**DERS TANITIM BİLGİLERİ (İNGİLİZCE)**

**Course Information**

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| Course Name | Code | Semester | Theory  (Hours/Week) | Application  (Hours/Week) | Laboratory (Hours/Week) | National Credit | ECTS |
| **Enzymes in Medicine & Diagnostic Importance** | **MED 314** | **I or II** | **2** | **0** | **0** | **1** | **2** |
| Pre-requisite(s) | **-** | | | | | | | |
| Course Language | English | | | | | | | |
| Course Type | Elective | | | | | | | |
| Mode of Delivery (face to face, distance learning) | Face-to-Face  Problem Solving | | | | | | | |
| Learning and Teaching Strategies | Lecture  Case based learning  Student presentation  Self-Learning | | | | | | | |
| Instructor(s) | Prof. Dr. Nedret Kılıç | | | | | | | |
| Course Objective | Comprehend general principles of enzymes, enzyme kinetics and their clinical significance | | | | | | | |
| Learning Outcomes | 1) Defines classes of enzymes and naming of enzymes.  2) Describes the characteristics of enzymatic reactions, free energy, equilibrium, and kinetics.  3) Explains the structures and compositions of enzymes.  4) Discusses the role of cofactors and conditions affecting enzymatic reactions.  5) Describes catalytic mechanism of enzymes, substrate specificity and enzyme kinetics based on the Michaelis–Menten equation.  6) Describes the significance of the Michaelis constant (Km).  7) Describes regulatory mechanisms that affect enzymatic reactions.  8) Defines the regulation mechanisms of allosteric enzymes and covalent modification.  9) Discusses the therapeutic use of enzymes and enzyme inhibitors.  10) Explains the diagnostic importance of enzymes.  11) Explains clinical enzyme assays and their procedures. | | | | | | | |
| Course Content | General properties and definitions of enzymes, classification and nomenclature of enzymes, enzyme kinetics, catalytic mechanism of enzymes, measurement of enzyme activity, clinical significance of enzymes, diagnostic methods of enzymes, assays for enzyme activities | | | | | | | |
| References | Clinical Chemistry: Principles, Techniques, and Correlations, Enhanced Edition: Principles, Techniques, and Correlations, Enhanced Edition 8th Edition, Michael L. Bishop (Author), Jones & Bartlett Learning, 2020.  Medical Biochemistry 5th Edition, John W. Baynes PhD (Author), Marek H. Dominiczak Dr Hab Med FRCPath (Author), Elsevier, 2018. | | | | | | | |

**Weekly Course outline**

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| Weeks | Topics | Pre-study |
| Week 1 | General Properties and Definitions of Enzymes  Classification and Nomenclature of Enzymes | 1 |
| Week 2 | Enzyme Kinetics: Catalytic Mechanism of Enzymes  Enzyme Kinetics: Factors that Influence Enzymatic Reactions-1 (Substrate Concentration, Enzyme Concentration, pH) | 1 |
| Week 3 | Enzyme Kinetics: Factors that Influence Enzymatic Reactions-2 (Temperature, Cofactors, Inhibitors)  Use of the Lineweaver–Burk and Eadie–Hofstee plots | 1 |
| Week 4 | Definition of Enzyme Activity  Measurement of Enzyme Activity  Calculation of Enzyme Activity | 1 |
| Week 5 | Regulation of Enzyme Activity | 1 |
| Week 6 | Mid-term | 1 |
| Week 7 | Clinical Significance of Enzymes  Enzymatic Measurement of Blood Glucose (The glucose oxidase/peroxidase assay) | 1 |
| Week 8 | Clinical Significance of Enzymes: Creatine Kinase  (Case based learning) | 1 |
| Week 9 | Clinical Significance of Enzymes: Lactate Dehydrogenase  (Case based learning) | 1 |
| Week 10 | Clinical Significance of Enzymes: Aspartate Aminotransferase  Clinical Significance of Enzymes: Alanine Aminotransferase  (Case based learning) | 1 |
| Week 11 | Clinical Significance of Enzymes: Alkaline Phosphatase  Clinical Significance of Enzymes: Acid Phosphatase  (Case based learning) | 1 |
| Week 12 | Clinical Significance of Enzymes: g-Glutamyltransferase  Clinical Significance of Enzymes: Amylase  (Case based learning) | 1 |
| Week 13 | Clinical Significance of Enzymes: Lipase  Clinical Significance of Enzymes: Glucose-6-Phosphate Dehydrogenase  (Case based learning) | 1 |
| Week 14 | Clinical Significance of Enzymes: Macroenzymes  Drug-Metabolizing Enzymes | 1 |
| Week 15 | Overview of semester | 1 |
| Week 16 | Final exam | 1 |

