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| **MEDICAL BIOLOGY MASTER’S DEGREE PROGRAM - Courses – ECTS Credits(T.Biyoloji YL)** |
| **FALL SEMESTER** |
| Course Code |  Course Name | ECTS | T+P+L | C/E | Language |
| [**521103202**](#DERS521103202) | [**RULES IN LABORATORY STUDIES AS TECHNICAL AND HEALTH**](#LabRULES)  | **7,5** | **2+0+0** | **COMPULSORY** | **TURKISH** |
| [**521103203**](#DERS521103203) | [**NUCLEIC ACIDS AND PROTEIN SYNTHESIS**](#NucleicACIDSandPROTEINsynthesis) | **7,5** | **2+0+0** | **COMPULSORY** | **TURKISH** |
| [**521103209**](#DERS521103209) | [**COMPERATIVE BIOLOGY OF ORGAN SYSTEMS**](#OrganBiology) | **7,5** | **2+2+0** | **COMPULSORY** | **TURKISH** |
| [521105204](#DERS521105204) | [INTERCELLULAR AND INTRACELLULAR COMMUNICATION](#IntracellularCommunication)  | 5 | 2+2+0 | ELECTIVE | TURKISH |
| [521103205](#DERS521103205) | [TELOMERE AND TELOMERASE ACTIVITY](#Telomerase) | 7,5 | 3+0+0 | ELECTIVE | TURKISH |
| [521105206](#DERS521105206) | [GENETICALLY MODIFIED ORGANISMS AND CYTOTOXIC EFFECTS](#GDO) | 5 | 2+2+0 | ELECTIVE | TURKISH |
| [521103207](#DERS521103207) | [MONOOXYGENASES](#Monooxygenases) | 7,5 | 3+0+0 | ELECTIVE | TURKISH |
| [521103208](#DERS521103208) | [PROTEOME AND PROTEOMICS](#Proteomes) | 7,5 | 3+0+0 | ELECTIVE | TURKISH |
| **521103400** | **SEMINAR** | **7,5** | **0+1+0** | **COMPULSORY** | **TURKISH** |
| **521101700** | **SPECIALIZATION FIELD COURSE** | **5** | **3+0+0** | **COMPULSORY** | **TURKISH** |
| **521101200** | **MASTER'S THESIS** | **25** | **0+1+0** | **COMPULSORY** | **TURKISH** |
| **520111103** | **RESEARCH METHODS AND PUBLISHING ETHICS\*** | **7,5** | **3+0+3** | **COMPULSORY** | **TURKISH** |
|  |  |  |  |  |
| **SPRİNG SEMESTER** |
| Course Code |  Course Name | ECTS | T+P+L | C/E | Language |
| [521104201](#DERS521104201) | [AMİNO ACID CROMATOGRAPHIC TECHNIQUES](#aminoacidCHROMATOGRAPHY) | 7,5 | 2+2+0 | ELECTIVE | TURKISH |
| [521104202](#DERS521104202) | [BIOLOGY OF EXPERIMENT ANIMALS AND USING OF EXPERIMENTAL TECHNIQUES](#AnimalsEXPERIMENT) | 7,5 | 2+2+0 | ELECTIVE | TURKISH |
| [521106203](#DERS521106203) | [STRUCTURE OF MITOCHONDRIA MITOCHONDRIAL DNA AND DISEASES](#mitochondriANDitsDNA) | 5 | 2+0+0 | ELECTIVE | TURKISH |
| [521106204](#DERS521106204) | [THE DETERMINATION OF PROTEIN EXPRESSION BY USING WITH SDS PAGE AND WESTERN BLOT ANALYSIS](#SDSPAGE) | 5 | 1+2+0 | ELECTIVE | TURKISH |
| [521106205](#DERS521106205) | [INTRODUCTİON OF NANOBİOLOGY](#NANOBIOLOGY) | 5 | 2+0+0 | ELECTIVE | TURKISH |
| [521104206](#DERS521104206) | [PROBLEMS OF CELL CULTURE AND CELL LINES THAT SHOULD BE CONSİDERED IN THE SELECTION OF THOSE](#CELLculture) | 7,5 | 2+2+0 | ELECTIVE | TURKISH |
| 521104207 | [CANCER MOLECULAR BIOLOGY](#DERS521104207) | 7,5 | 3+0+0 | ELECTIVE | TURKISH |
| **521103400** | **SEMINAR** | **7,5** | **0+1+0** | **COMPULSORY** | **TURKISH** |
| **521101700** | **SPECIALIZATION FIELD COURSE** | **5** | **3+0+0** | **COMPULSORY** | **TURKISH** |
| **521101200** | **MASTER'S THESIS** | **25** | **0+1+0** | **COMPULSORY** | **TURKISH** |
| **520111103** | **RESEARCH METHODS AND PUBLISHING ETHICS\*** | **7,5** | **3+0+3** | **COMPULSORY** | **TURKISH** |

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| **COURSE CODE:** | 521103202 | **DEPARTMENT:** Medical Biology |
| **COURSE NAME:** | Rules in laboratory studies as technical and health |
| **INSTRUCTOR NAME** | **COURSE LANGUAGE** | **Course Catagory** |
| Technical | Medical | Other(……) |
| Prof. Dr. İrfan DEĞİRMENCİ | Turkish |  | x |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **Ph.D.** | **COURSE OF PROVINCE** |
| **** | **x** | **** | **** |

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| **SEMESTER** | **WEEKLY COURSE PERIOD** | **COURSE OF** |
| **Theoric** | **Practice** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| Fall | 2  | 2  |   | 3  | 7,5 | COMPULSORY |
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| **ASSESMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **ACTIVITY** | **Quantity** | **Percentage (%)** |
| Mid-Term |  | **50**  |
| Quiz |  |   |
| Homework |   |   |
| Project |   |   |
| Report  |  |  |
| Other (………) |  |  |
| **FInal ExamInatIon** | **50** |
| **PREREQUISITE(S)** |   |
| **SHORT COURSE CONTENT** | Aim of using laboratory and contents, Rules of molecular biology laboratory, General laboratory methods, Security procedure, Preparing solutions, Destruction of chemical and solution, Using methods of equipments, Required material of laboratory, Vital investigation in laboratory, Using microscope and types in laboratory, Destruction of waste after experiment, Method writing and filing in study, Planned of study and application series, Material which is going to save to prepare |
| **COURSE AIMS** | To give information about rules of molecular biology laboratory. |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | The students learn how must be the molecular biology laboratory. By preparing homework, to learn the literature collection and presentation their work. |
| **LEARNING OUTCOMES OF THE COURSE**  | Can work safely in a laboratory environment. Can apply general methods in laboratories. Can prepare necessary chemicals and solutions. Can use general devices found in laboratories. Can dispose of waste resulting from experiments appropriately. Can plan and design the experiment to be implemented. Can prepare a research project. Can file experiment results appropriately. |
| **TEXTBOOK** |  |
| **OTHER REFERENCES** | 1. Laboratory Biosafety Manual, World Heath Organization, Genova
2. Hammersen, F.: Histology Color Atlas of Miroscopic Anatomy, Third Edition, Urbon-Schwarzenberg,Baltimore-Munich,1985
3. Pontin, C.F.A., (Çev: Korol,S.): Biyologlar İçin Mikroskop Tekniği Hakkında Notlar, Güven Matbaası, Ankara, 1960
4. Prophet, B.E., Mills B., Arington, B.: Laboratory Metods in Histotechnology Published by the American Registry of Pathology, Washington, D.C., 1992.
5. Sümbüllüoğlu, İ., Sümbüllüoğlu K.: Sağlık Bilimleri Araştırma Yöntemleri, Ankara, 1988.
6. Tamer, Ü.A.: Mikrobiyoloji Lab. Klavuzu, And. Ünv., Eğitim Sağlık ve Bilimsel Araştırma Çalışmaları Vakfı Yayınları, No 7, Eskişehir.
 |
| **TOOLS AND EQUIPMENTS REQUIRED**  |  |

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|  | **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 | Aim of using laboratory and contents, |
| 2 | Rules of molecular biology laboratory |
| 3 | General laboratory methods |
| 4 | Security producure |
| 5 | Preparing solutions |
| 6 | Destruction of chemical and solution |
| 7 | Using methods of equipments |
| 8 | Required material of laboratory  |
| 9 | MIDTERM EXAM |
| 10 | Vital investigation in laboratory |
| 11 | Using microscope and types in laboratory |
| 12 | Destruction of waste after experiment |
| 13 | Method writing and filing in study |
| 14 | Planned of study and application series |
| 15 | Material which is going to save,to prepare |
| 16 | FINAL EXAM |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (MSc)** | **1**Low | **2**MId | **3**HIgh |
| LO 1 | Ability to Recognize Basic Concepts in Medical Education |  | X |  |
| LO 2 | Literature Review and Evaluation Skills | X |  |  |
| LO 3 | Ability to Collect Information on Health Sciences and Apply the Information Obtained |  | X |  |
| LO 4 | Ability to Recognize, Formulate and Solve Medical Problems |  | X |  |
| LO 5 | Ability to Use Basic Concepts in the Health Field |  | X |  |
| LO 6 | Scientific Inquiry and Hypothesis Generation Skills |  |  | X |
| LO 7 | Ability to Design, Conduct Experiments, Analyze and Evaluate Data |  |  | X |
| LO 8 | Ability to Recognize and Appropriately Use Experimental Tools and Equipment |  |  | X |
| LO 9 | Ability to Use Computers/Programs Effectively in Research and Data Analysis |  |  | X |
| LO 10 | Ability to Work Effectively in Laboratories |  |  | X |
| LO 11 | Ability to Write a Research Project |  | X |  |
| LO 12 | Ability to Present Project Results in National/International Areas |  | X |  |
| LO 13 | Effective Written and Oral Communication/Presentation Skills |  | X |  |
| LO 14 | Ability to Develop New Technological Equipment/Methods |  | X |  |

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| **INSTRUCTOR NAME** | **DATE** |
| Prof. Dr. İrfan DEĞİRMENCİ |  |

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| **COURSE CODE:** | 521103203 | **DEPARTMENT:** Medical Biology |
| **COURSE NAME:** | Nucleic acids and Protein Synthesis |
| **INSTRUCTOR NAME** | **COURSE LANGUAGE** | **Course Catagory** |
| Technical | Medical | Other(……) |
| Prof. Dr. HÜLYAM KURT | Turkish |  | X |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **Ph.D.** | **COURSE OF PROVINCE** |
| **** | X | **** | **** |

