

# EK 1-B

T. C.

KAFKAS UNIVERSITY

FACULTY OF ENGINEERING AND ARCHITECTURE

DEPARTMENT OF BIOENGINEERING

CONTENTS OF THE COURSES AND THE BOOKS TO BE USED

## 1. CLASS 1. SEMESTER

<b>AIIT-101</b>	<b>Ataturk's principles and history of revolution I</b>	<b>2</b>	<b>0</b>	<b>0</b>
Explaining to the students how the establishment of Republic of Turkey, the conditions under which the state adopt the principles which form the basis of Atatürk; The aim of this course is to explain Atatürk's notion of nationality as a great man, revolutionary personality and leadership, nationalism which rejects racism and efforts to establish international peace.				
Textbook Supplementary Textbooks	Mustafa Kemal Atatürk ve Türk Devrim Tarihi ile ilgili çeşitli kaynaklar.			

<b>TD-101</b>	<b>Turkish Language I</b>	<b>2</b>	<b>0</b>	<b>0</b>
What is language? The place and importance of language in social life as a social institution; The relationship between language and culture. Turkish language. Spoken language, written language; Turkish written language and Turkish of Turkey. Language and culture. Punctuation. Punctuation; writing rules. The current status of the Turkish language and its spans. Common language, common culture.				
The structure of Turkish (additional root system) and word derivation. Situations that require a word. Considerations. The enrichment of language and its importance (details, Turkish words, new words). Development in Language (from Culture and Language). Elif, Gül, Ankara (from Turkish Secrets). The Turkish of Yunus. Expression and sentence disorders, their correction; sound sentence and elements. Species: a-Article, joke, chat, essay b- Story and novel c- Interview and interview d- Conference, open meeting, symposium, briefing, seminar etc. e-Communiqué. Ataturk and Turkish,				

sun-language theory. A Wise Of Knowledge (From The Secrets Of Turkish). Language Simplification and Turkish Language. Professional correspondence: Letter, report, report, decision, life story (resume) etc.	
Textbook	Ergin Muharrem, Türk Dil Bilgisi
Supplementary Textbooks	Ergin Muharrem, Üniversiteler için Türk Dili.

<b>BM-101</b>	<b>General Biology</b>	<b>3</b>	<b>2</b>	<b>4</b>
Molecular principles of life; Chemical structure of the cell; Cell organelles and membranes; Energy relations in the cell: Respiration, Fermentation and Photosynthesis; Cell division: Mitosis and cell circle, Meiosis division; Mendelism; Developmental biology; Reproductive; Evolutionary history of biological diversity; Origin of life; Diversity of life (protists, plants and animals); Plant forms and functions; Animal forms and functions; Ecological concepts and ecosystems. General Biology Lab; Introduction to Microscopy, Plant Cell, Starch Grains, Crystals, Plastids, Aleuron, Palisate and Sponge Parenchyma, Stomas, Feathers, Kollenkima, Stone Cells				
Textbook Supplementary Textbooks	1.Biology, Campbell, Reece,2007 2.Biology, Sylvia S. Mader, Wm. C. Brown Publishers, 2000 3. Biology Study Of Life, William D. Schraer, Herbert J. Stoltze, Prentice Hall, 1995 4.Genel Biyoloji, Keeton, Gould, Palme Yayıncılık, Ankara, 2003 5.Yaşamın Temel Kuralları Cilt I-II-III Kısım I-II-III, Prof. Dr. Ali Demirsoy, Meteksan Yayınları, Ankara, 2000			

<b>BM-103</b>	<b>Introduction to Bioengineering</b>	<b>3</b>	<b>0</b>	<b>3</b>
The term of bioengineering, its scope, ongoing studies, practical research, the applications in industry are explained by the seminars of the speakers invited from the universities, institutes and industry.				
Textbook Supplementary Textbooks	Introduction to Bioengineering, S.A. Berger, Oxford University Press, London, 2005			

<b>FİZ-101</b>	<b>Physics I</b>	<b>3</b>	<b>2</b>	<b>4</b>
Physics and measurement, One Dimensional Motion, Vectors, Two-dimensional Motion, Laws of Motion, Rotational Motion and Other Applications of Newton's Laws, Work and Kinetic Energy, Potential Energy and Conservation of Energy, Linear Momentum and Collisions, Rotation of a rigid body around an axis, Rolling Movement and Angular Momentum, Static Equilibrium and Elasticity, Oscillating Motion				
Textbook Supplementary Textbooks	PHYSICS, For Scientists and Engineers with Modern Physics, R.Serway,Saunders College Publishing, 1990.			

