**Courses – ECTS Credits**

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| Code | Course Name | ECTS | T+U+L | T/S | Language |
| Fall Semester | | | | | |
| 5211033304 | [CYTOBIOLOGY: FINE STRUCTURE OF CELL ORGANELLES](#DERS521101304) | 7.5 | 2+2+0 | COMPULSORY | TURKISH |
| 521103308 | [DNA and RNA PURIFICATION and CREATION OF RECOMBINANT DNA MM MOLECULES](#DERS521101308) | 7.5 | 2+2+0 | COMPULSORY | TURKISH |
| 521103301 | [MEMBRANE BIOLOGY AND TRANSPORT EVENTS](#DERS521101301) | 7.5 | 3+0+0 | ELECTIVE | TURKISH |
| 521103302 | [ONCOGENES](#DERS521101302) | 7.5 | 3+0+0 | ELECTIVE | TURKISH |
| 521103303 | [INTRACELLULAR PROTEIN MOVEMENTS](#DERS521101303) | 7.5 | 3+0+0 | ELECTIVE | TURKISH |
| 521103306 | [FINE STRUCTURE OF CELL NUCLEUS](#DERS521101306) | 7.5 | 3+0+0 | ELECTIVE | TURKISH |
| 521103307 | [RNA STRUCTURES AND FUNCTIONS THAT DO NOT PLAY A ROLE IN CODING](#DERS521101307) | 7.5 | 3+0+0 | ELECTIVE | TURKISH |
| 521101600 | [SPECIALIZED](file:///C:\Users\User\Desktop\ECTS%20BİLGİ%20KILAVUZU%2020.08.2014\ECTS%20BİLGİ%20KILAVUZU%20-%20Kopya\TIBBİ%20BİYOLOJİ%20AKTS\TIBBİ%20BİYOLOJİ%20%20YL%20TR.docx#Monooksigenazlar) FIELD COURSE | 5 | 3+0+0 | COMPULSORY | TURKISH |
|  | |  |  |  |  |
| Spring Term | | | | | |
| 521104305 | [NUCLEIC ACID AND PROTEIN ANALYSIS WITH COMPUTER PROGRAM](#DERS521102305) | 7.5 | 2+2+0 | COMPULSORY | TURKISH |
| 521104301 | [CELL CYCLE , MOLECULAR CONTROL OF CELL PROLIFERATION, CELL AGING AND APOPTOSIS](#DERS521102301) | 7.5 | 2+2+0 | ELECTIVE | TURKISH |
| 521104304 | [CELLULAR MECHANISM OF DEVELOPMENT](#DERS521102304) | 7.5 | 3+0+0 | ELECTIVE | TURKISH |
| 521106306 | [SOME MUTATIONS IN HUMAN GENES](#DERS521102306) | 5.0 | 2+0+0 | ELECTIVE | TURKISH |
| 521104307 | [EFFECTS OF NUTRIENTS ON CELLS AND ADAPTATION](#DERS521102307) | 7.5 | 3+0+0 | ELECTIVE | TURKISH |
| 521106308 | [INTRODUCTION TO MEDICAL BIOTECHNOLOGY](#DERS521102308) | 5.0 | 2+0+0 | ELECTIVE | TURKISH |
| 521104309 | [MUTATION DETECTION METHODS](#DERS521102309) | 7.5 | 2+2+0 | ELECTIVE | TURKISH |
| 521104310 | [ORGANEL PATHOLOGIES](#DERS521104310) | 7.5 | 3+0+0 | ELECTIVE | TURKISH |
| 5211043 11 | [MUTATIONS AND POLYMORPHISM](#DERS521104311) | 7.5 | 3+0+0 | ELECTIVE | TURKISH |
| 521101600 | [SPECIALIZED](file:///C:\Users\User\Desktop\ECTS%20BİLGİ%20KILAVUZU%2020.08.2014\ECTS%20BİLGİ%20KILAVUZU%20-%20Kopya\TIBBİ%20BİYOLOJİ%20AKTS\TIBBİ%20BİYOLOJİ%20%20YL%20TR.docx#Monooksigenazlar) FIELD COURSE | 5 | 3+0+0 | COMPULSORY | TURKISH |
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| **COURSE CODE: 521103301** | | **DEPARTMENT: MEDICAL BIOLOGY** | | | |
| **COURSE NAME: MEMBRANE BIOLOGY AND TRANSPORT EVENTS** | | | | | |
| **TEACHING THE COURSE**  **STAFF** | **COURSE LANGUAGE**  **Turkish: X**  **English: ** | | **Category of the Course** | | |
| Technical | Medical | Other( …… ) |
| Prof. Dr. M. Cengiz ÜSTÜNER |  | |  | **X** |  |

**COURSE LEVEL**

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

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| **SEMESTER** | **WEEKLY CLASS HOURS** | | | **YOUR COURSE** | | | |
| **Theoretical** | **APPLICATION** | **Lab** | **Credit** | **ECTS** | **TYPE** | |
| Spring ****  Fall **X** | 3 | 0 | 0 | 3 | 7.5 | MANDATORY ELECTIVE  ** X** | |
|  | | | | | | | |
| **EVALUATION CRITERIA** | | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | | | **Number** | **Percentage (%)** |
| Midterm Exam | | | **1** | **40** |
| Quiz | | |  |  |
| Homework | | |  |  |
| Project | | |  |  |
| Oral examination | | |  |  |
| Other ( ……… ) | | |  |  |
| **Final Exam** | | | | **60** |
| **PREREQUISITE(S)** | | | -- | | | | |
| **SHORT COURSE CONTENT** | | | The structure of the cell, the structure of the cell membrane and the molecules that participate in this structure. Transport of substances through the cell membrane, Simple, Passive , Active transport. Exocytosis , endocytosis and receptor-dependent endocytosis and examples | | | | |
| **COURSE AIMS** | | | The structure of a cell and its membrane, Teaching how this structure enables the transport of matter | | | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | the cell membrane to the student . To collect literature with the given homework, compile and collect the information, write a report and explain them. | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | Explain the general characteristics of the cell. Explain the structure and functions of the cell membrane. Explain the ways in which small molecules pass through the cell membrane. Classify the types of diffusion. Explain the active transport system. Define the secondary active transport system. Give examples of transport systems. Define channel proteins. Explain the passage of large molecules through the membrane. Explain receptor-dependent endocytosis. Explain the passage of viruses into the cell. | | | | |
| **TEXTBOOK** | | | Gunes, HV . Molecular Cell Biology, Kaan Bookstore, 2003 | | | | |
| **OTHER REFERENCES** | | | AlbertsB, Bray D, Lewis J. at all . MolecularBiology of TheCell,Garland  Publishing, Inc. , New York, 1994  Pollard TD ., Earnshaw WC. Cell Biology, Saunders , New York 2002. | | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | |  | | | | |

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|  | **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **HISTORY** | **TOPICS COVERED** |
| 1 |  | Future of the cell  Structure of the cell  Function of the cell membrane  Membrane lipids |
| 2 |  | Membrane proteins  Membrane carbohydrate |
| 3 |  | Transport across the cell membrane Membrane transport of small molecules: Simple transport; Passive transport  Active transport |
| 4 |  | Na+- K+ pump, Ca+2 pump, Proton pump  Sekonder active transport (active transport driven by ion gradients) |
| 5 |  | Active transport in bacteria, Osmos |
| 6 |  | Channel proteins, Ionophores |
| 7 |  | WRITTEN EXAM |
| 8 |  | Membrane transport of macromolecules : Exocytosis, Endocytosis |
| 9 |  | Receptor-mediated endocytosis |
| 10 |  | Cell import cholesterol by taking up LDL particle |
| 11 |  | Cell import iron by taking up transferrin particle |
| 12 |  | HIV(AIDS) |
| 13 |  | **Presentation of homework:** |
| 14 |  | **Presentation of homework:** |
| 15 |  | **Presentation of homework:** |
| 16 |  | WRITTEN EXAM |

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| **CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **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 of the Course**  **Signature**  Prof. Dr. M. Cengiz ÜSTÜNER | **History** |

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| **COURSE CODE: 521103302** | | **DEPARTMENT: MEDICAL BIOLOGY** | | | |
| **COURSE NAME: ONCOGENES** | | | | | |
| **TEACHING THE COURSE**  **STAFF** | **COURSE LANGUAGE**  **Turkish: X**  **English: ** | | **Category of the Course** | | |
| Technical | Medical | Other( …… ) |
| Prof. Dr. Didem TURGUT COŞAN |  | |  | **X** |  |