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| **SEMESTER** | **WEEKLY COURSE PERIOD** | **COURSE OF** |
| **Theoric** | **Practice** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| Fall |  3 |  0 |   | 3 | 7,5 | Compulsory |
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| **ASSESMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **ACTIVITY** | **Quantity** | **Percentage (%)** |
| Mid-Term |  | **50**  |
| Quiz |  |   |
| Homework |   |   |
| Project |   |   |
| Report  |  |  |
| Other (………) |  |  |
| **FInal ExamInatIon** | **50** |
| **PREREQUISITE(S)** |  -- |
| **SHORT COURSE CONTENT** | Structure and functions of nucleic acids;Transcription and Replication of. nucleic acids in Procaryot and eucaryot; Nucleic acids repair systems: Protein synthesis |
| **COURSE AIMS** | Learn and ivestigate to structure and function of nucleic acids in the last references |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | The student learn about nucleic acids; By preparing homework, they learn the literature collection and presantation their work |
| **LEARNING OUTCOMES OF THE COURSE**  | Can define the general properties of DNA and RNA molecules. Can explain DNA, RNA and protein synthesis. Can list the types of RNA. Can explain DNA damage and repair. Can express the structure and functioning of genes. |
| **TEXTBOOK** | Güneş,HV. Moleküler Hücre Biyolojisi, Kaan Kitabevi, 2003 |
| **OTHER REFERENCES** | Lewin B. Genes VI, Oxford University Press, 1997,Alberts B,Bray D, Lewis J. at all. Molecular Biology of The Cell,Garland  Publishing,Inc, New York, 1994Pollard TD.,Earnshaw WC. Cell Biology,Saunders, New York2002.Reed R. Coupling transcription, splicing and mRNA export. Current Opinion in  Cell Biology 2003, 15: 326-331.Caceres JF and Kornblihtt AR. Alternative splicing. Trends in Genetics, 2002,  18(4):186-193.Adelantado EM, Filippo JS, Abarca FM. Mobility of the Sinorhizobium meliloti  Group II Intron Rmlnt1 Occurs by Reverse Splicing into DNA.  Journal of Molecular Biology 2003. 327: 931-943. |
| **TOOLS AND EQUIPMENTS REQUIRED**  |  |

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|  |  **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 | Discovery of DNA,Futures of nucleic acids |
| 2 | PlasmidsStructure and types of RNAs |
| 3 | Transcription, Regulation of transcription |
| 4 | Synthesis of r RNA , **t** RNA and m RNA  |
| 5 | Formation of Cap and poly AProcessing of hnRNA  |
| 6 | DNA synthesis |
| 7 | Replication of DNA in Procaryotic and eucaryotic cell  |
| 8 | WRITTEN EXAM |
| 9 | DNA damage and repair |
| 10 | Protein synthesis |
| 11 | Protein synthesis |
| 12 | Structure and function of Procaryotic and eucaryotic genes Operon  |
| 13 | **Presentation of homework:**  |
| 14 | **Presentation of homework:** |
| 15 | **Presentation of homework:** |
| 16 | WRITTEN EXAM |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (MSc)** | **1**Low | **2**MId | **3**HIgh |
| LO 1 | Ability to Recognize Basic Concepts in Medical Education |  |  | X |
| LO 2 | Literature Review and Evaluation Skills |  |  | X |
| LO 3 | Ability to Collect Information on Health Sciences and Apply the Information Obtained |  | X |  |
| LO 4 | Ability to Recognize, Formulate and Solve Medical Problems |  | X |  |
| LO 5 | Ability to Use Basic Concepts in the Health Field |  | X |  |
| LO 6 | Scientific Inquiry and Hypothesis Generation Skills |  |  | X |
| LO 7 | Ability to Design, Conduct Experiments, Analyze and Evaluate Data | X |  |  |
| LO 8 | Ability to Recognize and Appropriately Use Experimental Tools and Equipment | X |  |  |
| LO 9 | Ability to Use Computers/Programs Effectively in Research and Data Analysis | X |  |  |
| LO 10 | Ability to Work Effectively in Laboratories |  | X |  |
| LO 11 | Ability to Write a Research Project |  | X |  |
| LO 12 | Ability to Present Project Results in National/International Areas |  | X |  |
| LO 13 | Effective Written and Oral Communication/Presentation Skills |  |  | X |
| LO 14 | Ability to Develop New Technological Equipment/Methods |  | X |  |

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| **INSTRUCTOR NAME** | **DATE** |
| Prof. Dr. HÜLYAM KURT |  |

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| **COURSE CODE:** | 521103209 | **DEPARTMENT:** Medical Biology |
| **COURSE NAME:** | Comperative Biology Of Organ Systems |
| **INSTRUCTOR NAME** | **COURSE LANGUAGE** | **Course Catagory** |
| Technical | Medical | Other(……) |
|  Prof. Dr. M. CENGİZ ÜSTÜNER | Turkish |  | X |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **Ph.D.** | **COURSE OF PROVINCE** |
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| **SEMESTER** | **WEEKLY COURSE PERIOD** | **COURSE OF** |
| **Theoric** | **Practice** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| Fall | 3 | 0 |   | 3 | 7,5 | Compulsory |
|  |
| **ASSESMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **ACTIVITY** | **Quantity** | **Percentage (%)** |
| Mid-Term |  | **50**  |
| Quiz |  |   |
| Homework |   |   |
| Project |   |   |
| Report  |  |  |
| Other (………) |  |  |
| **FInal ExamInatIon** | **50** |
| **PREREQUISITE(S)** |  -- |
| **SHORT COURSE CONTENT** | Organ systems, their functions, structure, and their relative comparision from single cell organisms to human |
| **COURSE AIMS** | Investigation of organ systems function and structure by comparing in protozoa and metazoa |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | To teach the stuendts the comperative biology of organ systems regarding from a unicellular to multicellular organism like human in a detailed way; By preparing homework, they learn the literature collection and presantation their work |
| **LEARNING OUTCOMES OF THE COURSE**  | Can describe the digestive system. Can describe the circulatory system. Can describe the respiratory system. Can describe the excretory system. Can describe the reproductive system. Can describe the nervous system. Can describe the endocrine system. Can describe the muscular and skeletal system. |
| **TEXTBOOK** | Başaran, A.: Tıbbi Biyoloji Ders Kitabı, Eskişehir, 2004. |
| **OTHER REFERENCES** | * Rhaesa, A,S.: The evolution of organ system (Oxford biology), New York,2007
* www.emc.maricopa.edu/faculty/farabee/BIOBK/BioBookEXCRET.html

Mader S.S.: Biology. Dubuque, 1996 |
| **TOOLS AND EQUIPMENTS REQUIRED**  |  |

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|  |  **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 | Digestive System |
| 2 | Circulatory System I |
| 3 | Circulatory System II |
| 4 | Respiratory System |
| 5 | Excretory System I |
| 6 | Excretory System II |
| 7 | Muscular and Skeletal System |
| 8 | Written Exam |
| 9 | Reproductive System I |
| 10 | Reproductive System II |
| 11 | Nervous System I |
| 12 | Nervous System II |
| 13 | Endocrine System I |
| 14 | Endocrine System II |
| 15 | **Homework Presentation** |
| 16 | **Final Exam** |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (MSc)** | **1**Low | **2**MId | **3**HIgh |
| LO 1 | Ability to Recognize Basic Concepts in Medical Education |  |  | X |
| LO 2 | Literature Review and Evaluation Skills |  |  | X |
| LO 3 | Ability to Collect Information on Health Sciences and Apply the Information Obtained |  | X |  |
| LO 4 | Ability to Recognize, Formulate and Solve Medical Problems |  | X |  |
| LO 5 | Ability to Use Basic Concepts in the Health Field |  | X |  |
| LO 6 | Scientific Inquiry and Hypothesis Generation Skills |  |  | X |
| LO 7 | Ability to Design, Conduct Experiments, Analyze and Evaluate Data |  | X |  |
| LO 8 | Ability to Recognize and Appropriately Use Experimental Tools and Equipment |  | X |  |
| LO 9 | Ability to Use Computers/Programs Effectively in Research and Data Analysis | X |  |  |
| LO 10 | Ability to Work Effectively in Laboratories | X |  |  |
| LO 11 | Ability to Write a Research Project | X |  |  |
| LO 12 | Ability to Present Project Results in National/International Areas | X |  |  |
| LO 13 | Effective Written and Oral Communication/Presentation Skills |  |  | X |
| LO 14 | Ability to Develop New Technological Equipment/Methods |  | X |  |

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| **INSTRUCTOR NAME** | **DATE** |
| Prof. Dr. M. CENGİZ ÜSTÜNER |  |

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| **COURSE CODE:** | 521105204 | **DEPARTMENT:** Medical Biology |
| **COURSE NAME:** | Intercellular and Intracellular Communications |
| **INSTRUCTOR NAME** | **COURSE LANGUAGE** | **Course Catagory** |
| Technical | Medical | Other(……) |
| Prof. Dr. M. Cengiz ÜSTÜNER | Turkish |  | x |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **Ph.D.** | **COURSE OF PROVINCE** |
| **** | **x** | **** | **** |

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| **SEMESTER** | **WEEKLY COURSE PERIOD** | **COURSE OF** |
| **Theoric** | **Practice** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| Fall | 2  |  |   | 2  | 5 | ELECTIVE |
|  |
| **ASSESMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **ACTIVITY** | **Quantity** | **Percentage (%)** |
| Mid-Term |  | **50**  |
| Quiz |  |   |
| Homework |  |  |
| Project |   |   |
| Report  |  |  |
| Other (………) |  |  |
| **FInal ExamInatIon** | **50** |
| **PREREQUISITE(S)** |   |
| **SHORT COURSE CONTENT** | Types of intercellular communications; cell surphace and intracellular receptors; relation of ligand-receptor, and signaling the role of protein kinase and protein phosphates; activation of adenyl cyclase by G protein receptor and G protein ; formation of signal by cAMP, cGMP, Ca+2, Ca+2-calmodulin complex; signal transduction by PIP2 (IP3, DAG); some diseases due to defective signal proteins that have role on cellular communication. |
| **COURSE AIMS** | -To give a cellular concept that littlest part of an organism is very important for coninuity of the life.-To give the understanding at molecular level that every mutation occure in a receptor protein and/or in a stimulative molecule have very effective role in this regulatory system. |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | -To choose their scientific research subject among these themes and to investigate the choosen subject at molecular level.-To investigate developing a cancerous cell in a cancer type.-To determine a mutation in a gene related to a disease.-To investigate effective point of the treatment in this pathway. |
| **LEARNING OUTCOMES OF THE COURSE**  | Explain the types of intercellular signals. Explain extracellular signals and responses to these signals. Classify ligand and receptor relationships. Explain the types of intracellular signals. Explain the different signaling pathways made by second messengers. Express the relationship between the cell signaling system and diseases. |
| **TEXTBOOK** |  |
| **OTHER REFERENCES** | -Pollard, T.D., Earnshaw, W.C.: Cell Biology, London, New-York, St-Louis, Sydney,Toronto, 2002.-Bray, A., Raff, K., Watson, R.: Molecular Biology of the Cell, Secon Ed., New-York, London, 1989.-Cooper, G.M.: The Cell, Washington D.C., 1997.Başaran A.: Tıbbi Biyoloji Ders Kitabı, Pelikan Yayınları, 8. Baskı, Pelikan Yayınları, İstanbul. |
| **TOOLS AND EQUIPMENTS REQUIRED** |  |