**Assessment methods**

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| --- | --- | --- |
| Course Activities | Number | Percentage % |
| Attendance |  |  |
| Laboratory |  |  |
| Application |  |  |
| Field Activities |  |  |
| Specific Practical Training (if any) |  |  |
| Assignments |  |  |
| Presentation | 1 | 10 |
| Projects |  |  |
| Seminars |  |  |
| Midterms | 1 | 40 |
| Final Exam | 1 | 50 |
| Total | 3 | 100 |
| Percentage of semester activities contributing grade success | 2 | 50 |
| Percentage of final exam contributing grade success | 1 | 50 |
| Total | 3 | 100 |

**Course Category**

|  |  |
| --- | --- |
| **Core Courses** |  |
| **Major Area Courses** | **X** |
| **Supportive Courses** |  |
| **Media and Management Skills Courses** |  |
| **Transferable Skill Courses** |  |

**Workload and ECTS Calculation**

|  |  |  |  |
| --- | --- | --- | --- |
| **Activities** | **Number** | **Duration (Hours)** | **Total Work Load** |
| Course Duration (Including Exam Week: 16X2 Total Hours) | 16 | 2 | 30 |
| Laboratory |  |  |  |
| Application |  |  |  |
| Specific practical training (if any) |  |  |  |
| Field Activities |  |  |  |
| Study Hours Out of Class (Preliminary work, reinforcement, etc.) | 15 | 1 | 15 |
| Presentation / Seminar Preparation | 1 | 4 | 4 |
| Projects |  |  |  |
| Homework assignment |  |  |  |
| Midterms (Study duration) | 5 | 1 | 5 |
| Final (Study duration) | 11 | 1 | 11 |
| Total Workload |  | | 65 |

**Matrix of the Course Learning Outcomes Versus Program Outcomes**

1: Lowest, 2: Low, 3: Average, 4: High, 5: Highest

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| --- | --- | --- | --- | --- | --- |
| **Program Outcomes** | **Contribution Level\*** | | | | |
| **1** | **2** | **3** | **4** | **5** |
| 1. Integrates and utilizes the information, skills, and approaches obtained from basic, clinical, and medical sciences, behavioral sciences, and social sciences when offering healthcare services. |  |  | **x** |  |  |
| 1. Offers healthcare services to patients with a biopsychosocial approach where the sociodemographic and sociocultural backgrounds of these individuals are taken into consideration, focusing on the universal human values, ethical principles, and professional duties; without exercising discrimination on the basis of language, religion, race, or sex. |  | **x** |  |  |  |
| 1. Aims to protect, improve, and develop individual and public health when offering healthcare services. |  | **x** |  |  |  |
| 1. Performs the necessary studies in sustaining and improving health, taking into the individual, public, social, and environmental factors to affect it. |  | **x** |  |  |  |
| 1. Trains healthy individuals/ patients, their relatives, and other healthcare workers in healthcare upon determining the features, requirements, and expectations of their target audience. |  |  | **x** |  |  |
| 1. Exercises a safe, rational, and effective approach in the procedures of prevention, diagnosis, treatment, follow-up, and rehabilitation; while offering healthcare services. |  |  |  | **x** |  |
| 1. Implements interventional and/or non-interventional practices in a way that is safe and effective for patients during the procedures of diagnosis, treatment, follow-up, and rehabilitation. |  |  |  | **x** |  |
| 1. Offers healthcare services taking into account the health and safety of patients and employees. |  | **x** |  |  |  |
| 1. Takes the regional and global changes in physical and socioeconomic settings to affect health, as well as the changes in the individual features and behaviors of patients referring to them into account, while offering healthcare. |  |  | **x** |  |  |
| 1. Takes the good medical practices into account while performing their duties. |  | **x** |  |  |  |
| 1. Undertakes the tasks and duties within the framework of their professional ethical rules, as well as their legal rights and duties. |  | **x** |  |  |  |
| 1. Stands for the improvements in the manner in which healthcare services are offered, taking into account the concepts of social reliability and social duty, in an effort to protect and improve individual and public health. |  |  | **x** |  |  |
| 1. Evaluates the effects of health policies and healthcare practices on public health indicators, and, where required, amends their evaluation on the grounds of scientific and social needs; in an effort to help improve the quality of healthcare services. |  | **x** |  |  |  |
| 1. Leads their healthcare team while offering healthcare services, in a participative, and collaborative manner. |  |  | **x** |  |  |
| 1. Establishes positive relationships within their healthcare team; and where needed, easily adapts to various positions among their team. |  |  | **x** |  |  |
| 1. Exercises effective communication with patients, the relatives of patients, healthcare professionals, and groups from other professions, as well as institutions and organizations. | **x** |  |  |  |  |
| 1. Plans and conducts scientific studies on the society to which they serve, and use the results of these, or those from other studies, to benefit the society. |  | **x** |  |  |  |
| 1. Accesses the current literature on their profession, and evaluates them with a critical approach. |  |  |  | **x** |  |
| 1. Chooses the correct sources of learning to improve the healthcare services that they offer, and regulates their own learning process. |  |  | **x** |  |  |
| 1. Demonstrates the skills of obtaining and evaluating new information, integrating newer pieces of information with their current ones, as well as adapting to changing conditions throughout their professional life. |  |  | **x** |  |  |