**COURSE LEVEL**

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

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| **SEMESTER** | **WEEKLY CLASS HOURS** | | | **YOUR COURSE** | | | |
| **Theoretical** | **APPLICATION** | **Lab** | **Credit** | **ECTS** | **TYPE** | |
| Spring  Fall **X** | 3 | 0 | 0 | 3 | 7.5 | MANDATORY ELECTIVE  ** X** | |
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| **EVALUATION CRITERIA** | | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | | | **Number** | **Percentage (%)** |
| Midterm Exam | | | **1** | **60** |
| Quiz | | |  |  |
| Homework | | |  |  |
| Project | | |  |  |
| Oral examination | | |  |  |
| Other ( ……… ) | | |  |  |
| **Final Exam** | | | | **40** |
| **PREREQUISITE(S)** | | |  | | | | |
| **SHORT COURSE CONTENT** | | | an Oncogene , How Do Oncogenes Work, Cancer Formation, Classification of Oncogenes , Tumor Cell Heterogeneity , Role of Proto-Oncogenes in Cancer Formation and Proto-Oncogene Activation, Oncosuppressor Genes, Classification and Properties of Oncogene Proteins, Growth Factors, Use of Oncogenes in Medical Research. | | | | |
| **COURSE AIMS** | | | Teaching the structure of genes that play a role in cancer formation and their effects on cancer formation. | | | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | Teaching the biology of cancer, which is the disease group with the highest mortality rate, and its relationship with genes. Collecting literature with homework , compiling information, preparing a report and explaining it. | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | Define oncogenes. Explain how oncogenes work. Classify oncogenes. Explain cancer formation. Relate oncogenes to cancer. Define the properties of oncogenes. Explain growth factors. Use oncogenes in research. | | | | |
| **TEXTBOOK** | | | Prof. Dr. Irfan DEGIRMECI 's Lecture Notes | | | | |
| **OTHER REFERENCES** | | | 1. Alberts , B ., Bray , J., D., Lewis , Raff , M., Roberts, K., Wartson , J., D. : MolecularBiology of THE CELL, Third Edition, GurlandPuplishing , Inc . New York London 1994. 2. Cooper DN ., Krawczak , M.: Human Gene Mutation , BiosScientificPublishers , Oxford, 1993. 3. Darnell J. , Lodish H., Baltimore D.: Molecular Cell Biology , ScientificAmericanBooksInc ., 1990. 4. Macdonald F. , Ford CHj . : OncogenesandTumorSuppressorGenes , BiosScientificPublishers , United Kingdom , 1991. | | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | |  | | | | |
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|  | **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **HISTORY** | **TOPICS COVERED** |
| 1 |  | What is oncogene? |
| 2 |  | How does oncogene work? |
| 3 |  | Forming of cancer |
| 4 |  | Classify of oncogenes |
| 5 |  | Tumor cell heterogenite |
| 6 |  | Role of proto-oncogene in cancer |
| 7 |  | Activation of proto-oncogene Tumor suppressor gene in cancer |
| 8 |  | Tumor suppressor gene |
| 9 |  | MIDTERM EXAM |
| 10 |  | Features of oncogene proteins |
| 11 |  | Classification of oncogene proteins |
| 12 |  | Growth factors |
| 13 |  | Using of oncogene in medical research |
| 14 |  | Presentation of homework |
| 15 |  | Presentation of homework |
| 16 |  | FINAL EXAM |

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| **CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **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 of the Course**  **Signature**  Prof. Dr. Didem TURGUT COŞAN | **History** |

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| **COURSE CODE: 521103303** | | **DEPARTMENT: MEDICAL BIOLOGY** | | | |
| **COURSE NAME:** **INTRACELLULAR PROTEIN MOVEMENTS** | | | | | |
| **TEACHING THE COURSE**  **STAFF** | **COURSE LANGUAGE**  **Turkish: X**  **English: ** | | **Category of the Course** | | |
| Technical | Medical | Other( …… ) |
| Prof. Dr. Hulyam KURT |  | |  | X |  |

**COURSE LEVEL**

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| **SCIENTIFIC PREPARATION** | **DEGREE** | **DOCTORATE** | **SPECIALIZED FIELD COURSE** |
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| **SEMESTER** | **WEEKLY CLASS HOURS** | | | **YOUR COURSE** | | | |
| **Theoretical** | **APPLICATION** | **Lab** | **Credit** | **ECTS** | **TYPE** | |
| Spring ****  Fall X | 3 | 0 |  | 3 | 7.5 | MANDATORY ELECTIVE  ** X** | |
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| **EVALUATION CRITERIA** | | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | | | **Number** | **Percentage (%)** |
| Midterm Exam | | | **1** | **40** |
| Quiz | | |  |  |
| Homework | | |  |  |
| Project | | |  |  |
| Oral examination | | |  |  |
| Other (………) | | |  |  |
| **Final Exam** | | | | **60** |
| **PREREQUISITE(S)** | | | -- | | | | |
| **SHORT COURSE CONTENT** | | | the organelles in the cell where protein synthesis takes place , the modification of proteins in the ER , the binding of sugars, the entry of proteins from the ER to the Golgi , and their maturation and transport to the lysosomes and cell surface. | | | | |
| **COURSE AIMS** | | | To provide an understanding at the molecular level of how proteins that are necessary for the cell and perform different functions follow a path to maturity after protein synthesis. | | | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | To be able to plan studies on receptors or lysosome enzymes at the molecular level. | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | Explain the membrane-bound organelles in the cell. Explain the transport of proteins between organelles. Define the concept of signal peptides. Explain nuclear pores. Explain the passage of proteins into the nucleus. Explain the transport of proteins into mitochondria. Explain the passage of proteins into peroxisomes. Explain the transport of proteins into the E.R. Explain the transport of proteins into the Golgi. | | | | |
| **TEXTBOOK** | | | -Başaran, A.: Medical Biology Textbook, Eskişehir, 2002.  -Güneş, HV: Molecular Cell Biology. Kaan Bookstore, Bursa, 2003. | | | | |
| **OTHER REFERENCES** | | | -Cooper, GM: The Cell, Dara- FarberCancerInstitute School. North America , 1997.  - Pollard , TD, Earnshaw , WC: Cell Biology , London , New-York, St -Louis, Sydney,Toronto , 2002. | | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | |  | | | | |

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|  | **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **HISTORY** | **TOPICS COVERED** |
| 1 |  | Membreneous cell organelles, interorganelle protein transport by different ways. |
| 2 |  | Signal peptidase and intracellular or intercellular transport of the molecules. |
| 3 |  | Nuclear pore complex and molecular traffic through nuclear pore complex. |
| 4 |  | Protein transport to mitochondria and chloroplasts. |
| 5 |  | Mitochondrial protein import and export. |
| 6 |  | Protein import into the matrix of mitochondria. |
| 7 |  | Protein import and mitochondrial assembly. |
| 8 |  | Import of proteins into the thylakoid lumen. |
| 9 |  | Peroxisomes, peroxisome assembly and E.R. assembly. |
| 10 |  | Protein transport from E.R.. |
| 11 |  | Export of proteins and lipids from the E.R.. |
| 12 |  | The mechanism of vesicular transport. |
| 13 |  | Protein transport from the E.R. to Golgi apparatus. |
| 14 |  | Oligosaccharides processing in the Golgi apparatus. |
| 15 |  | Protein transport from the trans Golgi network to the lysosomes. |
| 16 |  | Overview of the whole subjects. |

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| **CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **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 of the Course**  **Signature**  Prof. Dr. Hülyam KURT | **History** |

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| **COURSE CODE: 521103304** | | **DEPARTMENT: MEDICAL BIOLOGY** | | | |
| **COURSE NAME: CYTOBIOLOGY (ULTRA-STRUCTURE OF CELL ORGANELLES)** | | | | | |
| **TEACHING THE COURSE**  **STAFF** | **COURSE LANGUAGE**  **Turkish: X**  **English: ** | | **Category of the Course** | | |
| Technical | Medical | Other(……) |
| Prof. Dr. Hülyam KURT |  | |  | **X** |  |

**COURSE LEVEL**

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

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| **SEMESTER** | **WEEKLY CLASS HOURS** | | | **YOUR COURSE** | | | |
| **Theoretical** | **APPLICATION** | **Lab** | **Credit** | **ECTS** | **TYPE** | |
| Spring ****  Fall **X** | 2 | 2 | 0 | 3 | 7.5 | MANDATORY ELECTIVE  **X** | |
|  | | | | | | | |
| **EVALUATION CRITERIA** | | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | | | **Number** | **Percentage (%)** |
| Midterm Exam | | | **1** | **40** |
| Quiz | | |  |  |
| Homework | | |  |  |
| Project | | |  |  |
| Oral examination | | |  |  |
| Other (………) | | |  |  |
| **Final Exam** | | | | **60** |
| **PREREQUISITE(S)** | | | -- | | | | |
| **SHORT COURSE CONTENT** | | | The structure of the cell, the cell cytoplasm and the molecules that participate in this structure. The structure and functions of cell organelles . | | | | |
| **COURSE AIMS** | | | cell cytoplasm, organelles and their functions | | | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | To convey all the information about the cell cytoplasm to the student. To collect literature with the given homework, compile and collect the information, write a report and explain them. | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | Can describe the general structure of the cell. Can explain the structure and function of the cell membrane. Can describe the structure of the cytoplasm. Can define the cytoskeleton and its elements. Can explain the organelles and their functions. Can use a microscope. Can prepare slides. Can take sections. | | | | |
| **TEXTBOOK** | | | Gunes, HV . Molecular Cell Biology, Kaan Bookstore, 2003 | | | | |
| **OTHER REFERENCES** | | | AlbertsB, Bray D, Lewis J. at all . MolecularBiology of TheCell,Garland  Publishing, Inc. , New York, 1994  Pollard TD., Earnshaw WC. Cell Biology, Saunders , New York 2002.  Gartner LP andHiatt JL. Colortextbook of Histology,WBSaundersCompany ,  Philadelphia, 1997 | | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | |  | | | | |