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|  |  **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 | Intercellular stimulation, intercellular communication.  |
| 2 | Endocrine signaling, paracrine signaling, synaptic signaling, autocrine signaling. |
| 3 | The role of extracellular signalings in cellular metabolism. |
| 4 | Cellular signalings and their receptors. |
| 5 | Intracellular signal transduction: Cell surface receptors and other receptors. |
| 6 | G protein-coupled receptors. |
| 7 | G proteins. |
| 8 | Activation of adenyl cyclase by G protein. |
| 9 | Seconder messangers. |
| 10 | 3’-5’ AMP (cAMP), 3’-5’ GMP (cGMP), Ca+2 ions, calmodulin. |
| 11 | Relationship betwen cAMP and calcium messangers. |
| 12 | Inositol 4,5-biphosphate (IP2) and 1,2-diacylglycerol. |
| 13 | Inositol 1,4,5-triphosphate (IP3) and 1,2-diacylglycerol.. |
| 14 | Signaling by steroid hormone receptors. |
| 15 | Diseases due to defects in intercellular signaling system. |
| 16 | Overview of the whole subjects. |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (MSc)** | **1**Low | **2**MId | **3**HIgh |
| LO 1 | Ability to Recognize Basic Concepts in Medical Education |  |  | X |
| LO 2 | Literature Review and Evaluation Skills |  |  | X |
| LO 3 | Ability to Collect Information on Health Sciences and Apply the Information Obtained |  |  | X |
| LO 4 | Ability to Recognize, Formulate and Solve Medical Problems |  | X |  |
| LO 5 | Ability to Use Basic Concepts in the Health Field |  | X |  |
| LO 6 | Scientific Inquiry and Hypothesis Generation Skills |  | X |  |
| LO 7 | Ability to Design, Conduct Experiments, Analyze and Evaluate Data | X |  |  |
| LO 8 | Ability to Recognize and Appropriately Use Experimental Tools and Equipment | X |  |  |
| LO 9 | Ability to Use Computers/Programs Effectively in Research and Data Analysis | X |  |  |
| LO 10 | Ability to Work Effectively in Laboratories | X |  |  |
| LO 11 | Ability to Write a Research Project |  | X |  |
| LO 12 | Ability to Present Project Results in National/International Areas |  | X |  |
| LO 13 | Effective Written and Oral Communication/Presentation Skills |  |  | X |
| LO 14 | Ability to Develop New Technological Equipment/Methods |  | X |  |

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| **INSTRUCTOR NAME** | **DATE** |
| Prof. Dr. M. Cengiz ÜSTÜNER |  |

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|  **COURSE CODE:** | 521103205 | **DEPARTMENT:** Medical Biology |
| **COURSE NAME:**Telomere and Telomerase Activity |
| **INSTRUCTOR NAME** | **COURSE LANGUAGE** | **Course Catagory** |
| Technical | Medical | Other(……) |
| Prof. Dr. DİDEM TURGUT COŞAN | Turkish |  | X |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **Ph.D.** | **COURSE OF PROVINCE** |
| **** | X | **** | **** |

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| **SEMESTER** | **WEEKLY COURSE PERIOD** | **COURSE OF** |
| **Theoric** | **Practice** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| Fall |  2 | 2 |   | 3 | 7,5 | ELECTIVE |
|  |
| **ASSESMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **ACTIVITY** | **Quantity** | **Percentage (%)** |
| Mid-Term |  | **50**  |
| Quiz |  |   |
| Homework |   |   |
| Project |   |   |
| Report  |  |  |
| Other (………) |  |  |
| **FInal ExamInatIon** | **50** |
| **PREREQUISITE(S)** |  -- |
| **SHORT COURSE CONTENT** | Determination of telomeric localization on the chromosomes; structures of telomeric DNA and single strand and double strand telomeric proteins; structure and function of telomerases; replication of telomeric DNA; the role of telomerases on the apoptotic and non-apoptotic cell death; the analyses methods of telomeric enzyme activity. |
| **COURSE AIMS** | -To emphasis on the reterdation studies of senescence and relation between cancer and telomerase.-To give opportunity of experimental studies related to this subject to the students.-To determine telomerase activity in different cancer cells |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | -To give to the students the analyses opportunity of telomeric and telomerase activity on cancer cells.-To give to the students to measures opportunity of telomeric proteins and telomerase main protein TERT (telomerase reverse transkriptase). |
| **LEARNING OUTCOMES OF THE COURSE**  | Explain the term telomere. Describe the functions and duties of telomeres. Identify the proteins attached to telomeres and explain their duties. Explain telomeric DNA replication. Explain the duties and duties of telomerase enzyme. Identify the proteins that help telomerase. Understand the relationship between telomerase and cell death and other diseases. |
| **TEXTBOOK** | Ayşe Başaran: Detailed conference text on telomeres and telomerases and various literatures. |
| **OTHER REFERENCES** | -Smith., De Lang, T.: TRF1, a manual telomeric protein, TIG, Vol.13, No. 1, 1997. (Telomer proteini ekstraksiyon metodu)-Wiley, J.: Telomere and Telomerase, Willey J. And Ions, INC, England, 1997.-Rudolph, K.L., Chang., S., Lee, H ve ark.: Longevity, Stress Response, and Cancer in aging telomerase-deficient Nice, Cell, Vol:96, 701-712.-Counter C.M., Gupta J., Harley, C.B. ve ark.. Telomerase activity in normal leukocytes and in hematologic malignancies, Blood, Vol:85, No:9, (May1), 1995:2315-2320. |
| **TOOLS AND EQUIPMENTS REQUIRED**  |  |

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|  |  **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 | Localization of telomeres and structure of telomere . |
| 2 | Functions of telomere. |
| 3 | Telomeric DNA and base sequences of telomeric DNA in human and various organisms. |
| 4 | Single strand and double strand telomeric proteins. |
| 5 | Replication of telomeric DNA. |
| 6 | Telomeric DNA in the cells of young and old and cancer cells. |
| 7 | Telomerase enzyme and its structure. |
| 8 | Activity of telomerase enzyme. |
| 9 | RNA of telomerase. |
| 10 | Main telomerase protein (Telomerase Reverse Transcriptase). |
| 11 | Telomerase helper proteins. |
| 12 | DNA of telomerase; occurrance of some abnormalities due to telomerase enzyme absence. |
| 13 | Programmed cell death (apoptosis). |
| 14 | The role of telomeric DNA and telomerase activity on the apoptosis. |
| 15 | Determination techniques of telomerase enzyme activity and their comparison. |
| 16 | Overview of the whole subjects. |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (MSc)** | **1**Low | **2**MId | **3**HIgh |
| LO 1 | Ability to Recognize Basic Concepts in Medical Education |  |  | X |
| LO 2 | Literature Review and Evaluation Skills |  |  | X |
| LO 3 | Ability to Collect Information on Health Sciences and Apply the Information Obtained |  |  | X |
| LO 4 | Ability to Recognize, Formulate and Solve Medical Problems |  | X |  |
| LO 5 | Ability to Use Basic Concepts in the Health Field |  |  | X |
| LO 6 | Scientific Inquiry and Hypothesis Generation Skills |  | X |  |
| LO 7 | Ability to Design, Conduct Experiments, Analyze and Evaluate Data | X |  |  |
| LO 8 | Ability to Recognize and Appropriately Use Experimental Tools and Equipment | X |  |  |
| LO 9 | Ability to Use Computers/Programs Effectively in Research and Data Analysis | X |  |  |
| LO 10 | Ability to Work Effectively in Laboratories | X |  |  |
| LO 11 | Ability to Write a Research Project |  | X |  |
| LO 12 | Ability to Present Project Results in National/International Areas |  | X |  |
| LO 13 | Effective Written and Oral Communication/Presentation Skills |  |  | X |
| LO 14 | Ability to Develop New Technological Equipment/Methods |  | X |  |

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| **INSTRUCTOR NAME** | **DATE** |
| Prof. Dr. DİDEM TURGUT COŞAN |  |

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| **COURSE CODE:** | 521105206 | **DEPARTMENT:** Medıcal Biology |
| **COURSE NAME:** | Genetically Modified Organisms and Cytotoxic Effects |
| **INSTRUCTOR NAME** | **COURSE LANGUAGE** | **Course Catagory** |
| Technical | Medical | Other(……) |
| Prof. Dr. M. Cengiz ÜSTÜNER | Turkish |  | x |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **Ph.D.** | **COURSE OF PROVINCE** |
| **** | x | **** | **** |

