |
| **7** |  | Midterm Exam |
| **8** |  | Physical and chemical sensors |
| **9** |  | Biological and bio-sensors |
| **10** |  | Sensors in medicine applicaitons |
| **11** |  | Sensors in biomedical applicaitons |
| **12** |  | Key komponents of a sensor technology: Hardware and Software |
| **13** |  | Sensor networks and their desing |
| **14** |  | Data collection and processing in sensors |
| **15** |  | Summary and future trends |
| **16** |  | FINAL EXAM |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CONTRIBUTION OF THE LEARNING OUTCOMES OF THE COURSE TO THE LEARNING OUTCOMES OF THE MASTERS PROGRAM** | | **Contribution Level** | | |
| **NO** | **LEARNING OUTCOMES** | **1**  **Low** | **2**  **Mid** | **3**  **High** |
| LO 1 | Ability to Collect and Apply Information on Health Sciences |  | **X** |  |
| LO 2 | Ability to Scientific Inquiry and Hypothesis Formation |  | **X** |  |
| LO 3 | Ability to Literature Review and Evaluation |  | **X** |  |
| LO 4 | Ability to Design, Conduct, Analyze and Evaluate Experiments |  | **X** |  |
| LO 5 | Ability to Recognize and Use Experimental Tools and Equipment Appropriately |  |  | **X** |
| LO 6 | Ability to Work in an Interdisciplinary Team |  | **X** |  |
| LO 7 | Ability to Recognize Medical Problems, Ability to Formulate and Solve |  | **X** |  |
| LO 8 | Ability to Use Computer Effectively in Research and Data Analysis |  |  | **X** |
| LO 9 | Ability to Understand the Contribution of Experimental Studies to National and International Science | **X** |  |  |
| LO 10 | Effective Oral and Oral Communication/Presentation Skills |  |  |  |
| LO 11 | Ability to Understand and Apply Professional and Ethical Responsibility |  | **X** |  |
| LO 12 | Ability to Understand and Apply the Importance of Lifelong Learning |  | **X** |  |
| LO 13 | Ability to Recognize Basic Concepts in Medical Education |  | **X** |  |
| LO 14 | Ability to Approach Ethical Problems by Centering Basic Concepts |  | **X** |  |

|  |  |
| --- | --- |
| **Instructor of the Course**  **Assoc. Prof. Dr. Malik KAYA**  **Signature** | **DATE**  25.03.2025 |