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|  | **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **HISTORY** | **TOPICS COVERED** |
| 1 |  | Microskopy |
| 2 |  | Kinds of microscope |
| 3 |  | Structure of Electron microscope |
| 4 |  | Preparation of tissue |
| 5 |  | Animal dissection and fixation |
| 6 |  | Dehydration and clearing |
| 7 |  | Embedding |
| 8 |  | EXAM |
| 9 |  | Sectioning, Mounting and staining |
| 10 |  | Epithelium |
| 11 |  | Bone |
| 12 |  | Cartilage |
| 13 |  | Muscle |
| 14 |  | Blood |
| 15 |  | Connective tissue |
| 16 |  | EXAM |

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| **CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **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 of the Course**  **Signature**  Prof. Dr. Hülyam KURT | **History** |

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| **COURSE CODE: 521103306** | | **DEPARTMENT: MEDICAL BIOLOGY** | | | |
| **COURSE NAME: FINE STRUCTURE OF CELL NUCLEUS** | | | | | |
| **TEACHING THE COURSE**  **STAFF** | **COURSE LANGUAGE**  **Turkish: X**  **English: ** | | **Category of the Course** | | |
| Technical | Medical | Other(……) |
| Prof. Dr. Hülyam KURT |  | |  | **X** |  |

**COURSE LEVEL**

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

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| **SEMESTER** | **WEEKLY CLASS HOURS** | | | **YOUR COURSE** | | | |
| **Theoretical** | **APPLICATION** | **Lab** | **Credit** | **ECTS** | **TYPE** | |
| Spring ****  Fall **X** | 3 | 0 | 0 | 3 | 7.5 | MANDATORY ELECTIVE  ** X** | |
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| **EVALUATION CRITERIA** | | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | | | **Number** | **Percentage (%)** |
| Midterm Exam | | | **1** | **40** |
| Quiz | | |  |  |
| Homework | | |  |  |
| Project | | |  |  |
| Oral examination | | |  |  |
| Other (………) | | |  |  |
| **Final Exam** | | | | **60** |
| **PREREQUISITE(S)** | | | -- | | | | |
| **SHORT COURSE CONTENT** | | | chromosomal DNA is packaged as it transitions from a threadlike structure to a chromosome, grouping of human chromosomes according to the position of the centromere , DNA replication , mRNA transcription from DNA and removal of intron sequences during mRNA maturation, ribosome production in the nucleolus . | | | | |
| **COURSE AIMS** | | | of the regulation that takes place in the nucleus, the control center of the cell, and the formation of mRNA and ribosomes from DNA. | | | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | the nucleus and other units related to protein synthesis. | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | Explain the packaging of chromosomes. Describe the structure of chromosomes. Explain the functions of chromosomes. Describe the structure of nucleosomes. Explain the formation of mitotic chromosomes. Explain chromosome replication. Explain mRNA synthesis. Explain the mechanisms required for mRNA maturation. | | | | |
| **TEXTBOOK** | | | -Başaran, A.: Medical Biology Textbook, 6th Edition, Nobel-Güneş Bookstore, Eskişehir, 2002.  -Güneş, HV: Molecular Cell Biology. Kaan Bookstore, Bursa, 2003. | | | | |
| **OTHER REFERENCES** | | | - Pollard , TD, Earnshaw , WC: Cell Biology , New-York, 2002.  - Bray , A., Raff L., Watson, R.: MolecularBiology of the Cell., Newyork , London , 2002. | | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | |  | | | | |

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|  | **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **HISTORY** | **TOPICS COVERED** |
| 1 |  | Chromosomal DNA and its packaging. |
| 2 |  | Each chromosome has a centromere, two telomeres and an origin of replication. |
| 3 |  | Most of the chromosomal DNA do not encode proteins, but each gene produces one RNA molecule. |
| 4 |  | Structure of nucleosomes. |
| 5 |  | Structure of chromosomes. |
| 6 |  | The condensation of the transcriptional active chromatin more degraded. |
| 7 |  | Biochemical differentiation of an active chromatin. |
| 8 |  | Formation of mitotic chromosomes from chromatin. |
| 9 |  | Replication of chromosomes. |
| 10 |  | Replication of DNA. |
| 11 |  | Binding of new histones to the chromatine after synthesis. |
| 12 |  | Covalently binding of mRNA precursors to the each end. |
| 13 |  | Removal of intron sequences. |
| 14 |  | Formation of ribosomes in the nucleus. |
| 15 |  | Organisation and evolution of the nuclear genome. |
| 16 |  | Overview of the whole subjects. |

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| **CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **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 of the Course**  **Signature**  Prof. Dr. Hülyam KURT | **History** |

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| **COURSE CODE: 521103307** | | **DEPARTMENT: MEDICAL BIOLOGY** | | | |
| **COURSE NAME: STRUCTURES AND FUNCTIONS OF NON-CODING RNAS** | | | | | |
| **TEACHING THE COURSE**  **STAFF** | **COURSE LANGUAGE**  **Turkish: X**  **English: ** | | **Category of the Course** | | |
| Technical | Medical | Other(……) |
| Prof. Dr. Didem TURGUT COŞAN |  | |  | X |  |

**COURSE LEVEL**

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

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| **SEMESTER** | **WEEKLY CLASS HOURS** | | | **YOUR COURSE** | | | |
| **Theoretical** | **APPLICATION** | **Lab** | **Credit** | **ECTS** | **TYPE** | |
| Spring ****  Fall **X** | 3 | 0 | 0 | 3 | 7.5 | MANDATORY ELECTIVE  ** X** | |
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| **EVALUATION CRITERIA** | | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | | | **Number** | **Percentage (%)** |
| Midterm Exam | | | **1** | **60** |
| Quiz | | |  |  |
| Homework | | |  |  |
| Project | | |  |  |
| Oral examination | | |  |  |
| Other (………) | | |  |  |
| **Final Exam** | | | | **40** |
| **PREREQUISITE(S)** | | |  | | | | |
| **SHORT COURSE CONTENT** | | | gene silencing, RNA interference and non-coding RNAs is given. | | | | |
| **COURSE AIMS** | | | With the developing technology, there are many developments in the field of molecular biology and new ones are added to our knowledge. The subject of non-coding RNA is one of the topics that has been studied recently. Recently, RNAi interference was discovered and then concepts such as miRNA , siRNA and dsRNA were added to the types of RNA we know. Research on this subject continues and information increases every day. Therefore, this subject is quite current and a broad subject that can be a subject of a course. Another subject that emerged with the discovery of RNA interference is the subject called gene silencing or gene silencing, which is based on the principle that silencing genes can be targeted in the treatment of diseases. Examining this subject will be enlightening for innovations that will make a breakthrough in science. | | | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | To shed light on the world of non-coding RNAs that play a role in gene silencing, an important area of research in the development of new treatment methods. | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | Explain RNAi. Describe the mechanism of gene silencing. Classify small non-coding RNAs. Explain microRNA. Explain siRNA. Explain dsRNA. Explain Dicer. Describe RNAi-like mechanisms. Explain possible uses of RNAi in treatments. Understand the place of non-coding RNAs in biology and medicine. | | | | |
| **TEXTBOOK** | | |  | | | | |
| **OTHER REFERENCES** | | | 1. Andrew Z. Fire and Craig C. Mello The Nobel Prize in Physiology or Medicine [The Nobel Assembly at Karolinska Institutet](http://www.mednobel.ki.se) October 2006. 2. KrishnaraoAppasani RNA Interference Technology - From Basic Science to Drug Development Edited by Andrew Fire, Marshall Nirenberg CUP GeneExpression Systems, Inc., Massachusetts March 2005 | | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | |  | | | | |

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|  | **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **HISTORY** | **TOPICS COVERED** |
| 1 |  | Discovery of RNA interferense |
| 2 |  | Interferens RNA (RNAi). |
| 3 |  | Cellular components of gene silencing. |
| 4 |  | Non coding small RNAs.. |
| 5 |  | MicroRNA. |
| 6 |  | siRNA. |
| 7 |  | Mechanisms of gene silencing. |
| 8 |  | Transkripsiyonal gene silencing. |
| 9 |  | Transposon silencing. |
| 10 |  | Transgen silencing. |
| 11 |  | Post-transcriptional gene silencing. |
| 12 |  | dsRNA. |
| 13 |  | Dicer. |
| 14 |  | RNAi-like mechanisms. |
| 15 |  | RNAi treatment and in the future. |
| 16 |  | Non coding RNAs in molecular biology and medicine in the place. |