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| **SEMESTER** | **WEEKLY COURSE PERIOD** | **COURSE OF** |
| **Theoric** | **Practice** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| Autumn | 2  | 0  |   | 2  | 5 | ELECTIVE |
|  |
| **ASSESMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **ACTIVITY** | **Quantity** | **Percentage (%)** |
| Mid-Term |  | **50** |
| Quiz |  |   |
| Homework |  |   |
| Project |   |   |
| Report  |  |  |
| Other (………) |  |  |
| **FInal ExamInatIon** | **50** |
| **PREREQUISITE(S)** |   |
| **SHORT COURSE CONTENT** | Definition of genetically modified organisms. Evaluation of the relationship between genetically modified organisms, and molecular biology. Formation mechanism of genetically modified organisms. Types of genetically modified organisms.Application areas.Determine the effects of the environment.To reveal the mechanism of cytotoxic effect on human health.Useful identification of genetically modified organisms.To reveal the advantages and disadvantages. |
| **COURSE AIMS** | Determination of genetically modified organisms and to reveal cytotoxic effects. |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | To identify the genetically modified organism,To reveal the relationship between genetically modified organisms and molecular biology,To identify usage areas,To explain the mechanism of cytotoxic effect on human health, |
| **LEARNING OUTCOMES OF THE COURSE**  | Define genetically modified organism (GMO). Define the relationship between GMO and molecular biology. Explain the mechanisms of GMO formation. Know the types of genetically modified organisms. Explain the use of GMO in agriculture, food, animal husbandry and health. Evaluate the safety of GMO and its effects on the environment. Understand its effects on human health. Understand its advantages and disadvantages. |
| **TEXTBOOK** |  |
| **OTHER REFERENCES** | Bush, R.R., Hefle. S.L.: “Food allergens.” In: Critical Reviews in Food Science and Nutrition,Allergenicity of Foods Produced by Genetic Modification, IFBC/ILSI 36(S),S119-S150, 1996.Lehrer, S., Reese. G.: “Food Allergens: Implictions for biotechnology.” In: Biotechnology and Safety Assessment, 2nd ed., J. Thomas ed. Taylor and Francis, 127-150, 1998.Lehrer, S.B., Reese. G.: “Biosafety of genetically modified plants and microorganisms: Recent developments in approaches to evaluation of allergenicity.” In: The Fourth International Symposium on the Biosafety Results of Field Tests of Genetically Modified Plants and Microorganisms. 1-12, 1997.Lehrer, S.B., Horner, W.E., Reese. G.: ”Why are some proteins allergenic? Implications for biotechnology.” Critical Review in Food Science and Nutrition 36(6), 553-64, 1996.Matsuda, T., Alvarez, A.M., Tada, Y., Adachi T., Nakamura. R.: “Gene engineering for hypo-allergenic rice: repression of allergenic protein synthesis in seeds of transgenic rice plants by antisense RNA.” In: Proceedings of the International Workshop on Life Science in Production and Food-consumption of Agricultural Products, Session-4, 1993. |
| **TOOLS AND EQUIPMENTS REQUIRED**  |  |

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|  |  **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 | Definition of genetically modified organisms.Bioengineering, biotechnology, biosecurity concepts and interactions of their scope |
| 2 | Biotechnological applications on the different approaches to the past, present and future |
| 3 | Genetically modified organisms and the relationship between molecular biology |
| 4 | Formation mechanism of genetically modified organisms I |
| 5 | Formation mechanism of genetically modified organisms II |
| 6 | Types of genetically modified organisms I |
| 7 | Types of genetically modified organisms II |
| 8 | Application areas - agricultural production, food, animal husbandry |
| 9 | Application areas - the health field |
| 10 | Importance of genetic resources and biosafety |
| 11 | Identify the effects of the environment |
| 12 | Cytotoxic mechanism of action of human health I |
| 13 | Cytotoxic mechanism of action of human health II |
| 14 | Determination of beneficial genetically modified organisms |
| 15 | To reveal the advantages and disadvantages of genetically modified organisms |
| 16 | Convention on Biological Diversity Cartagena Protocol on Biosafety |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (MSc)** | **1**Low | **2**MId | **3**HIgh |
| LO 1 | Ability to Recognize Basic Concepts in Medical Education |  |  | X |
| LO 2 | Literature Review and Evaluation Skills |  |  | X |
| LO 3 | Ability to Collect Information on Health Sciences and Apply the Information Obtained |  |  | X |
| LO 4 | Ability to Recognize, Formulate and Solve Medical Problems |  | X |  |
| LO 5 | Ability to Use Basic Concepts in the Health Field |  | X |  |
| LO 6 | Scientific Inquiry and Hypothesis Generation Skills |  | X |  |
| LO 7 | Ability to Design, Conduct Experiments, Analyze and Evaluate Data |  | X |  |
| LO 8 | Ability to Recognize and Appropriately Use Experimental Tools and Equipment | X |  |  |
| LO 9 | Ability to Use Computers/Programs Effectively in Research and Data Analysis |  | X |  |
| LO 10 | Ability to Work Effectively in Laboratories | X |  |  |
| LO 11 | Ability to Write a Research Project |  | X |  |
| LO 12 | Ability to Present Project Results in National/International Areas |  | X |  |
| LO 13 | Effective Written and Oral Communication/Presentation Skills |  |  | X |
| LO 14 | Ability to Develop New Technological Equipment/Methods |  | X |  |

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| **INSTRUCTOR NAME** | **DATE** |
| Prof. Dr. M. Cengiz ÜSTÜNER |  |

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| **COURSE CODE:** | 521103207 | **DEPARTMENT:** Medical Biology |
| **COURSE NAME:**Monooxygenases  |
| **INSTRUCTOR NAME** | **COURSE LANGUAGE** | **Course Catagory** |
| Technical | Medical | Other(……) |
| Prof. Dr. Hulyam KURT | Turkish |  | X |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **Ph.D.** | **COURSE OF PROVINCE** |
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| **SEMESTER** | **WEEKLY COURSE PERIOD** | **COURSE OF** |
| **Theoric** | **Practice** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| Fall | 3 | 0 | 0 | 3 | 7,5 | ELECTIVE |
|  |
| **ASSESMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **ACTIVITY** | **Quantity** | **Percentage (%)** |
| Mid-Term |  | **50** |
| Quiz |  |   |
| Homework |  |  |
| Project |   |   |
| Report  |  |  |
| Other (………) |  |  |
| **FInal ExamInatIon** | **50** |
| **PREREQUISITE(S)** |  -- |
| **SHORT COURSE CONTENT** | Oxidation reactions, oxidation reactions play a role in enzyme systems, mediated oxidation of microsomal enzymes, Oksidazlar and conceptual information about oksigenazlar. mechanisms of Monooxygenase action. |
| **COURSE AIMS** | To understand molecular structures and mechanisms of Monooxygenase action. |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | - To discuss monooxygenases molecular structure, cholesterol, steroid hormone, vitamin production and destruction, its role in carsinogenesis with drug metabolism, importance of human health and diseases.  |
| **LEARNING OUTCOMES OF THE COURSE**  | Explain the mechanisms of oxidation and reduction. Identify the enzymes responsible for oxidation reactions. Explain the functions and duties of monooxygenases. Explain the functions of microsomal monooxygenases. Define P450 enzymes. Explain the effects of P450 enzymes in drug metabolism. |
| **TEXTBOOK** | - [Robert K. Murray](http://www.amazon.com/exec/obidos/search-handle-url/ref%3Dntt_athr_dp_sr_1?%5Fencoding=UTF8&search-type=ss&index=books&field-author=Robert%20K.%20Murray) [Daryl K. Granner](http://www.amazon.com/exec/obidos/search-handle-url/ref%3Dntt_athr_dp_sr_2?%5Fencoding=UTF8&search-type=ss&index=books&field-author=Daryl%20K.%20Granner) [Peter A. Mayes](http://www.amazon.com/exec/obidos/search-handle-url/ref%3Dntt_athr_dp_sr_3?%5Fencoding=UTF8&search-type=ss&index=books&field-author=Peter%20A.%20Mayes) [Victor W. Rodwell](http://www.amazon.com/exec/obidos/search-handle-url/ref%3Dntt_athr_dp_sr_4?%5Fencoding=UTF8&search-type=ss&index=books&field-author=Victor%20W.%20Rodwell). Harper's Biochemistry. McGraw-Hill Publishing Co; 25th edition. August 28, 1999. |
| **OTHER REFERENCES** | -1- Cashman JR: Structural and catalytic properties of the mammalian flavin-containing monooxygenase. *Chem Res Toxicol* 8(2):166-8. 1995.2- [Robert K. Murray](http://www.amazon.com/exec/obidos/search-handle-url/ref%3Dntt_athr_dp_sr_1?%5Fencoding=UTF8&search-type=ss&index=books&field-author=Robert%20K.%20Murray) [Daryl K. Granner](http://www.amazon.com/exec/obidos/search-handle-url/ref%3Dntt_athr_dp_sr_2?%5Fencoding=UTF8&search-type=ss&index=books&field-author=Daryl%20K.%20Granner) [Peter A. Mayes](http://www.amazon.com/exec/obidos/search-handle-url/ref%3Dntt_athr_dp_sr_3?%5Fencoding=UTF8&search-type=ss&index=books&field-author=Peter%20A.%20Mayes) [Victor W. Rodwell](http://www.amazon.com/exec/obidos/search-handle-url/ref%3Dntt_athr_dp_sr_4?%5Fencoding=UTF8&search-type=ss&index=books&field-author=Victor%20W.%20Rodwell). Harper's Biochemistry. McGraw-Hill Publishing Co; 25th edition. August 28, 1999.3**- Nebert D W, Eisen H J, Negishi M, Lang M A, Hjelmeland L M, and Okey A B :** Genetic Mechanisms Controlling the Induction of Polysubstrate Monooxygenase (P-450) Activities. Annual Review of Pharmacology and Toxicology. Vol. 21: 431-462 . 1981.4- Archakov AI: **Cytochromes P-450, drug disease, and personified medicine. Part I.** Klin Med (Mosk) - 86(2): 4-8. 01-JAN-2008. |
| **TOOLS AND EQUIPMENTS REQUIRED**  |  |

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|  |  **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS**  |
| 1 | Oxidation and Reduction Mechanisms |
| 2 | Enzymes involved in Oxidation Reactions |
| 3 | Oxidases and Monooxygenases |
| 4 | Dihydrogenases and Hydroperoxidases |
| 5 | Molecular Action of Monooxygenases |
| 6 | Microsomal Monooxygenases |
| 7 | Exam |
| 8 | Oxidation Reactions done by Nonmicrosomal Enzymes |
| 9 | Flavin Monooxygenases and cytP450 enzyme system |
| 10 | P450 enzymes (CYP’s) |
| 11 | Effect of P450 enzymes on Drug metabolism |
| 12 | Phase I Reactions |
| 13 | Phase II Reactions |
| 14 | Important P450 enzymes in endogen chemical metabolism |
| 15 | P450 dependant monooxygenases |
| 16 | Presentation of Homeworks |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (MSc)** | **1**Low | **2**MId | **3**HIgh |
| LO 1 | Ability to Recognize Basic Concepts in Medical Education |  |  | X |
| LO 2 | Literature Review and Evaluation Skills |  |  | X |
| LO 3 | Ability to Collect Information on Health Sciences and Apply the Information Obtained |  |  | X |
| LO 4 | Ability to Recognize, Formulate and Solve Medical Problems |  | X |  |
| LO 5 | Ability to Use Basic Concepts in the Health Field |  | X |  |
| LO 6 | Scientific Inquiry and Hypothesis Generation Skills |  | X |  |
| LO 7 | Ability to Design, Conduct Experiments, Analyze and Evaluate Data |  | X |  |
| LO 8 | Ability to Recognize and Appropriately Use Experimental Tools and Equipment | X |  |  |
| LO 9 | Ability to Use Computers/Programs Effectively in Research and Data Analysis | X |  |  |
| LO 10 | Ability to Work Effectively in Laboratories | X |  |  |
| LO 11 | Ability to Write a Research Project |  | X |  |
| LO 12 | Ability to Present Project Results in National/International Areas |  | X |  |
| LO 13 | Effective Written and Oral Communication/Presentation Skills |  |  | X |
| LO 14 | Ability to Develop New Technological Equipment/Methods |  | X |  |