<b>KİM-101</b>	<b>General Chemistry</b>	<b>3</b>	<b>2</b>	<b>4</b>
Atom, molecules and ions. Chemical formulas and equations. Electronic structure of atom, Chemical bonds. Periodic table and elements. Gases. Liquids. Solids. Intermolecular gravitational forces. Chemical thermodynamics. Chemical equilibrium. Solutions and solubility. Acid and base concept. Ionic balance. Solution reactions. Oxidation and reduction. The stoichiometry. Gravimetry and volumetry. Electrochemistry. Chemical kinetics. General Chemistry lab; Introduction to chemical laboratory equipment. Use of scales. First aid in laboratory accidents and intoxications. Bunsen burner flame. Filtration. Centrifugation. Crystallization. The distillation. Sublimation. Combustion temperature. Cooling diagram. Acid-base indicators. The neutralization. Neutralization reactions. Temperature-volume connection of gases				
Textbook Supplementary Textbooks	Kimya, Site Own Cambridge University Press, London 2011 Genel Kimya I-II İlkeler ve Uygulamalar, Ralph H. Petrucci, Palme Yayınevi, Ankara, 2006			

<b>MAT-101</b>	<b>Mathematics I</b>	<b>4</b>	<b>0</b>	<b>4</b>
Vector algebra: Vectors, Scalar and Vector Products Arithmetic Operations. Line and Vector Form Plane Equations. Matrix algebra: Matrices, Matrix Arithmetic Operations. Determinants. Solution of Linear Equation Sets. Degree. The Eigenvalue of a Matrix. Derivative: Concept of Change Rate.				

Differentiation Methods, Closed and Logarithmic Differentiation. Value Theorem. Higher Education Derivatives, Concordance. Plane Curvature of curves. Optimization application. Integration: limiting sums. Integration Methods. Integral applications. Generalized Integrals, Beta and Gamma Functions, Laplace Transformations.	
Textbook	Analiz I-II, Hasan Şenay, Ahmet Doğan, Hacı Sulak, Nobel Yayınevi, Ankara, 2004
Supplementary Textbooks	İstatistik Analiz Metodları, Bilge Alova Köksal, Çağlayan Yayınları, İstanbul, 2003

<b>BM-104</b>	<b>Basic Computer Technologies</b>	<b>0</b>	<b>2</b>	<b>1</b>
This course covers the basic computer knowledge, the Windows operating system, and the training for the use of Microsoft Office programs. In addition, the use of the Internet is based on information technology tools, access to information, problem solving, information processing and presentation.				
Textbook	Temel Bilgi Teknolojileri I, Anadolu Üniversitesi Yayınları, Eskişehir.			
Supplementary Textbooks	Temel Bilgi Teknolojileri II, Anadolu Üniversitesi Yayınları, Eskişehir.			

### 1. CLASS 2. SEMESTER

<b>AİİT-102</b>	<b>Ataturk's principles and history of revolution II</b>	<b>2</b>	<b>0</b>	<b>0</b>
Atatürk's life. Turkish Revolution's strategy, two major revolutions in the political field, Terakkiperver Cumhuriyet Fırkası and Taktir-i Sükûn period, the Turkish revolution and development, revolutions in the field of economics, the revolution in the field of education and culture, the attempt of multi-party life and its reactions, the Kemalist Thought System, principles and threats to these principles, social structure and the field of health reforms, the domestic and foreign policy of the Republic of Turkey (1938-1950), Democratic Party Period (1950-1960), after 1960, Turkey's internal and external policy. Geopolitics and Turkey's geopolitical position, Psychological Threat against the University Youth.				
Textbook	Mustafa Kemal Atatürk ve Türk Devrim Tarihi ile ilgili çeşitli kaynaklar			
Supplementary Textbooks				