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| **CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **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 of the Course**  **Signature**  Prof. Dr. Didem TURGUT COŞAN | **History** |

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| **COURSE CODE: 521103308** | | **DEPARTMENT: MEDICAL BIOLOGY** | | | |
| **COURSE NAME:** **DNA AND RNA PURIFICATION AND CREATION OF RECOMBINANT DNA MOLECULES** | | | | | |
| **TEACHING THE COURSE**  **STAFF**  Prof. Dr. Didem TURGUT COŞAN | **COURSE LANGUAGE**  **Turkish: X**  **English: ** | | **Category of the Course** | | |
| Technical | Medical | Other(……) |
|  |  | |  | X |  |

**COURSE LEVEL**

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| **SCIENTIFIC PREPARATION** | **DEGREE** | **DOCTORATE** | **SPECIALIZED FIELD COURSE** |
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| **SEMESTER** | **WEEKLY CLASS HOURS** | | | **YOUR COURSE** | | | |
| **Theoretical** | **APPLICATION** | **Lab** | **Credit** | **ECTS** | **TYPE** | |
| Spring ****  Fall **X** | 2 | 2 | 0 | 3 | 7.5 | MANDATORY ELECTIVE  **X** | |
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| **EVALUATION CRITERIA** | | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | | | **Number** | **Percentage (%)** |
| Midterm Exam | | | **1** | **60** |
| Quiz | | |  |  |
| Homework | | |  |  |
| Project | | |  |  |
| Oral examination | | |  |  |
| Other (………) | | |  |  |
| **Final Exam** | | | | **40** |
| **PREREQUISITE(S)** | | | - | | | | |
| **SHORT COURSE CONTENT** | | | Purification of DNA, Purification of RNA, Nucleic Acid Electrophoresis , Basic factors affecting electrophoresis speed, Separation of nucleic acids, Gel composition, devices and electrophoresis , DNA Run in Gel Electrophoresis , DNA Run in Agarose Gel, DNA Run in Acrylamide Gel, Structures of Recombinant DNA Molecules, Digestion with restriction enzyme, Preparation of vectors for molecular cloning, Assembly of recombinant molecules | | | | |
| **COURSE AIMS** | | | To explain the basic methods used in the Molecular Biology laboratory theoretically and to ensure their transfer into practice. | | | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | To acquire basic knowledge about molecular biology and put it into practice. To collect literature through homework, compile information, prepare a report and explain it. | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | Can purify DNA. Can purify RNA. Can explain electrophoresis techniques. Can define factors affecting electrophoresis. Can prepare gel. Can prepare necessary chemicals and solutions in gel electrophoresis. Can use gel electrophoresis device. Can explain types of gel electrophoresis. Can explain restriction enzymes and their use in electrophoresis. Can analyze gel image. | | | | |
| **TEXTBOOK** | | | Prof. Dr. Irfan DEGIRMECI's Lecture Notes | | | | |
| **OTHER REFERENCES** | | | * Alberts , B., Bray , J., D., Lewis , Raff , M., Roberts, K., Wartson , J., D. : MolecularBiology of THE CELL, Third Edition, GurlandPuplishing , Inc . New York London 1994. * Brown TA: EssentialMolecularBiology Volume IA PracticalApproach . IRL Press , Oxford UniversityPress,Oxford , New York, Tokyo, 1990. * Cooper DN, Krawczak , M.: Human Gene Mutation , BiosScientificPublishers , Oxford, 1993. * Darnell J., Lodish H., Baltimore D.: Molecular Cell Biology , ScientificAmericanBooksInc ., 1990. * Sambrook J, Fritsch EF, Maniatis , T.: MolecularCloning , A Laboratory Manual, Cold Spring HarborLaboratoryPress , 1989. | | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | |  | | | | |

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|  | **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **HISTORY** | **TOPICS COVERED** |
| 1 |  | Purification DNA |
| 2 |  | Purification of RNA |
| 3 |  | Electrophoresis of nucleic acids |
| 4 |  | Basic factors influencing electrophoretic mobility |
| 5 |  | Nucleic acids separations |
| 6 |  | Gel composition, apparatus and electrophoresis |
| 7 |  | Recovery of DNA from electrophoresis gel |
| 8 |  | Recovery of DNA from agarose gels |
| 9 |  | MIDTERM EXAM |
| 10 |  | Recovery of DNA from polyacrylamide gels |
| 11 |  | Construction of recombinant DNA molecules |
| 12 |  | Restriction enzyme digestions |
| 13 |  | Preparation of vectors for molecular cloning |
| 14 |  | Construction of recombinant molecules |
| 15 |  | Presentation of homework |
| 16 |  | FINAL EXAM |

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| **CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **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 of the Course**  **Signature**  Prof. Dr. Didem TURGUT COŞAN | **History** |

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| **COURSE CODE: 521104301** | | **DEPARTMENT: MEDICAL BIOLOGY** | | | |
| **COURSE NAME:** **CELL CYCLE, MOLECULAR CONTROL OF CELL PROLIFERATION, CELL AGING, APOPTOSIS** | | | | | |
| **TEACHING THE COURSE**  **STAFF** | **COURSE LANGUAGE**  **Turkish:** X  **English: ** | | **Category of the Course** | | |
| Technical | Medical | Other(……) |
| Prof. Dr. Didem TURGUT COŞAN |  | |  | X |  |

**COURSE LEVEL**

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| **SCIENTIFIC PREPARATION** | **DEGREE** | **DOCTORATE** | **SPECIALIZED FIELD COURSE** |
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| **SEMESTER** | **WEEKLY CLASS HOURS** | | | **YOUR COURSE** | | | |
| **Theoretical** | **APPLICATION** | **Lab** | **Credit** | **ECTS** | **TYPE** | |
| Spring X  Autumn **** | 2 | 2 | 0 | 3 | 7.5 | MANDATORY ELECTIVE  **X** | |
|  | | | | | | | |
| **EVALUATION CRITERIA** | | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | | | **Number** | **Percentage (%)** |
| Midterm Exam | | | **1** | **40** |
| Quiz | | |  |  |
| Homework | | |  |  |
| Project | | |  |  |
| Oral examination | | |  |  |
| Other (………) | | |  |  |
| **Final Exam** | | | | **60** |
| **PREREQUISITE(S)** | | | -- | | | | |
| **SHORT COURSE CONTENT** | | | Checkpoints in the interphase phase of cell division , types of elements in the Cdk ( Cdc )/ cyclin complex in checkpoints in yeast and mammalian cells, functions of proteins such as p21 and p53 in the G 2 checkpoint, substances that cause cell aging, molecular mechanism of apoptosis . | | | | |
| **COURSE AIMS** | | | Control of cell proliferation at the molecular level, and the situations in which cancer may occur. | | | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | -To understand how various substances encountered in daily life affect cell proliferation at the molecular level.  - To examine in cell lines or experimental animals to what extent a cancerous tissue can be repaired by using anticarcinogenic substances . | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | Classify the types of cell proliferation. Define the stages of mitosis. Explain the G1, S and G2 stages. Define the proteins involved in the cell cycle. Explain the structure of Cdk and cyclins. Explain the cell cycle checkpoints. Explain the role of MPF in the cell cycle. Describe the molecular mechanism of cellular aging. Explain apoptosis and genes and proteins that play a role in apoptosis. | | | | |
| **TEXTBOOK** | | | -Başaran, A.: Medical Biology Textbook, 6th Edition, Nobel-Güneş Bookstore, Eskişehir, 2002. | | | | |
| **OTHER REFERENCES** | | | - Pollard , TD, Earnshaw , WC: Cell Biology , New-York, 2002.  - Alberts , B., Bray , D., Lewis , J., Raff , M., Roberts, K., Watson, J.D.: MolecularBiology of the Cell., Newyork , London , 1989.  -Cooper, GM: The Cell, USA, 1997.  - Alberts , B., Bray , J., D., Lewis , Raff , M., Roberts, K., Wartson , J., D. : MolecularBiology of THE CELL, Third Edition, GurlandPuplishing , Inc . New York London 1994.  -Cooper DN, Krawczak , M.: Human Gene Mutation , BiosScientificPublishers , Oxford, 1993.  - Darnell J., Lodish H., Baltimore D.: Molecular Cell Biology , ScientificAmericanBooksInc ., 1990.  - Macdonald F., Ford CHj . : OncogenesandTumorSuppressorGenes , BiosScientificPublishers , | | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | |  | | | | |