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| **INSTRUCTOR NAME** | **DATE** |
| Prof.Dr. Hülyam KURT |  |

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| **COURSE CODE:** 521103208 | **DEPARTMENT:** Medical Biology |
| **COURSE NAME:** Proteome and Proteomics |
| **INSTRUCTOR NAME** | **COURSE LANGUAGE** | **Course Catagory** |
| Technical | Medical | Other(……) |
| Prof. Dr. Didem TURGUT COŞAN | Turkish |  | **X** |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **Ph.D.** | **COURSE OF PROVINCE** |
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| **SEMESTER** | **WEEKLY COURSE PERIOD** | **COURSE OF** |
| **Theoric** | **Practice** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| Fall | 2 | 2 | 0  | 3  | 7,5 | ELECTIVE |
|  |
| **ASSESMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **ACTIVITY** | **Quantity** | **Percentage (%)** |
| Mid-Term |  | **50**  |
| Quiz |  |  |
| Homework |  |  |
| Project |   |  |
| Report  |  |  |
| Other (………) |  |  |
| **FInal ExamInatIon** | **50** |
| **PREREQUISITE(S)** |   |
| **SHORT COURSE CONTENT** | Description and history of proteom, identification of protein and peptides, protein databases, methods used in the identification of proteomes |
| **COURSE AIMS** | To give information about description of proteom, which resarch areas it is used in and about the methods used in the identification of proteom. |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | To give basic and current informations related with proteom and proteomics which are thought to be an important guiding in the investigation of new methods of diagnosis and treatment |
| **LEARNING OUTCOMES OF THE COURSE**  | Define the proteome. Apply the techniques used in proteome analysis. Explain the structure of proteins. Apply electrophoresis techniques. Explain spectrometry techniques. Apply chromatography techniques. Explain microarray techniques. Use bioinformatics to evaluate data. |
| **TEXTBOOK** |  |
| **OTHER REFERENCES** | 1. Brown T.A.: Essential Molecular Biology Volume I A Practical Approach. IRL Press, Oxford University Press,Oxford, New York, Tokyo, 1990.
2. M. Schena, (Editor) DNA Microarray. Publisher: Scion Publishing Ltd. Publication date: October 2007
3. Richard J. Simpson Basic Methods in Protein Purification and analysis: A Laboratory Manual Joint ProteomicS Laboratory (JPSL) of the Ludwig Institute for Cancer Research and the Walter and Eliza Hall Institute of Medical Research, Melbourne, Australia; Peter D. Adams, Fox Chase Cancer Center, Philadelphia; Erica A. Golemis, Fox Chase Cancer Center, Philadelphia 2009
4. Richard Simpson: [Proteomics: A Cold Spring Harbor Laboratory Course Manual](http://www.cshlpress.com/default.tpl?action=full&cart=124393553552842589&--eqskudatarq=656&newtitle=Proteomics%3A%20A%20Cold%20Spring%20Harbor%20Laboratory%20Course%20Manual)Ludwig Institute for Cancer Research, Melbourne 2009.
5. Sambrook J, Fritsch E.F., Maniatis, T.: Molecular Cloning, A Laboratory Manual, Cold Spring Harbor Laboratory Press, 1989.
 |
| **TOOLS AND EQUIPMENTS REQUIRED**  |  |

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|  |  **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 | Description of proteom the history |
| 2 | General strategy used in proteom analysis |
| 3 | Protein and/or peptides definition (Identification) |
| 4 | Three-dimensional structure |
| 5 | Gel electrophoresis |
| 6 | Polyacrilamide gel |
| 7 | Two-dimensional gel electrophoresis  |
| 8 | Gel stain techniques  |
| 9 | Protein Databases  |
| 10 | Mass Spectrometer  |
| 11 | Kinds of chromatography |
| 12 | Column chromatography  |
| 13 | Three-dimensional structure of protein identification methods |
| 14 | Immunoassay |
| 15 | Protein microarray  |
| 16 | Bioinformatic |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (MSc)** | **1**Low | **2**MId | **3**HIgh |
| LO 1 | Ability to Recognize Basic Concepts in Medical Education |  |  | X |
| LO 2 | Literature Review and Evaluation Skills |  |  | X |
| LO 3 | Ability to Collect Information on Health Sciences and Apply the Information Obtained |  |  | X |
| LO 4 | Ability to Recognize, Formulate and Solve Medical Problems |  |  | X |
| LO 5 | Ability to Use Basic Concepts in the Health Field |  | X |  |
| LO 6 | Scientific Inquiry and Hypothesis Generation Skills |  | X |  |
| LO 7 | Ability to Design, Conduct Experiments, Analyze and Evaluate Data |  | X |  |
| LO 8 | Ability to Recognize and Appropriately Use Experimental Tools and Equipment | X |  |  |
| LO 9 | Ability to Use Computers/Programs Effectively in Research and Data Analysis | X |  |  |
| LO 10 | Ability to Work Effectively in Laboratories | X |  |  |
| LO 11 | Ability to Write a Research Project |  | X |  |
| LO 12 | Ability to Present Project Results in National/International Areas |  | X |  |
| LO 13 | Effective Written and Oral Communication/Presentation Skills |  |  | X |
| LO 14 | Ability to Develop New Technological Equipment/Methods |  | X |  |

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| **INSTRUCTOR NAME** | **DATE** |
| Prof. Dr. Didem TURGUT COŞAN |  |

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| **COURSE CODE:** | 521104201 | **DEPARTMENT:** Medical Biology |
| **COURSE NAME:**Amino Acid Cromatographic Techniques |
| **INSTRUCTOR NAME** | **COURSE LANGUAGE** | **Course Catagory** |
| Technical | Medical | Other(……) |
| Prof. Dr. Hulyam KURT | Turkish |  | X |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **Ph.D.** | **COURSE OF PROVINCE** |
| **** | X | **** | **** |

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| **SEMESTER** | **WEEKLY COURSE PERIOD** | **COURSE OF** |
| **Theoric** | **Practice** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| Spring |  2 | 2 |   | 3 | 7,5 | ELECTIVE |
|  |
| **ASSESMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **ACTIVITY** | **Quantity** | **Percentage (%)** |
| Mid-Term |  | **50** |
| Quiz |  |  |
| Homework |  |  |
| Project |   |  |
| Report  |  |  |
| Other (………) |  |  |
| **FInal ExamInatIon** | **50** |
| **PREREQUISITE(S)** |  -- |
| **SHORT COURSE CONTENT** | Characteristics of the amino acids and proteins and their normal metabolic pathways; some examples of metabolic diseases (mainly phenylketonuria) due to abnormalities on the metabolic pathways; analyses of metabolic diseases due to abnormality of amino acid methabolism in the urine and blood by chemical tests, paper chromatographic test and Guthrie tests . |
| **COURSE AIMS** | -To give the reasons of amino acid metabolic disorder; to give the knowledge of some amino acid metabolic disorders are curable (such as phenylketonuria) by early diagnosis and some practical applications. |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | -The main objective of this course is to give knowledge to the students that some metabolic disorders such as phenylketonuria are curable by diabetic therapy; besides to give knowledge practical applications techniques of the related subjects. |
| **LEARNING OUTCOMES OF THE COURSE)** | Can define the structure of amino acids. Can classify amino acids. Can define the structure of proteins. Can classify proteins. Can classify amino acid metabolisms. Can explain diseases related to amino acid metabolism disorders. Can apply amino acid chromatography techniques. |
| **TEXTBOOK** | -Haktan, M., Aydın, A.: Pediatride Metabolizma Bozuklukları, İstanbul, 1986. |
| **OTHER REFERENCES** | -Haktan, M., Aydın, A.: Pediatride Metabolizma Bozuklukları, İstanbul, 1986-Yalçındağ, S.: Çocukta Metabolizma Hastalıkları, İstanbul, 1983-Kayaalp, O.S.: Tıbbi Farmakoloji-Cilt III, Ankara, 1978-Yerson, M.: İnsan Biyokimyası, İstanbul, 1988-Nyhan, W.L., Ozand, P.T.: Atlas of Metabolic Diseases, Chapman & Hall Medical, 1997. |
| **TOOLS AND EQUIPMENTS REQUIRED**  |  |

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|  |  **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS**  |
| 1 | Structure of amino acids.  |
| 2 | Classifications of the amino acids. |
| 3 | Chemical reactions of the a.a.. |
| 4 | Structure of the proteins (Primer, seconder and tersier strctures). |
| 5 | Classification of the proteins. |
| 6 | Biological functions of the proteins. |
| 7 | Metabolism of the proteins. |
| 8 | Metabolism of the a.a. |
| 9 | Metabolic disorders of a.a. |
| 10 | Alcaptonuria and albinism. |
| 11 | Phenylketonuria. |
| 12 | Tyrosinemia. |
| 13 | Analysis of amino acid disorders by chemical ways. |
| 14 | Quantitative and Qualitative analyses of amino acid metabolic disorders in urine and blood by paper chromatography |
| 15 | Analyses of phenylketonuria in the heel blood by Guthrie tests. |
| 16 | Overview of the whole subjects. |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (MSc)** | **1**Low | **2**MId | **3**HIgh |
| LO 1 | Ability to Recognize Basic Concepts in Medical Education |  |  | X |
| LO 2 | Literature Review and Evaluation Skills |  |  | X |
| LO 3 | Ability to Collect Information on Health Sciences and Apply the Information Obtained |  |  | X |
| LO 4 | Ability to Recognize, Formulate and Solve Medical Problems |  |  | X |
| LO 5 | Ability to Use Basic Concepts in the Health Field |  |  | X |
| LO 6 | Scientific Inquiry and Hypothesis Generation Skills |  | X |  |
| LO 7 | Ability to Design, Conduct Experiments, Analyze and Evaluate Data |  | X |  |
| LO 8 | Ability to Recognize and Appropriately Use Experimental Tools and Equipment |  | X |  |
| LO 9 | Ability to Use Computers/Programs Effectively in Research and Data Analysis |  | X |  |
| LO 10 | Ability to Work Effectively in Laboratories |  | X |  |
| LO 11 | Ability to Write a Research Project | X |  |  |
| LO 12 | Ability to Present Project Results in National/International Areas | X |  |  |
| LO 13 | Effective Written and Oral Communication/Presentation Skills |  |  | X |
| LO 14 | Ability to Develop New Technological Equipment/Methods |  | X |  |

