

BIOCHEMISTRY I

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| 1 | Course Title: | BIOCHEMISTRY I |
| 2 | Course Code: | MBG3005 |
| 3 | Type of Course: | Compulsory |
| 4 | Level of Course: | First Cycle |
| 5 | Year of Study: | 3 |
| 6 | Semester: | 5 |
| 7 | ECTS Credits Allocated: | 6.00 |
| 8 | Theoretical (hour/week): | 3.00 |
| 9 | Practice (hour/week): | 0.00 |
| 10 | Laboratory (hour/week): | 0 |
| 11 | Prerequisites: | - |
| 12 | Language: | Turkish |
| 13 | Mode of Delivery: | Face to face |
| 14 | Course Coordinator: | Doç. Dr. BURCU ERBAYKENT |
| 15 | Course Lecturers: | |
| 16 | Contact information of the Course Coordinator: | Dr. Öğr. Üyesi Burcu ERBAYKENT TEPEDELEN e-posta: berbaykent@uludag.edu.tr 0 224 29 42847 Fen-Edebiyat Fakültesi, Moleküler Biyoloji ve Genetik Bölümü, Görükle Kampüsü, 16059 Bursa |
| 17 | Website: | |
| 18 | Objective of the Course: | With the Biochemistry I course, the main objective is to provide information on the structure, organization and function of living material at molecular level. In this introductory lesson; It is aimed to associate the chemistry of biological components with biological function and to give basic information about biological macromolecules. |
| 19 | Contribution of the Course to Professional Development: | Being able to define carbohydrates, lipids, and proteins which constitute the energy sources and building blocks of the living organisms, Being able to disseminate knowledge gained about basic biochemical subjects both verbally and in writing. |
| 20 | Learning Outcomes: | |
| | 1 | Ability to use basic knowledge of Biomolecules in living systems |
| | 2 | Understanding the structure, function and roles of biomolecules in the organism |
| | 3 | Ability to recognize different biomolecules and understand their essential properties for life |
| | 4 | Comprehension of classification of enzymes and minerals, their properties and functions; being able to assess situations characterized by their excess and deficiency. |
| | 5 | Understanding the reaction mechanisms in biological processes |
| | 6 | Being able to disseminate knowledge gained about basic biochemical subjects both verbally and in writing. |
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| 21 | Course Content: | |
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| | Course Content: | |
| Week | Theoretical | Practice |
| 1 | Introduction to biochemistry, weak interactions in aqueous media, non-covalent interactions | |
| 2 | Amino acids; structure / stereochemistry, classification and properties of sidechains, essential amino acids, ionization of amino acids and isoelectric point, amino acid reactions and amino acid composition analysis | |
| 3 | Peptides: classification, peptide bond and structure; stability and peptide bond formation, rotations, conformations, polypeptide property of peptides, Peptide N-, C- Terminal analysis: Sanger and Edman Degradation | |
| 4 | Proteins; Functional and structural classification, Organization of protein structure, Primary Structure: Nature of protein sequences, Secondary structure: helices, layer structures, β -Loop, irregular spiral structures, stability, characteristic features, Ramachandran curves, super secondary structure, protein motifs and domains | |
| 5 | Tertiary structure: Factors affecting tertiary structure formation, Thermodynamics of protein folding, Chaperones, Denaturation, Quaternary structure: multimeric structures, examples of fibrous proteins; Overview of keratin, collagen, elastin, protein isolation and purification | |
| 6 | Protein function: Oxygen transport and storage; Hemoglobin / Myoglobin, cooperativity and allostery, allosteric change models, effects of other ligands on allosteric behavior, Bohr effect | |
| 7 | Enzymes: Terminology, classification and general properties | |
| 8 | Enzymes: Principles of catalysis, enzyme catalysis kinetics and kinetic parameters, enzyme inhibition, regulation of enzyme activity | |
| 9 | Coenzymes, vitamins and essential metals; Classification, structures of metabolite and vitamin-derived coenzymes, their role in enzyme function, protein coenzymes, vitamins as essential precursors, water and fat-soluble vitamins | |
| 10 | Nucleic acids: Nature of nucleic acids, primary, secondary and tertiary structures; base pairing, double helices, circular DNA and super helices, denaturation and renaturation, melting point of DNA | |
| 11 | Biological functions of nucleic acids, overview of molecular biology, storage of genetic information, genome, central dogma | |