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|  | **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **HISTORY** | **TOPICS COVERED** |
| 1 |  | Cell division types. |
| 2 |  | General description of mitosis and its stages. |
| 3 |  | Descriptions of interphase, G1, G2 and S phases. |
| 4 |  | Descriptions of protein kinase and phosphatases. |
| 5 |  | Cell cycle check point proteins; structure of Cdk (cyclin dependent kinase) and cyclins. |
| 6 |  | Cdk/cyclin complex types in mammalia (human) and yeast. |
| 7 |  | Cell cycle check points (G1, G2, S). |
| 8 |  | M check point and MPF (M-Phase Protein Factor). |
| 9 |  | Regulation of MPF activity. |
| 10 |  | Check point system of yeast cell cycle. |
| 11 |  | Cell cycle check points in human and the other vertebrates. |
| 12 |  | Stages of mitosis and caryokinesis. |
| 13 |  | Disassembly and reassembly of nuclear envelope and cytokinesis. |
| 14 |  | Duration and frequency of mitosis. |
| 15 |  | Molecular mechanism of cellular senecense. |
| 16 |  | Investigation of apoptosis and the role of gene and proteins on the apoptotic events in human and yeast. |

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| **CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **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 of the Course**  **Signature**  Prof. Dr. Didem TURGUT COŞAN | **History** |

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| **COURSE CODE: 521104304** | | **DEPARTMENT: MEDICAL BIOLOGY** | | | |
| **COURSE NAME:** **CELLULAR MECHANISM OF DEVELOPMENT** | | | | | |
| **TEACHING THE COURSE**  **STAFF** | **COURSE LANGUAGE**  **Turkish:** X  **English: ** | | **Category of the Course** | | |
| Technical | Medical | Other(……) |
| Prof. Dr. Hulyam KURT |  | |  | X |  |

**COURSE LEVEL**

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

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| **SEMESTER** | **WEEKLY CLASS HOURS** | | | **YOUR COURSE** | | | |
| **Theoretical** | **APPLICATION** | **Lab** | **Credit** | **ECTS** | **TYPE** | |
| Spring X  Autumn **** | 3 | 0 | 0 | 3 | 7.5 | MANDATORY ELECTIVE  **** X | |
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| **EVALUATION CRITERIA** | | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | | | **Number** | **Percentage (%)** |
| Midterm Exam | | | **1** | **40** |
| Quiz | | |  |  |
| Homework | | |  |  |
| Project | | |  |  |
| Oral examination | | |  |  |
| Other (………) | | |  |  |
| **Final Exam** | | | | **60** |
| **PREREQUISITE(S)** | | | -- | | | | |
| **SHORT COURSE CONTENT** | | | Molecular control of organismal formation, zygote, morula, blastula and gastrula stages, ectoderm, endoderm and mesoderm formation, mechanisms directing body formation, examination of body formation in C. elegans . | | | | |
| **COURSE AIMS** | | | The event in which the mechanisms effective in the formation of an organism control each other. | | | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | To be able to comprehend how complex a system functions in the formation of an organism, from the simplest to the most advanced. | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | Define morphogenetic movements. Explain the polarity of amphibian embryo development. Explain the stages of morula, blastula and gastrula. Define gastrulation movements. Explain the factors affecting the germ layer. Explain the regulation of morphogenetic movements at the molecular level. Explain cell migration. Describe the factors affecting stem cell development. Describe the role of determination in tissue formation. | | | | |
| **TEXTBOOK** | | | -Başaran, A.: Medical Biology Textbook, 6th Edition, Nobel-Güneş Bookstore, Eskişehir, 2002.  -Kayalı, H., Şatrooğlu , G., Taşyürekli, M.: Human Embryology (7th Edition), Alfa Printing House , Istanbul, 1992. | | | | |
| **OTHER REFERENCES** | | | - Alberts , B., Lewis , R., Watson, R.: MolecularBiology of the Cell., Second Edition (p:879-946), Newyork , London , 1989. | | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | |  | | | | |

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|  | **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **HISTORY** | **TOPICS COVERED** |
| 1 |  | Morphogenetic movements and shaping of the body plan. |
| 2 |  | The polarity of the Amphibian embryo depends on the polarity of the egg. |
| 3 |  | Morula, blastula and gastrula cycles. |
| 4 |  | The organization of gastrulation movements of the dorsal lip of blasthapore. |
| 5 |  | The factors that effect three germ layers by gastrulation. |
| 6 |  | Formation of somites. |
| 7 |  | The regulation of morphogenetic movements of the cells at the molecular level. |
| 8 |  | Control of embryonic tissues through cell migrations. |
| 9 |  | The changes of early embryonic animal cells. |
| 10 |  | The whole cells of early mammalian embryo have same developmental potential. |
| 11 |  | The systems that effect the stem cells development in the mammalian embryo. |
| 12 |  | The analyses of cell determination by experimental transplantation. |
| 13 |  | The control of determination by the cytoplasm; the cellular potential on the formation of tissues. |
| 14 |  | To effect each others of proliferating cells on the regeneration event. |
| 15 |  | The contrıl of molecular level on the body development of C. elegans. |
| 16 |  | Overview of the whole subjects. |

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| **CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **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 of the Course**  **Signature**  Prof. Dr. Hülyam KURT | **History** |

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| **COURSE CODE: 521104305** | | **DEPARTMENT: MEDICAL BIOLOGY** | | | |
| **COURSE NAME:** **NUCLEIC ACID AND PROTEIN ANALYSIS WITH COMPUTER PROGRAM** | | | | | |
| **TEACHING THE COURSE**  **STAFF**  Prof. Dr. M. Cengiz ÜSTÜNER | **COURSE LANGUAGE**  **Turkish:** x  **English: ** | | **Category of the Course** | | |
| Technical | Medical | Other(……) |
|  |  | |  | x |  |

**COURSE LEVEL**

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| **SCIENTIFIC PREPARATION** | **DEGREE** | **DOCTORATE** | **SPECIALIZED FIELD COURSE** |
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| **SEMESTER** | **WEEKLY CLASS HOURS** | | | **YOUR COURSE** | | | |
| **Theoretical** | **APPLICATION** | **Lab** | **Credit** | **ECTS** | **TYPE** | |
| Spring x  Autumn **** | 2 | 2 | 0 | 3 | 7.5 | MANDATORY ELECTIVE  **X** | |
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| **EVALUATION CRITERIA** | | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | | | **Number** | **Percentage (%)** |
| Midterm Exam | | | **1** | **40** |
| Quiz | | |  |  |
| Homework | | |  |  |
| Project | | |  |  |
| Oral examination | | |  |  |
| Other (………) | | |  |  |
| **Final Exam** | | | | **60** |
| **PREREQUISITE(S)** | | |  | | | | |
| **SHORT COURSE CONTENT** | | | to the LabWork program , examination of the program's various menus | | | | |
| **COURSE AIMS** | | | To ensure that a DNA gel examined in the laboratory is loaded into the computer and examined correctly. | | | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | Thanks to this program, students can use computers healthily in molecular biology studies without encountering any difficulties in their future studies. | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | Can start and record the LAbwork program. Can explain the ID-Jel tool menus. Can do exercises on the gel loaded into the program. Can edit the background on the gel. Can calculate data. Can save the information about the experiment. Can do quantitative PCR analysis. Can do Southern Blot analysis. Can do Western Blot analysis. Can do Nouthern blot analysis. Can do dot blot analysis. | | | | |
| **TEXTBOOK** | | | LabWork Program manual | | | | |
| **OTHER REFERENCES** | | |  | | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | |  | | | | |

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|  | **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **HISTORY** | **TOPICS COVERED** |
| 1 |  | Starting the LabWorks software program |
| 2 |  | ID-Gel tool palette, options |
| 3 |  | Identifying lanes and bands |
| 4 |  | Background correction |
| 5 |  | Molecular weight standards |
| 6 |  | Data calculations |
| 7 |  | Saving and printing experiment information |
| 8 |  | Colony counting |
| 9 |  | Quantitative PCR |
| 10 |  | Southern blot analysis |
| 11 |  | Western blot analysis |
| 12 |  | Northern blot analysis |
| 13 |  | Single band analysis |
| 14 |  | Dot blot analysis |
| 15 |  | Presentation of homework: |
| 16 |  | Presentation of homework: |

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| **CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **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 of the Course**  **Signature**  Prof. Dr. M. Cengiz ÜSTÜNER | **History** |

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| **COURSE CODE:** **521106306** | | **DEPARTMENT: MEDICAL BIOLOGY** | | | |
| **COURSE NAME:** **SOME MUTATIONS IN HUMAN GENES** | | | | | |
| **TEACHING THE COURSE**  **STAFF**  Prof. Dr. Didem TURGUT COŞAN | **COURSE LANGUAGE**  **Turkish: x**  **English: ** | | **Category of the Course** | | |
| Technical | Medical | Other(……) |
|  |  | |  | x |  |