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| **INSTRUCTOR NAME** | **DATE** |
| Prof. Dr. Hülyam KURT |  |

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| **COURSE CODE:** | 521104202 | **DEPARTMENT:** Medical Biology |
| **COURSE NAME:** | Biology Of Experiment Animals And Using Of Experimental Techniques |
| **INSTRUCTOR NAME** | **COURSE LANGUAGE** | **Course Catagory** |
| Technical | Medical | Other(……) |
| Prof. Dr. Hülyam KURT | Turkish |  | x |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **Ph.D.** | **COURSE OF PROVINCE** |
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| **SEMESTER** | **WEEKLY COURSE PERIOD** | **COURSE OF** |
| **Theoric** | **Practice** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| Spring | 2  | 2  |   | 3  | 7,5 | ELECTIVE |
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| **ASSESMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **ACTIVITY** | **Quantity** | **Percentage (%)** |
| Mid-Term |  | **50**  |
| Quiz |  |  |
| Homework |  |  |
| Project |   |  |
| Report  |  |  |
| Other (………) |  |  |
| **FInal ExamInatIon** | **50** |
| **PREREQUISITE(S)** |   |
| **SHORT COURSE CONTENT** | Selection of experiment animals, structure of experimental cages, feeding of animals, generating of animals and care, biology of mice, rat, rabbit and cobaya, experiment technique with experimental animals, technique of anesthetized of experimental animal, attention of health rules |
| **COURSE AIMS** | To give knowledge about biology of experimental animals and experimental techniques with animals  |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | The students learn speciality of experimental animals. By preparing homework, to learn the literature collection and presentation their work. |
| **LEARNING OUTCOMES OF THE COURSE**  | Explain types of laboratory animals. Define laboratory cages. Explain feeding, production and care of animals. Explain biology of mice, rats and guinea pigs. Give substances to laboratory animals. Take blood, urine and tissue samples from laboratory animals. Anesthetize laboratory animals. Dispose of animal waste. |
| **TEXTBOOK** |  |
| **OTHER REFERENCES** | 1. Arrington, L. R.: Introductory Laboratory Animal Science. The Interstate, Danville (III) USA 206 p. 1972.
2. Dennis E. J. Baker: The Laboratory Rat. Vol. 1-C. Academic Press, California, USA, 1979.
3. Harkness, J.E., Wagner, J.E.: The Biology and Medicine of Rabbits and Rodents. (Fourth Edition). Williams & Wilkins, 1995.
4. Holmes D.D.: Clinical Laboratory Animal Medicine An Introduction, 1984.
5. Merdivenci A.: Laboratuar Hayvan Bakımı, Üretimi ve Deney Tekniği, İstanbul Üniv. Cerrahpaşa Tıp Fak. Istanbul, 106s. 1971.
6. Waynforth, H.B., Flecknell, P.A.: Experimental and Surgical Technique in the Rat. Academic Press, London, 1994.
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| **TOOLS AND EQUIPMENTS REQUIRED**  |  |

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|  |  **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 | Selection of experiment animals |
| 2 | Structure of life cages and urine collecting cages |
| 3 | Feeding of animals and generating of animals and care |
| 4 | Biology of mice |
| 5 | Biology of rat |
| 6 | Biology of rabbit |
| 7 | Biology of cobaya |
| 8 | Giving material to experiment animals, taking blood from jugular vein |
| 9 | MIDTERM EXAM |
| 10 | Taking blood from tail vein and earlap |
| 11 | Taking blood from heart and jugular vein |
| 12 | Collection of serum, plasma and urine from animal. |
| 13 | Anaesthetic technique |
| 14 | Cleaning waste of animal |
| 15 | FINAL EXAM |
| 16 | Selection of experiment animals |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (MSc)** | **1**Low | **2**MId | **3**HIgh |
| LO 1 | Ability to Recognize Basic Concepts in Medical Education |  |  | X |
| LO 2 | Literature Review and Evaluation Skills |  |  | X |
| LO 3 | Ability to Collect Information on Health Sciences and Apply the Information Obtained |  |  | X |
| LO 4 | Ability to Recognize, Formulate and Solve Medical Problems |  | X |  |
| LO 5 | Ability to Use Basic Concepts in the Health Field |  | X |  |
| LO 6 | Scientific Inquiry and Hypothesis Generation Skills |  | X |  |
| LO 7 | Ability to Design, Conduct Experiments, Analyze and Evaluate Data |  |  | X |
| LO 8 | Ability to Recognize and Appropriately Use Experimental Tools and Equipment |  |  | X |
| LO 9 | Ability to Use Computers/Programs Effectively in Research and Data Analysis |  |  | X |
| LO 10 | Ability to Work Effectively in Laboratories |  |  | X |
| LO 11 | Ability to Write a Research Project |  | X |  |
| LO 12 | Ability to Present Project Results in National/International Areas |  | X |  |
| LO 13 | Effective Written and Oral Communication/Presentation Skills |  |  | X |
| LO 14 | Ability to Develop New Technological Equipment/Methods |  | X |  |

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| **INSTRUCTOR NAME** | **DATE** |
| Prof. Dr. Hülyam KURT |  |

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| **COURSE CODE:** | 521106203 | **DEPARTMENT:** Medical Biology |
| **COURSE NAME:** | Biological Structure of Mitochondria, Mitochondrial DNA and Mitochondrial Diseases |
| **INSTRUCTOR NAME** | **COURSE LANGUAGE** | **Course Catagory** |
| Technical | Medical | Other(……) |
| Prof. Dr. M. CENGİZ ÜSTÜNER | Turkish |  | X |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **Ph.D.** | **COURSE OF PROVINCE** |
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| **SEMESTER** | **WEEKLY COURSE PERIOD** | **COURSE OF** |
| **Theoric** | **Practice** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| Spring |  2 | 0 |   | 2 | 5 | ELECTIVE |
|  |
| **ASSESMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **ACTIVITY** | **Quantity** | **Percentage (%)** |
| Mid-Term |  | **50**  |
| Quiz |  |  |
| Homework |  |  |
| Project |   |  |
| Report  |  |  |
| Other (………) |  |  |
| **FInal ExamInatIon** | **50** |
| **PREREQUISITE(S)** |  -- |
| **SHORT COURSE CONTENT** | The structure of mitochondria, energy reactions in mitochondria. Mitochondrial DNA and various mitochondrial diseases. |
| **COURSE AIMS** | The structure of mitochondria, energy production and mitochondrial diseases |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | Transfer all information about mitochondria. Collecting the literature with the given homework, collecting and collecting the information and writing it as a report and explaining them |
| **LEARNING OUTCOMES OF THE COURSE**  | Explain the structure of mitochondria. Explain the functions of mitochondria. Explain the synthesis of mitochondrial proteins and their transport to mitochondria. Explain the structure and replication of mitochondrial DNA. Explain the mitochondrial DNA repair system and transcription. Classify mitochondrial diseases. |
| **TEXTBOOK** | Gunes, HV. Molecular Cell Biology, Kaan Bookstore, 2003 |
| **OTHER REFERENCES** | Alberts B,Bray D, Lewis J. at all. Molecular Biology of The Cell,Garland  Publishing,Inc, New York, 1994Pollard TD.,Earnshaw WC. Cell Biology,Saunders, New York 2002. |
| **TOOLS AND EQUIPMENTS REQUIRED**  |  |

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|  |  **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS**  |
| 1 | Mitochondria and evolution |
| 2 | Structure of mitochondria |
| 3 | Mitochondria and energy metabolism |
| 4 | Electron transport system |
| 5 | Mitochondrial life cycle |
| 6 | Synthesis of mitochondrial proteins and transport to mitochondria |
| 7 | MIDTERM |
| 8 | Mitochondrial DNA structure and replication |
| 9 | Mitochondrial DNA repair system, |
| 10 | Mitochondrial DNA transcription |
| 11 | Mitochondrial diseases |
| 12 | Mitochondrial Diseases |
| 13 | **Presentation of homework:**  |
| 14 | **Presentation of homework:** |
| 15 | **Presentation of homework:** |
| 16 | WRITTEN EXAM |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (MSc)** | **1**Low | **2**MId | **3**HIgh |
| LO 1 | Ability to Recognize Basic Concepts in Medical Education |  |  | X |
| LO 2 | Literature Review and Evaluation Skills |  |  | X |
| LO 3 | Ability to Collect Information on Health Sciences and Apply the Information Obtained |  |  | X |
| LO 4 | Ability to Recognize, Formulate and Solve Medical Problems |  | X |  |
| LO 5 | Ability to Use Basic Concepts in the Health Field |  | X |  |
| LO 6 | Scientific Inquiry and Hypothesis Generation Skills |  | X |  |
| LO 7 | Ability to Design, Conduct Experiments, Analyze and Evaluate Data |  | X |  |
| LO 8 | Ability to Recognize and Appropriately Use Experimental Tools and Equipment | X |  |  |
| LO 9 | Ability to Use Computers/Programs Effectively in Research and Data Analysis | X |  |  |
| LO 10 | Ability to Work Effectively in Laboratories | X |  |  |
| LO 11 | Ability to Write a Research Project |  | X |  |
| LO 12 | Ability to Present Project Results in National/International Areas |  | X |  |
| LO 13 | Effective Written and Oral Communication/Presentation Skills |  |  | X |
| LO 14 | Ability to Develop New Technological Equipment/Methods |  | X |  |

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| **INSTRUCTOR NAME** | **DATE** |
| Prof. Dr. M. CENGİZ ÜSTÜNER |  |