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| 12 | Protein Biosynthesis; Overview of gene expression, Replication: semiconservative replication, replication mechanisms, Telomeres and telomerases, DNA damage and repair, mutations, Transcription: genes and operons, regulation and inhibition of transcription, introns and exons, RNA processing: capping, cleavages, polyadenylation | |
| 13 | Carbohydrates: General properties, functions, classification | |
| 14 | Lipids: General properties, functions, classification | |
| 22 | Textbooks, References and/or Other Materials: | 1) Lehninger Principles of Biochemistry”, 5 th Edn. Palgrave Macmillan, (2008) 2) Voet D., Fundamentals of Biochemistry: Life at the molecular Level.(2008) 3) Horton R., Principles of Biochemistry, Prentis Hall (2005) 4) Boyer R. Interactive Concepts in Biochemistry 2/e, Wiley (2008) |
| 23 | Assesment | |
| TERM LEARNING ACTIVITIES | | |
| | NUMBE R | WEIGHT |
| Midterm Exam | 1 | 40.00 |
| Quiz | 0 | 0.00 |
| Home work-project | 0 | 0.00 |
| Final Exam | 1 | 60.00 |
| Total | 2 | 100.00 |
| Contribution of Term (Year) Learning Activities to Success Grade | | 40.00 |
| Contribution of Final Exam to Success Grade | | 60.00 |
| Total | | 100.00 |
| Measurement and Evaluation Techniques Used in the Course | | Written examination |
| 24 | ECTS / WORK LOAD TABLE | |

| Activites | Number | Duration (hour) | Total Work Load (hour) |
|----------------------------|--------|-----------------|------------------------|
| Theoretical | 14 | 3.00 | 42.00 |
| Practicals/Labs | 0 | 0.00 | 0.00 |
| Self study and preperation | 14 | 4.00 | 56.00 |
| Homeworks | 2 | 20.00 | 40.00 |
| Projects | 0 | 0.00 | 0.00 |
| Field Studies | 0 | 0.00 | 0.00 |
| Midterm exams | 1 | 15.00 | 15.00 |
| Others | 0 | 0.00 | 0.00 |
| Final Exams | 1 | 20.00 | 20.00 |
| Total Work Load | | | 188.00 |
| Total work load/ 30 hr | | | 5.77 |
| ECTS Credit of the Course | | | 6.00 |

| 25 | CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS | | | | | | | | | | | | | | | |
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| | PQ1 | PQ2 | PQ3 | PQ4 | PQ5 | PQ6 | PQ7 | PQ8 | PQ9 | PQ10 | PQ11 | PQ12 | PQ13 | PQ14 | PQ15 | PQ16 |
| ÖK1 | 5 | 4 | 5 | 2 | 2 | 0 | 0 | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| ÖK2 | 5 | 4 | 5 | 2 | 2 | 0 | 0 | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| ÖK3 | 5 | 4 | 5 | 2 | 2 | 0 | 0 | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| ÖK4 | 5 | 4 | 5 | 2 | 2 | 0 | 0 | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| ÖK5 | 5 | 4 | 5 | 2 | 2 | 0 | 0 | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| ÖK6 | 5 | 4 | 5 | 2 | 2 | 0 | 0 | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| LO: Learning Objectives PQ: Program Qualifications | | | | | | | | | | | | | | | | |
| Contribution Level: | 1 very low | | | 2 low | | | 3 Medium | | | 4 High | | | 5 Very High | | | |