**COURSE LEVEL**

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| **SCIENTIFIC PREPARATION** | **DEGREE** | **DOCTORATE** | **SPECIALIZED FIELD COURSE** |
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| **SEMESTER** | **WEEKLY CLASS HOURS** | | | **YOUR COURSE** | | | |
| **Theoretical** | **APPLICATION** | **Lab** | **Credit** | **ECTS** | **TYPE** | |
| Spring **x**  Autumn | 2 | 0 | 0 | 2 | 5.0 | MANDATORY ELECTIVE  ** X** | |
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| **EVALUATION CRITERIA** | | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | | | **Number** | **Percentage (%)** |
| Midterm Exam | | | **1** | **60** |
| Quiz | | |  |  |
| Homework | | |  |  |
| Project | | |  |  |
| Oral examination | | |  |  |
| Other (………) | | |  |  |
| **Final Exam** | | | | **40** |
| **PREREQUISITE(S)** | | |  | | | | |
| **SHORT COURSE CONTENT** | | | Deamination due to methylation of 5-methylcytosine , Single base pair mutations leading to diseases, Gene conversion, Point mutations in the mitochondrial genome, Gene Deletions , Large gene deletions , Short gene deletions , Mitochondrial genome deletions , Gene insertions , duplications and inversions , Small insertions , Large insertions , Gene duplications , Inversions , Expansion of unstable repeat sequences, mRNASplicing Junctions in Human Genes and Single Base Pair Status in Their Phenotypic Products, Regulatory Mutations | | | | |
| **COURSE AIMS** | | | To teach theoretically the mutations in humans, their characteristics and detection methods. | | | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | To acquire basic knowledge about molecular biology and put it into practice. To collect literature through homework, compile information, prepare a report and explain it. | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | Explain single base pair changes. Define deamination. Associate single base pair mutations with diseases. Define gene conversion. Explain gene deletions. Define large gene deletions. Explain mitochondrial genome deletions. Define gene insertions, deletions, duplications and inversions. | | | | |
| **TEXTBOOK** | | | Prof. Dr. Irfan DEGIRMECI's Lecture Notes | | | | |
| **OTHER REFERENCES** | | | Alberts , B., Bray , J., D., Lewis , Raff , M., Roberts, K., Wartson , J., D. : MolecularBiology of THE CELL, Third Edition, GurlandPuplishing , Inc . New York London 1994.  Brown TA: EssentialMolecularBiology Volume IA PracticalApproach . IRL Press , Oxford UniversityPress,Oxford , New York, Tokyo, 1990.  Cooper DN, Krawczak , M.: Human Gene Mutation , BiosScientificPublishers , Oxford, 1993.  Darnell J., Lodish H., Baltimore D.: Molecular Cell Biology , ScientificAmericanBooksInc ., 1990.  Sambrook J, Fritsch EF, Maniatis , T.: MolecularCloning , A Laboratory Manual, Cold Spring HarborLaboratoryPress , 1989. | | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | |  | | | | |

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|  | **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **HISTORY** | **TOPICS COVERED** |
| 1 |  | Single base pair alteration |
| 2 |  | Deamination linked with 5-metilcytosine metilation |
| 3 |  | Single base pair mutation causing disease |
| 4 |  | Gene transformation |
| 5 |  | Point mutation in mitochondrial genome |
| 6 |  | Deletions of gene |
| 7 |  | Large gene deletion |
| 8 |  | Short gene deletion |
| 9 |  | MIDTERM EXAM |
| 10 |  | Deletion of mitochondrial genom |
| 11 |  | Insertion duplication and invertion of gene |
| 12 |  | Small insertion, large insertion |
| 13 |  | Duplication of gene, invertions, expansion of unstable repeat sequences |
| 14 |  | Single base pair substitutions in human gene mRNA splice junction and their phenotypic consequences |
| 15 |  | Regulatory mutations |
| 16 |  | FINAL EXAM |

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| **CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **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 of the Course**  **Signature**  Prof. Dr. Didem TURGUT COŞAN | **History** |

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| **COURSE CODE: 521104307** | **DEPARTMENT: MEDICAL BIOLOGY** | | | |
| **COURSE NAME: EFFECTS OF NUTRIENTS ON CELLS AND ADAPTATION** | | | | |
| **TEACHING THE COURSE**  **STAFF** | **COURSE LANGUAGE**  **Turkish: X**  **English: ** | **Category of the Course** | | |
| Technical | Medical | Other(……) |
| Prof. Dr. Didem TURGUT COŞAN |  |  | **X** |  |

**COURSE LEVEL**

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

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| **SEMESTER** | **WEEKLY CLASS HOURS** | | | **YOUR COURSE** | | |
| **Theoretical** | **APPLICATION** | **Lab** | **Credit** | **ECTS** | **TYPE** |
| Spring **X**  Autumn **** | 3 | 0 | 0 | 3 | 7.5 | MANDATORY ELECTIVE  ** X** |
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| **EVALUATION CRITERIA** | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | | **Number** | **Percentage (%)** |
| Midterm Exam | | **1** | **60** |
| Quiz | |  |  |
| Homework | |  |  |
| Project | |  |  |
| Oral examination | |  |  |
| Other ( ……… ) | |  |  |
| **Final Exam** | **40** | | |
| **PREREQUISITE(S)** | | |  | | | |
| **SHORT COURSE CONTENT** | | | The aim is to learn the effects of the nutrients we consume on cells at the molecular level. | | | |
| **COURSE AIMS** | | | In this course, the natural plant species that we consume as food in nature will be determined. The changes that plants consumed as food show due to environmental conditions and the effects of these changed nutrients on cells will be examined. The effects of air pollution and solid, liquid and gas wastes of industry on plants will be examined and evaluated from a molecular biological perspective. The changes and damages that these effects can cause in the cell will be determined. In addition, the adaptation response of cells to these changes will be evaluated. | | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | Learning the effects of nutrients on cells at the molecular level. Evaluating the adaptation response of cells. | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | Define plant natural nutrients. Explain the effects of pesticides and insecticides on plants. Explain the effects of polluted water on plants. Explain the effects of air pollution on plants. Explain the effects of heavy metals on plants. Explain the damage caused by these substances in cells. Explain the adaptation mechanisms against damage. Define autophagy. | | | |
| **TEXTBOOK** | | |  | | | |
| **OTHER REFERENCES** | | | 1. [Daayf](http://eu.wiley.com/WileyCDA/Section/id-302479.html?query=Fouad+Daayf) F (Editor), [Lattanzio](http://eu.wiley.com/WileyCDA/Section/id-302479.html?query=Vincenzo+Lattanzio) V (Editor). RecentAdvances in PolyphenolResearch , Wiley-Blackwell , August 2008. 2. [Packer](http://www.amazon.com/s/ref=ntt_athr_dp_sr_1?_encoding=UTF8&sort=relevancerank&search-alias=books&field-author=Lester%20Packer) L (Editor), [Sies](http://www.amazon.com/s/ref=ntt_athr_dp_sr_2?_encoding=UTF8&sort=relevancerank&search-alias=books&field-author=Helmut%20Sies) H (Editor). FlavonoidsandOtherPolyphenols , Methods in Enzymology . 3. [Shahidi](http://www.amazon.com/s/ref=rdr_ext_aut?_encoding=UTF8&index=books&field-author=Fereidoon%20Shahidi) F, [Naczk](http://www.amazon.com/s/ref=rdr_ext_aut?_encoding=UTF8&index=books&field-author=Marian%20Naczk) M. [Phenolics in FoodandNutraceuticals](javascript:void(0)) . CRC press . 4. Alberts , B ., Bray , J., D., Lewis , Raff , M., Roberts, K., Wartson , J., D. : MolecularBiology of The Cell, Third Edition, GurlandPuplishing , Inc . New York London 1994. 5. Bray , A ., Raff L., Watson, R.: MolecularBiology of the Cell., Newyork , London , 2002. 6. Cooper, G. M .: The Cell, Dara- FarberCancerInstitute School. North America , 1997.   Pollard , TD ., Earnshaw , WC: Cell Biology , London , New-York, St -Louis, Sydney,Toronto , 2002. | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | |  | | | |

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|  | **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **HISTORY** | **TOPICS COVERED** |
| 1 |  | What are natural plant nutrients? |
| 2 |  | Effects of pesticides, insecticides and other chemicals on soil structure and morphological and anatomical reactions on plant organ systems. |
| 3 |  | Effect of domestic and industrial waste water on morphological deformations in plants. |
| 4 |  | Effects of air pollution and industrial pollution types like solid, liquid and gas on plants |
| 5 |  | Effects of accumulation heavy metal on changes in ruderal and culture plants. |
| 6 |  | Observation on morphological and anatomical changes. |
| 7 |  | Effects of adaptation on morphological and anatomical changes. |
| 8 |  | Cell damage caused and mechanisms. |
| 9 |  | Tissue damage caused and mechanisms. |
| 10 |  | Chemical damage. |
| 11 |  | Kinds of chemical damage. |
| 12 |  | Reversible damage. |
| 13 |  | Cellular adaptation for damage |
| 14 |  | Heterophagy. |
| 15 |  | Autophagy. |
| 16 |  | Natural plant nutrients and autophagy. |

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| **CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **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 of the Course**  **Signature**  Prof. Dr. Didem TURGUT COŞAN | **History** |

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| **COURSE CODE: 521106308** | | | **DEPARTMENT: MEDICAL BIOLOGY** | | |
| **COURSE NAME:** **INTRODUCTION TO MEDICAL BIOTECHNOLOGY** | | | | | |
| **TEACHING THE COURSE**  **STAFF**  Prof. Dr. Didem TURGUT COŞAN | **COURSE LANGUAGE**  **Turkish: x**  **English: ** | **Category of the Course** | | | |
| Technical | | Medical | Other ( …… ) |
|  |  |  | | **X** |  |