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| **COURSE CODE:** | 521106204 | **DEPARTMENT:** MEDICAL BIOLOGY |
| **COURSE NAME:** | The determination of Protein Expression by Using with SDS Page and Western Blot Analysis  |
| **INSTRUCTOR NAME** | **COURSE LANGUAGE** | **Course Category** |
| Technical | Medical | Other(……) |
| Prof. Dr. M. Cengiz ÜSTÜNER | Turkish |  | x |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **Ph.D.** | **COURSE OF PROVINCE** |
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| **SEMESTER** | **WEEKLY COURSE PERIOD** | **COURSE OF** |
| **Theoric** | **Practice** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| Spring |  1 | 2  |   |  2 | 5 | ELECTIVE |
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| **ASSESMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **ACTIVITY** | **Quantity** | **Percentage (%)** |
| Mid-Term |  | **50** |
| Quiz |  |  |
| Homework |  |  |
| Project |   |  |
| Report  |  |  |
| Other (………) |  |  |
| **FInal ExamInatIon** | **50** |
| **PREREQUISITE(S)** |   |
| **SHORT COURSE CONTENT** | Determination of the appropriate proteins for analysis., SDS PAGE and Western blot analysis protocols, obtaining of the determinated proteins, electrophoresis system,transfer procedure of tje proteins from gel to nitroceelulose membrane, blocking, process, labeling of the protein by antibody, view with ECL and determination of the amount on software. To reveal the advantages of the SDS PAGE and Western blot method. |
| **COURSE AIMS** |  Isolation of proteins, and determination of the protein expression by SDS PAGE and Western blot method  |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | To determine specific protein in tissue or cells,To determine expression of proteins by the method of SDS PAGE and Western blotting,To analyze Western blot bands.  |
| **LEARNING OUTCOMES OF THE COURSE**  | Can isolate proteins. Can purify proteins. Can apply electrophoresis and Western Blotting methods. Can prepare gels. Can measure total protein. Can analyze gel images. Can calculate gel electrophoresis results. |
| **TEXTBOOK** |  |
| **OTHER REFERENCES** | Towbin, H. et. al.; Electrophoretic transfer of proteins from polyacrylamide gels to nitrocellulose sheets: procedure and some applications. Proc Natl Acad Sci U S A. 76(9):4350-4, 1979.Towbin, H and Gordon, J. Immunoblotting and dot immunobinding--current status and outlook. J Immunol Methods 4;72(2):313-40, 1984. Matsudaira, P. Sequence from picomole quantities of proteins electroblotted onto polyvinylidene difluoride membranes. J Biol Chem. 262(21):10035-8, 1987.Stott D.I. Immunoblotting, dot-blotting, and ELISPOT assays: methods and applications. J Immunoassay ;21(2-3):273-96,1988. |
| **TOOLS AND EQUIPMENTS REQUIRED**  |  |

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|  |  **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 | Protein structural analysis, functional analysis of proteins,Isolation of Protein-Protein Purification |
| 2 | The basic principle of the electrophoresis method The purpose of the Electrophoresis and Western Blotting methodApplication areas  |
| 3 | Preparation of tissue supernatants for Western Blotting Introduction of gels |
| 4 | By protein assay kit, calculation of total tissue protein and amount of protein loaded in each well  |
| 5 | Purpose of the SDS gel electrophoresisThe selection of the gel and preparation of gel solutions |
| 6 | The principle of SDS-PAGE electrophoresisSeparating gels and stoking gels preparation and loading of samples |
| 7 | Factors affecting the electrophoretic migration of the proteinsElectrophoresis application |
| 8 | Acrylamide concentrationSandwich preparation and blotting |
| 9 | Buffer solutions used in SDS-PAGECoomassie blue staining of the gel |
| 10 | AntibodiesBiomarkers |
| 11 | The membranes and the differences between the membranes Solution of the membrane bloking, and  incubation with primary antibody |
| 12 | Western blot protocolIncubation of the membrane with a secondary antibody |
| 13 | ECL (Enhanced chemiluminescence) and the display of proteins with ECL |
| 14 | Marking and staining of proteins related toWestern blot imaging methods |
| 15 | Displayed the Protein marked with antibody and determination of the amount with ECLEvaluation of the bands  |
| 16 | Analysis of Western blot bandsThe membrane staining with Ponceau S Western blot stripping stage |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (MSc)** | **1**Low | **2**MId | **3**HIgh |
| LO 1 | Ability to Recognize Basic Concepts in Medical Education |  | X |  |
| LO 2 | Literature Review and Evaluation Skills |  |  | X |
| LO 3 | Ability to Collect Information on Health Sciences and Apply the Information Obtained |  |  | X |
| LO 4 | Ability to Recognize, Formulate and Solve Medical Problems |  | X |  |
| LO 5 | Ability to Use Basic Concepts in the Health Field |  | X |  |
| LO 6 | Scientific Inquiry and Hypothesis Generation Skills |  |  | X |
| LO 7 | Ability to Design, Conduct Experiments, Analyze and Evaluate Data |  |  | X |
| LO 8 | Ability to Recognize and Appropriately Use Experimental Tools and Equipment |  |  | X |
| LO 9 | Ability to Use Computers/Programs Effectively in Research and Data Analysis |  |  | X |
| LO 10 | Ability to Work Effectively in Laboratories |  |  | X |
| LO 11 | Ability to Write a Research Project |  | X |  |
| LO 12 | Ability to Present Project Results in National/International Areas |  | X |  |
| LO 13 | Effective Written and Oral Communication/Presentation Skills |  |  | X |
| LO 14 | Ability to Develop New Technological Equipment/Methods |  | X |  |

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| **INSTRUCTOR NAME** | **DATE** |
| Prof. Dr. M. Cengiz ÜSTÜNER |  |

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| **COURSE CODE:** | 521106205 | **DEPARTMENT:** MEDICAL BIOLOGY |
| **COURSE NAME:** | Introduction to the Nanobiology |
| **INSTRUCTOR NAME** | **COURSE LANGUAGE** | **Course Catagory** |
| Technical | Medical | Other(……) |
| Prof. Dr. M. Cengiz ÜSTÜNER | Turkish |  | x |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **Ph.D.** | **COURSE OF PROVINCE** |
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| **SEMESTER** | **WEEKLY COURSE PERIOD** | **COURSE OF** |
| **Theoric** | **Practice** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| Spring |  2 |  0 |   | 2  | 5 | ELECTIVE |
|  |
| **ASSESMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **ACTIVITY** | **Quantity** | **Percentage (%)** |
| Mid-Term |  | **50** |
| Quiz |  |  |
| Homework |  |  |
| Project |   |  |
| Report  |  |  |
| Other (………) |  |  |
| **FInal ExamInatIon** | **50** |
| **PREREQUISITE(S)** |   |
| **SHORT COURSE CONTENT** | Nanotechnology: Molecules and Determination of bonding structures.Definition of the units used in the molecular level.Definition of nanotechnology.Identifying areas of nanotechnology applied to molecular biology.Determination of physical properties of nanometer-scaled structures.Nanoscopic and macroscopic identification of appropriate methods for molecular biology applications.The creation of nanometer-scale structures in molecular biology.Nanotechnology applications and benefits of the use of molecular biology. |
| **COURSE AIMS** |  With atomic size limits based on scientific progress, common definition of the nanotechnology and nanobiology, which collect the different sciences in a one point, determine the application areas in molecular biology. |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** |  The acquisition of basic knowledge related to the applications of nanotechnology and nanobiology. |
| **LEARNING OUTCOMES OF THE COURSE**  | Explain the synthesis of nanostructures. Explain the characterization of nanostructures. Explain nanocarbon technologies. Describe the analysis methods of nanoparticles. Explain bionanosensors. Understand nanoparticle drug delivery systems. Understand the use of nanotechnology in health. |
| **TEXTBOOK** |  |
| **OTHER REFERENCES** | 1. Petrucci, R.H., Harwood, W.S., Herring G.F.: General Chemistry Principles and Modern Applications, Eighth Edition by California State University, USA, 2005.2. Katarzyna, B.K, Masanori S.: From molecular biology to nanotechnology and nanomedicine, Biosystems. 2002 Mar-May;65(2-3):123-38.3. Hosokawa, M., Nogi, K., Naito, M., Yokoyama T.: Addressing of nanoparticles by using DNA molecules, Nanoparticle Technology Handbook, Pages 485-488, 2008.4. Gupta, P.D., Manasi, D., Vasavada A.R.: Proteın Nanotechnology - A Powerful Futurıstıc Dıagnostıc Technıque Indian Journal Of Clinical Biochemistry, 20 (2) 48-53, 2005.5. Permiakov, N.K., Ananian, M.A., Sorokovo, V.I., Luskinovich, P.N.: Scanning probe microscopy and medico-biological nanotechnology: history and prospects. Arkh. Patol. 60, 9–13 1998.6. Drexler, K.E.: Nanosystems: Molecular Machinery, Manufacturing, and Computation, Wiley, New York, 1992. |
| **TOOLS AND EQUIPMENTS REQUIRED** |  |

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|  |  **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 | Bionanotechnology : Nanotechnology and bionanotechnology |
| 2 | Nanotechnology: molecules and determination of bonding structures. Definition of the units used in the molecular level. |
| 3 | The importance of the size of the nano. Need for nano-size—surface volume ratio significance. Significance and key features of nano-size |
| 4 | Synthesis and characterization of nanostructures |
| 5 | The nano carbon. The nano carbon technologies |
| 6 | Methods of analysis of nanoparticles |
| 7 | Examination of bionano materials with spectroscopic methods |
| 8 | Artificial molecular receptors |
| 9 | Biyonano sensors |
| 10 | Nanoparticles as drug delivery systems. The importance of the nano dimension in drug transporting  |
| 11 | Targeted drug deliver Role of nanotechnology in drug during transportation |
| 12 | Chemistry of drug delivery vehicles. a) Nanocapsules b)Unilamellar liposomal vesicles |
| 13 |  c)Nanoparticles d)Microemulsions |
| 14 | Bionanoimaging |
| 15 | Applications of bionanotechnology1. Nanostructures and nanosystems
2. Nanoparticles
3. In vitro diagnostics
4. Medical application of nanosystems and nanoparticles
 |
| 16 | Nanotoxicology. Identification of potential risks |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (MSc)** | **1**Low | **2**MId | **3**HIgh |
| LO 1 | Ability to Recognize Basic Concepts in Medical Education |  |  | X |
| LO 2 | Literature Review and Evaluation Skills |  |  | X |
| LO 3 | Ability to Collect Information on Health Sciences and Apply the Information Obtained |  | X |  |
| LO 4 | Ability to Recognize, Formulate and Solve Medical Problems |  | X |  |
| LO 5 | Ability to Use Basic Concepts in the Health Field |  |  | X |
| LO 6 | Scientific Inquiry and Hypothesis Generation Skills |  |  | X |
| LO 7 | Ability to Design, Conduct Experiments, Analyze and Evaluate Data |  | X |  |
| LO 8 | Ability to Recognize and Appropriately Use Experimental Tools and Equipment |  | X |  |
| LO 9 | Ability to Use Computers/Programs Effectively in Research and Data Analysis | X |  |  |
| LO 10 | Ability to Work Effectively in Laboratories | X |  |  |
| LO 11 | Ability to Write a Research Project |  | X |  |
| LO 12 | Ability to Present Project Results in National/International Areas |  | X |  |
| LO 13 | Effective Written and Oral Communication/Presentation Skills |  |  | X |
| LO 14 | Ability to Develop New Technological Equipment/Methods |  | X |  |