**COURSE LEVEL**

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| **SCIENTIFIC PREPARATION** | **DEGREE** | **DOCTORATE** | **SPECIALIZED FIELD COURSE** |
| **** | **** | **x** | **** |

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| **SEMESTER** | **WEEKLY CLASS HOURS** | | | **YOUR COURSE** | | | |
| **Theoretical** | **APPLICATION** | **Laboratory** | **Credit** | **ECTS** | **TYPE** | |
| Spring x  Autumn **** | 2 | 0 | 0 | 2 | 5.0 | MANDATORY ELECTIVE  ** X** | |
|  | | | | | | | |
| **EVALUATION CRITERIA** | | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | | | **Number** | **Percentage (%)** |
| Midterm Exam | | | **1** | **60** |
| Quiz | | |  |  |
| Homework | | |  |  |
| Project | | |  |  |
| Oral examination | | |  |  |
| Other ( ……… ) | | |  |  |
| **Final Exam** | | | | **40** |
| **PREREQUISITE(S)** | | |  | | | | |
| **SHORT COURSE CONTENT** | | | of Biotechnology , Definition and Scope, Purpose and Areas of Use, Medical Biotechnological Products, Methods, Medical Biotechnology and Biomolecule Design, Medical Biotechnology and Biomarkers , Medical Biotechnological Transformation and Transfection , Clinical Approaches and Ethical Principles in Medical Biotechnology , Medical Biotechnology Laboratory and Safety, Status of Medical Biotechnology in Turkey | | | | |
| **COURSE AIMS** | | | biotechnology, which is one of the popular topics of today . Biotechnological methods used in various researches in the field of biology can also be used in the treatment of many diseases in the field of medicine in the future and there are many researches carried out on this subject. Knowing the properties and usage areas of biotechnological methods , on which intensive researches continue, is very important for medical science. | | | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | biotechnology, which has an increasing importance every day and has a wide range of uses from industry to medicine, and to ensure that they have knowledge on such a current subject. | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | Explain the concept of biotechnology. Know the purpose and usage areas of biotechnology. Define medical biotechnological methods. Define biomolecular and biomarkers. Explain biopolymeric materials and transfection in biotechnology. Understand cell and tissue engineering. Explain in vitro and in vivo gene transfer. Explain inhibition of gene expression. Understand the use of stem cells. Define necessary equipment. | | | | |
| **TEXTBOOK** | | | UnderstandingBiotechnology by [A.​ Borém](http://www.informit.com/safari/author_bio.asp@ISBN=0131010115) , [F. R. Santos](http://www.informit.com/safari/author_bio.asp@ISBN=0131010115) , [D. E. Bowen](http://www.informit.com/safari/author_bio.asp@ISBN=0131010115) (2003) | | | | |
| **OTHER REFERENCES** | | | 1. [SyntheticPolymersforBiotechnologyandMedicine](http://www.amazon.com/Synthetic-Polymers-Biotechnology-Medicine-Intelligence/dp/1587060272/ref=sr_1_3?s=books&ie=UTF8&qid=1304526263&sr=1-3) by R. Freitag (2002) 2. Bionanotechnology : Lessons [from](http://eu.wiley.com/WileyCDA/Section/id-302479.html?query=David+S.+Goodsell) Nature by [D. S. Goodsell](http://eu.wiley.com/WileyCDA/Section/id-302479.html?query=David+S.+Goodsell) (2004) 3. Cell and TissueCulture : LaboratoryProcedures by [A . Doyle](http://www.amazon.com/s/ref=ntt_athr_dp_sr_1?_encoding=UTF8&sort=relevancerank&search-alias=books&field-author=Alan%20Doyle) , [J. B. Griffiths](http://www.amazon.com/s/ref=ntt_athr_dp_sr_2?_encoding=UTF8&sort=relevancerank&search-alias=books&field-author=J.%20Bryan%20Griffiths) , [A. Griffiths , J. B. Doyle](http://www.amazon.com/s/ref=ntt_athr_dp_sr_3?_encoding=UTF8&sort=relevancerank&search-alias=books&field-author=A.%2C%20Griffiths%2C%20J.B.%20Doyle) , [D. G. Newell](http://www.amazon.com/s/ref=ntt_athr_dp_sr_4?_encoding=UTF8&sort=relevancerank&search-alias=books&field-author=D.G.%20Newell) (1998) | | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | |  | | | | |

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|  | **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **HISTORY** | **TOPICS COVERED** |
| 1 |  | The History and Description of Biotechnology |
| 2 |  | The Purpose, Compherension and Usage of Biotechnology |
| 3 |  | Medical Biotechnological Products and Procedures |
| 4 |  | New Methods which is used in Biotechnology and its Evolution |
| 5 |  | Medical Biotechnology, Biyomarkers and Biyomolecules |
| 6 |  | Biopolymeric Materials in Biotechnology and their Transfection |
| 7 |  | Cell and Tissue Engineering in Biotechnology |
| 8 |  | Biotechnological In vitro and In vivo Gene Transfer |
| 9 |  | Biotechnological Vectors (Plasmid, Viral etc.) |
| 10 |  | Treatment with Inhibition of Biotechnology and Gene Expression |
| 11 |  | Priciples of Treatment with non-coding RNA Technology and its Application |
| 12 |  | Regenerative Treatment for Stem Cell Usage with Biotechnology |
| 13 |  | The Medical Importance of In Vivo Screening System in Biotechnology |
| 14 |  | Necessary Equipments for Medical Biotechnology Laboratory and Laboratory Spesifity |
| 15 |  | Clinic Approaches in Medical Biotechnology and Ethic Principles |
| 16 |  | Clinic Approaches and Status of Medical Biology in Turkey |

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| **CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **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 of the Course**  **Signature**  Prof. Dr. Didem TURGUT COŞAN | **History** |

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| **COURSE CODE: 521104309** | | **DEPARTMENT: MEDICAL BIOLOGY DEPARTMENT** | | | |
| **COURSE NAME:** **MUTATION DETECTION METHODS** | | | | | |
| **TEACHING THE COURSE**  **STAFF** | **COURSE LANGUAGE**  **Turkish: X**  **English: ** | | **Category of the Course** | | |
| Technical | Medical | Other( …… ) |
| Prof. Dr. Hülyam KURT |  | |  | X |  |

**COURSE LEVEL**

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

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| **SEMESTER** | **WEEKLY CLASS HOURS** | | | **YOUR COURSE** | | | |
| **Theoretical** | **APPLICATION** | **Lab** | **Credit** | **ECTS** | **TYPE** | |
| Spring **X**  Autumn **** | 2 | 2 | 0 | 3 | 7.5 | MANDATORY ELECTIVE  ** X** | |
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| **EVALUATION CRITERIA** | | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | | | **Number** | **Percentage (%)** |
| Midterm Exam | | | **1** | **60** |
| Quiz | | |  |  |
| Homework | | |  |  |
| Project | | |  |  |
| Oral examination | | |  |  |
| Other ( ……… ) | | |  |  |
| **Final Exam** | | | | **40** |
| **PREREQUISITE(S)** | | |  | | | | |
| **SHORT COURSE CONTENT** | | | Southern , Northern Blot Analysis, Polymerase Chain Reaction (PCR), Mutation Detection with PCR and Analysis, Deletion Screening, Use of mRNA / cDNA , Gel Electrophoresis Denaturation , Heteroduplex Analysis, SSCP ( Single - Strant Conformation Polymorphism ) Analysis, Rapid Screening of Known Mutations, Ligase Chain Reaction, Linkage Analysis, Risk Analysis, DNA Polymorphism and Disease Linkages, Positional Cloning, DNA Polymorphism and Disease Linkages, Analysis in Gel Documentation System, DNA Sequence Analysis Method, Mutation Screening from Gene Banks by Computer | | | | |
| **COURSE AIMS** | | | Teaching mutation detection methods theoretically and practically. | | | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | mutation detection methods in a practical way in the laboratory . Collecting literature with homework , compiling information and putting it in a report form and being able to explain it. | | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | Define Southern Blot and Northern Blot analysis. Explain PCR. Determine mutation with PCR. Perform denaturation and heteroduplex analysis with gel electrophoresis. Perform SSCP analysis. Perform linkage analysis. Define diseases associated with DNA polymorphism. Classify DNA sequence analysis methods. | | | | |
| **TEXTBOOK** | | | Prof. Dr. Irfan DEGIRMECI's Lecture Notes | | | | |
| **OTHER REFERENCES** | | | Alberts , B ., Bray , J., D., Lewis , Raff , M., Roberts, K., Wartson , J., D. : MolecularBiology of THE CELL, Third Edition, GurlandPuplishing , Inc . New York London 1994.  Brown TA .: EssentialMolecularBiology Volume IA PracticalApproach . IRL Press , Oxford UniversityPress,Oxford , New York, Tokyo, 1990.  Cooper DN ., Krawczak , M.: Human Gene Mutation , BiosScientificPublishers , Oxford, 1993.  Darnell J. , Lodish H., Baltimore D.: Molecular Cell Biology , ScientificAmericanBooksInc ., 1990.  Sambrook J, Fritsch EF ., Maniatis , T.: MolecularCloning , A Laboratory Manual, Cold Spring HarborLaboratoryPress , 1989. | | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | |  | | | | |