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| **INSTRUCTOR NAME** | **DATE** |
| Prof. Dr. M. Cengiz ÜSTÜNER |  |

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| **COURSE CODE:**521104206 | **DEPARTMENT:** Medical Biology |
| **COURSE NAME:** Problems of cell culture and cell lines that should be considered in the selection of those |
| **INSTRUCTOR NAME**Prof. Dr. Didem TURGUT COŞAN | **COURSE LANGUAGE****Turkish: x****English: ** | **Course Catagory** |
| Technical | Medical | Other(……) |
|  |  |  | **X** |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **Ph.D.** | **COURSE OF PROVINCE** |
| **** | **x** | **** | **** |

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| **SEMESTER** | **WEEKLY COURSE PERIOD** | **COURSE OF** |
| **Theoric** | **Practice** | **Laboratory** | **Credit** | **ECTS** | **TYPE** |
| Spring | 2 | 2 | 0  | 3  | 7,5 | ELECTIVE |
|  |
| **ASSESMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **ACTIVITY** | **Quantity** | **Percentage (%)** |
| Mid-Term |  | **50**  |
| Quiz |  |  |
| Homework |  |  |
| Project |   |  |
| Report  |  |  |
| Other (………) |  |  |
| **FInal ExamInatIon** | **50** |
| **PREREQUISITE(S)** |   |
| **SHORT COURSE CONTENT** |  To give information on the basic structure of the cells in culture and biology, the selection of specific cell lines for research, contamination and basic research rules  |
| **COURSE AIMS** | Tissue culture (primary culture), as well as cell culture, and are used in many studies researchers have used in experiments in vivo behavior of materials to help them learn about the environment. Unlike tissue culture cell lines to be studied in cell culture to study the suitability of these cells is important where and how to be obtained. In addition, each cell is different from the needs of the media environment and their choice is important. Mediums like it could be ready for use as a cost reduction in order to be prepared by the user. The researchers therefore also have information on this subject is needed. In addition, cell culture media of these many problems, this technique actually seemed easy become inextricable, and the researcher's effort to buy time and has led to financial losses. Before starting this work may be what is known of this problem and be done to solve what is important to know. If the problem is contamination, contamination can be conducted to determine the type of tests and determined the type of contamination is necessary to decide the appropriate solutions |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | To give information about basic rules of the cell culture working area and teach the techniques can be applied to solve any problems encountered |
| **LEARNING OUTCOMES OF THE COURSE**  | Explain the biology of cultured cells. Determine nutritional and other requirements of cell lines. Explain cell culture techniques. Select a cell line specific to the research. Implement work in a cell culture laboratory. Use the necessary equipment and devices. Prepare the necessary chemicals. Understand the importance of contamination. |
| **TEXTBOOK** |  |
| **OTHER REFERENCES** | 1. B. E. Kipsop, A. Doyle, Maintenance of microorganism and cultured cells: a manual of laboratory methods, second edition, academic press, 1991.
2. S. Ozturk and W. Hu, Cell Culture Technology for Pharmaceutical and Cell-Based Therapies., CRC Press, 2005.
3. Coligan et al., Current Protocols in Immunology, Supp.55, John Wiley&Sons, Bestheda, 2002.
4. Freshney, Culture of Animal Cells, 4th ed., Wiley-Liss, New York, 2000
5. Gartner LP and Hiatt JL. Color textbook of Histology,W.B.Saunders Company, Philadelphia,1997.
6. Greenstein et al., Nörobilim, Bozbuğa et al (çeviri ed.), Nobel Tıp, İstanbul, 2004
7. Kleinsmith L. J., Kish V. M., Principles of Cell and Molecular Biology, Second Edition, Harper Collins College Publishers, 1995.
8. Pinel, Biopsychology, 4th ed., Allyn&Bacon, Boston, 2000
9. Widmaier et al., Vander et al’s Human Physiology, 9th ed., Mc Graw Hill, New York, 2004.
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| **TOOLS AND EQUIPMENTS REQUIRED**  |  |

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|  |  **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 | The basic structure of the cells in culture and biology. |
| 2 | Cellular and nutritional needs.  |
| 3 | Cell proliferation and growth factors in culture.  |
| 4 | Cell culture techniques.  |
| 5 | The selection of specific cell lines for research.  |
| 6 | Locations of cell lines can be achieved and how it can be obtained.  |
| 7 | Necessary equipment for cell culture.  |
| 8 | Factors affecting cell growth and division.  |
| 9 | Culture media and chemicals.  |
| 10 | Types of contamination.  |
| 11 | Techniques to determine the type of contamination.  |
| 12 | Bacterial contamination.  |
| 13 | Fungal contamination |
| 14 | Ways to overcome contamination.  |
| 15 | Cellular risk factors.  |
| 16 | Basic working rules for cellular  |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (MSc)** | **1**Low | **2**MId | **3**HIgh |
| LO 1 | Ability to Recognize Basic Concepts in Medical Education |  |  | X |
| LO 2 | Literature Review and Evaluation Skills |  |  | X |
| LO 3 | Ability to Collect Information on Health Sciences and Apply the Information Obtained |  |  | X |
| LO 4 | Ability to Recognize, Formulate and Solve Medical Problems |  |  | X |
| LO 5 | Ability to Use Basic Concepts in the Health Field |  | X |  |
| LO 6 | Scientific Inquiry and Hypothesis Generation Skills |  | X |  |
| LO 7 | Ability to Design, Conduct Experiments, Analyze and Evaluate Data |  |  | X |
| LO 8 | Ability to Recognize and Appropriately Use Experimental Tools and Equipment |  |  | X |
| LO 9 | Ability to Use Computers/Programs Effectively in Research and Data Analysis |  |  | X |
| LO 10 | Ability to Work Effectively in Laboratories |  |  | X |
| LO 11 | Ability to Write a Research Project |  | X |  |
| LO 12 | Ability to Present Project Results in National/International Areas |  | X |  |
| LO 13 | Effective Written and Oral Communication/Presentation Skills |  |  | X |
| LO 14 | Ability to Develop New Technological Equipment/Methods |  | X |  |

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| **INSTRUCTOR NAME** | **DATE** |
| Prof.Dr. Didem TURGUT COŞAN |  |

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| **COURSE CODE** | 521104207 | **DEPARTMENT** | **MEDICAL BIOLOGY** |
| **COURSE NAME** | Cancer Molecular Biology |
| **INSTRUCTOR NAME** | **COURSE LANGUAGE** | **COURSE CATAGORY** |
| Prof. Dr. İrfan DEĞİRMENCİ | Turkish | **Technical** | **Medical** | **Other (…)** |
|  | x |  |

**COURSE LEVEL**

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| **PROPAEDEUTIC** | **M.SC.** | **Ph.D.** |
|  | x |  |

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| **SEMESTER** | **WEEKLY COURSE PERIOD** | **COURSE OF** |
| **TEORIC** | **PRACTICE** | **LABORATORY** | **CREDIT** | **ECTS** | **TYPE****Compulsory/Elective** |
| Spring  | 3 |  |  | 3 | 7,5 | **Elective** |
|  |
| **ASSESMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **ACTIVITY** | **Quantity** | **Percentage (%)** |
| Mid-Term |  | **50**  |
| Quiz |  |  |
| Homework |  |  |
| Project |   |  |
| Report  |  |  |
| Other (………) |  |  |
| **FInal ExamInatIon** | **50** |
| **PREREQUISITE(S)** |  |
| **SHORT COURSE CONTENT** | Information about cancer molecular biology will be given. |
| **COURSE AIMS** | To recognize the molecular characteristics of cancer cells and to learn about fighting cancer at the molecular level. |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | Learning basic information about Cancer Molecular Biology |
| **LEARNING OUTCOMES OF THE COURSE**  | Define cancer epidemiology. Classify the stages of carcinogenesis. Determine carcinogenic factors. Explain the types of cancer. Express the cell cycle and its relationship with cancer. Define the genes that play a role in cancer. Explain the relationship between cancer and environmental factors. |
| **TEXTBOOK** | Kanser Genetiği ve Moleküler Biyolojisi |
| **OTHER REFERENCES** | Molecular Biology of The Cell |
| **TOOLS AND EQUIPMENTS REQUIRED**  |  |

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| **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **DATE** | **TOPICS** |
| **1** |  | Cancer epidemiology |
| **2** |  | Stages of carcinogenesis |
| **3** |  | Carcinogenic Factors |
| **4** |  | Types of cancer according to their cellular origin |
| **5** |  | Cell cycle and cancer |
| **6** |  | Effects of cell signaling pathways in cancer formation |
| **7** |  | Genes responsible for cancer formation |
| **8** |  | Conversion of genes into cancer genes |
| **9** |  | Midterm |
| **10** |  | Cancer, gene and environmental factor interactions |
| **11** |  | Invasion and metastasis in cancer |
| **12** |  | Angogenesis in cancer |
| **13** |  | Tumor microenvironment |
| **14** |  | Cancer and immunity |
| **15,16** |  | FINAL EXAM |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (MSc)** | **1**Low | **2**MId | **3**HIgh |
| LO 1 | Ability to Recognize Basic Concepts in Medical Education |  |  | X |
| LO 2 | Literature Review and Evaluation Skills |  |  | X |
| LO 3 | Ability to Collect Information on Health Sciences and Apply the Information Obtained |  | X |  |
| LO 4 | Ability to Recognize, Formulate and Solve Medical Problems |  | X |  |
| LO 5 | Ability to Use Basic Concepts in the Health Field |  | X |  |
| LO 6 | Scientific Inquiry and Hypothesis Generation Skills |  | X |  |
| LO 7 | Ability to Design, Conduct Experiments, Analyze and Evaluate Data |  | X |  |
| LO 8 | Ability to Recognize and Appropriately Use Experimental Tools and Equipment | X |  |  |
| LO 9 | Ability to Use Computers/Programs Effectively in Research and Data Analysis | X |  |  |
| LO 10 | Ability to Work Effectively in Laboratories | X |  |  |
| LO 11 | Ability to Write a Research Project |  | X |  |
| LO 12 | Ability to Present Project Results in National/International Areas | X |  |  |
| LO 13 | Effective Written and Oral Communication/Presentation Skills |  |  | X |
| LO 14 | Ability to Develop New Technological Equipment/Methods |  | X |  |

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| **INSTRUCTOR NAME** | **DATE** |
| Prof. Dr. İrfan DEĞİRMENCİ |  |