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|  | **WEEKLY PLAN OF THE COURSE** | |
| **WEEK** | **HISTORY** | **TOPICS COVERED** |
| 1 |  | Southern Blot Analysis, Northern Blot analysis |
| 2 |  | Polimerase chain reaction (PCR) |
| 3 |  | Mutation detection by PCR and analysis, Deletion scanning |
| 4 |  | Using of mRNA/cDNA, Seperation of incorrect chemical combination |
| 5 |  | Denaturation by gel electrophorese, Heterodouble analysis |
| 6 |  | SSCP (Single- Strant Conformation Polimorphism ) analysis |
| 7 |  | Processing of DNA sequence |
| 8 |  | Known mutation rapidly scanning, Ligase chain reaction |
| 9 |  | MIDTERM EXAM |
| 10 |  | Linkage analysis,Linkage analysis by RFLP, risk analysis |
| 11 |  | Positional cloning, DNA polymorphism and association with disease, Processing of DNA isolation |
| 12 |  | Isolation of mRNA, Provided cDNA from mRNA |
| 13 |  | Method of gel elektrophorese, Analysis in gel documantion system |
| 14 |  | Processing of DNA sequence analysis |
| 15 |  | Mutation scanning from gene banks by computer |
| 16 |  | FINAL EXAM |

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| **CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **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 of the Course**  **Signature**  Prof. Dr. Hülyam KURT | **History** |

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| **COURSE CODE** | **521104310** | **DEPARTMENT** | **MEDICAL BIOLOGY** | | |
| **COURSE NAME** | | **ORGANEL PATHOLOGIES** | | | |
| **INSTRUCTOR GIVING THE COURSE** | | **COURSE LANGUAGE** | **COURSE CATEGORY** | | |
| Prof. Dr. İrfan DEĞİRMENCİ | | Turkish | **Technical** | **Medical** | **Other( …… )** |
|  | x |  |

**COURSE LEVEL**

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| **SCIENTIFIC PREPARATION** | **DEGREE** | **DOCTORATE** |
|  |  | **X** |

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| **SEMESTER** | **WEEKLY CLASS HOURS** | | | **YOUR COURSE** | | |
| **THEORETICAL** | **APPLICATION** | **LAB** | **LOAN** | **ECTS** | **TYPE** |
| Spring | 3 |  |  | 3 | 7.5 | Elective |
|  | | | | | | |
| **EVALUATION CRITERIA** | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | **Number** | **Percentage (%)** | |
| Midterm Exam | **1** | **40** | |
| Quiz |  |  | |
| Homework |  |  | |
| Project |  |  | |
| Oral examination |  |  | |
| Other ( ……… ) |  |  | |
| **Final Exam** | | **60** | |
| **PREREQUISITE(S)** | | |  | | | |
| **SHORT COURSE CONTENT** | | | of organelles, he/she learns the pathologies that occur in single organelles and the changes that occur in cells. | | | |
| **COURSE AIMS** | | | To recognize the molecular characteristics of cancer cells and to learn about combating cancer at the molecular level. | | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | cell organelles on the cell and organism by learning the pathologies of cell organelles one by one. | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | Describe the structures of organelles. Describe the functions of organelles. Describe the diseases associated with ER. Describe the diseases associated with ribosomes. Describe the diseases associated with lysosomes. Describe the diseases associated with peroxisomes. Describe the diseases associated with mitochondria. Describe the diseases associated with nuclear membranes. | | | |
| **TEXTBOOK** | | | Molecular biology of the cell | | | |
| **OTHER REFERENCES** | | | Molecular Cell Biology | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | |  | | | |

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| **WEEKLY PLAN OF THE COURSE** | | |
| **WEEK** | **HISTORY** | **TOPICS TO BE COVERED** |
| **1** |  | of Organelles 1 |
| **2** |  | Structures and Functions of Organelles 2 |
| **3** |  | Endoplasmic Reticulum Pathologies and Their Relationship with Diseases |
| **4** |  | Golgi Complex Pathologies and Their Relationship with Diseases |
| **5** |  | Ribosome Pathologies and Their Relationship with Diseases |
| **6** |  | Lysosome Pathologies and Their Relationship with Diseases 1 |
| **7** |  | Lysosome Pathologies and Their Relationship with Diseases 2 |
| **8** |  | Midterm Exam |
| **9** |  | Peroxisome Pathologies and Their Relationship with Diseases |
| **10** |  | Mitochondrial Pathologies and Their Relationship with Diseases |
| **11** |  | Nuclear membrane pathologies and their relationship with diseases |
| **12** |  | Article review and evaluation 1 |
| **13** |  | Article review and evaluation 2 |
| **14** |  | Article review and evaluation 3 |
| **15,16** |  | END OF SEMESTER EXAM |

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| **CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **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 GIVING THE COURSE** | **HISTORY** |
| Prof. Dr. İrfan DEĞİRMENCİ |  |

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| **COURSE CODE** | **521104311** | **DEPARTMENT** | MEDICAL BIOLOGY | | |
| **COURSE NAME** | | **MUTATIONS AND POLYMORPHISM** | | | |
| **INSTRUCTOR GIVING THE COURSE** | | **COURSE LANGUAGE** | **COURSE CATEGORY** | | |
| Prof. Dr. İrfan DEĞİRMENCİ | | Turkish | **Technical** | **Medical** | **Other( …… )** |
|  | x |  |

**COURSE LEVEL**

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| **SCIENTIFIC PREPARATION** | **DEGREE** | **DOCTORATE** |
|  |  | **x** |

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| **SEMESTER** | **WEEKLY CLASS HOURS** | | | **YOUR COURSE** | | |
| **THEORETICAL** | **APPLICATION** | **LAB** | **LOAN** | **ECTS** | **TYPE** |
| Spring | 3 |  |  | 3 | 7.5 | Elective |
|  | | | | | | |
| **EVALUATION CRITERIA** | | | | | | |
| **SEMESTER ACTIVITIES** | | | **Type of activity** | **Number** | **Percentage (%)** | |
| Midterm Exam | **1** | **40** | |
| Quiz |  |  | |
| Homework |  |  | |
| Project |  |  | |
| Oral examination |  |  | |
| Other ( ……… ) |  |  | |
| **Final Exam** | | **60** | |
| **PREREQUISITE(S)** | | |  | | | |
| **SHORT COURSE CONTENT** | | | Mutations, types, mutagenic factors, gene variations, comparison of mutations and polymorphisms | | | |
| **COURSE AIMS** | | | After reminding the student of the concept of mutation, to make him/her understand the differences with polymorphisms and the reasons for individual differences. | | | |
| **COURSE CONTRBUTION TO THE PROFESSIONAL EDUCATION OBJECTIVES** | | | polymorphisms , individual differences and individual differences in the treatment of diseases. | | | |
| **LEARNING OUTCOMES OF THE COURSE** | | | Define mutation. Define factors that cause mutation. Classify mutation types. Explain gene mutations. Define chromosomal mutations. Define polymorphism. Classify types of polymorphism. Explain areas of use of polymorphism in medicine. Explain the relationship between polymorphism and drug resistance. | | | |
| **TEXTBOOK** | | | Molecular Biology of the Cell | | | |
| **OTHER REFERENCES** | | | Molecular Cell Biology | | | |
| **TOOLS AND EQUIPMENTS REQUIRED** | | |  | | | |

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| **WEEKLY PLAN OF THE COURSE** | | |
| **WEEK** | **HISTORY** | **TOPICS TO BE COVERED** |
| **1** |  | Definition of mutation, mutagenesis |
| **2** |  | Factors causing mutation |
| **3** |  | Mutation Types, Mutations According to Their Origin |
| **4** |  | Mutations According to Their Size, Gene Mutations |
| **5** |  | Genome Mutations |
| **6** |  | Chromosome Mutations- Structural |
| **7** |  | Definition of polymorphism , areas of use |
| **8** |  | Midterm Exam |
| **9** |  | Types of Polymorphism |
| **10** |  | Areas of use of polymorphisms in medicine |
| **11** |  | polymorphisms and drug resistance |
| **12** |  | Article review and evaluation 1 |
| **13** |  | Article review and evaluation 2 |
| **14** |  | Article review and evaluation 3 |
| **15,16** |  | END OF SEMESTER EXAM |

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| **CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAM LEARNING OUTCOMES** | | **Contribution Level** | | |
| **NO** | **LESSON OUTCOMES** | **1**  **Little** | **2**  **Middle** | **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 GIVING THE COURSE** | **HISTORY** |
| Prof. Dr. İrfan DEĞİRMENCİ |  |