<b>TD-102</b>	<b>Turkish Language II</b>	<b>2</b>	<b>0</b>	<b>0</b>
<p>The place and importance of language in social life as a social institution; The relationship between language and culture. Turkish language. Spoken language, written language; Turkish written language and Turkish of Turkey. Language and culture. Punctuation; writing rules. The current status of the Turkish language and its spans. Common language, common culture.</p> <p>The structure of Turkish (additional root system) and word derivation. Situations that require a word. Considerations. The enrichment of language and its importance (details, Turkish words, new words). Development in Language (from Culture and Language). Elif, Gül, Ankara (from Turkish Secrets). The Turkish of Yunus. Expression and sentence disorders, their correction; sound sentence and elements. Species: a-Article, joke, chat, essay b- Story and novel c- Interview and interview d- Conference, open meeting, symposium, briefing, seminar etc. e-Communiqué. Atatürk and Turkish, sun-language theory. A Wise Of Knowledge (From The Secrets Of Turkish). Language Simplification and Turkish Language. Professional correspondence: Letter, report, report, decision, life story (resume) etc.</p>				
Textbook	Ergin Muharrem, Türk Dil Bilgisi			
Supplementary Textbooks	Ergin Muharrem, Üniversiteler için Türk Dili Kaplan Mehmet, Türk Edebiyatı Araştırmaları- 3 Tip Tahlilleri			

<b>BM-102</b>	<b>Cell Biology for Bioengineers</b>	<b>3</b>	<b>2</b>	<b>4</b>
<p>History, cell types, origin and evolution of cells. Prokaryotic and eukaryotic cells. Molecular combination of cells. Methods used in the examination of cells. Biosynthesis of cell components. Membrane and Organelles. Cell communication. Cell nucleus. Cell cycle and division. Apoptosis. Cells as experimental models. Materials used in cell biology. Production of cells in culture. Basic principles of cryopreservation of cells. Microscopy. Electron microscope. Biochemistry, membrane. Cytoskeleton. Cell wall, extracellular matrix, cell-cell connections, adhesion molecules. Protein pathway and vesicle transition. Signal transmission. Cancer. Cell Biology Lab; Evolution of the cell; the conditions of the primitive world and the formation of the proton; the discovery of cell structure and the importance of cellular organization; cell organelles; structure and function of the cell membrane; intracellular membrane networks; DNA packaging; core; oxygen respiration and mitochondria; photosynthesis and chloroplasts; structure of the cell skeleton; extracellular structure</p>				

and cell matrix; intercellular recognition and cell adhesion; cell cycle and cell division; intercellular chemical signaling; cell differentiation	
Textbook Supplementary Textbooks	<ol style="list-style-type: none"> <li>1. Molecular Biology of the Cell, Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter, TÜBA, Sistem Ofset Basım Yayın Sanayi Tic. Lim. Şti., Ankara, 2008</li> <li>2. Cell and Molecular Biology, Cerald Karp, John Wiley &amp; Sons, Inc, Newyork, 1999</li> <li>3. Moleküler Hücre Biyolojisi, Prof. Dr. Hasan Veysi Güneş, Kaan Kitabevi, Eskişehir, 2006</li> <li>4. Cells, David M. Prescott, Jones and Bartlett Publishers, Boston, 2000</li> </ol>

<b>KİM-103</b>	<b>Physical chemistry</b>	<b>3</b>	<b>0</b>	<b>3</b>
Definition of physical chemistry and general concepts, applications of bioengineering physical chemistry, Gas laws and ideal gas law conditions, Kinetic gas theory, Non-ideal gas state and liquefaction of gases, Applications of industrial gases in Bioengineering and the solubility of gases, Liquid properties, Phase diagrams and Critical conditions Adsorption, absorption and osmosis concepts, Adsorption Thermochemistry (system and system variables, thermodynamic laws) Concepts, absorption and osmosis, Thermochemistry (Enthalpy, entropy), Thermochemistry (Gibbs free energy and applications), Electrochemistry (oxidation-reduction concepts, electrochemical cells, batteries, fuel cells), Electrochemistry (relations between electrochemistry and thermochemistry)				
Textbook Supplementary Textbooks	Physical Chemistry for the Life Sciences, 2nd Edition. 2011. Peter Atkins, Julio de Paula. Oxford University Press General Chemistry: Principles and Modern Applications 2011.			

<b>FİZ-102</b>	<b>Physics II</b>	<b>3</b>	<b>2</b>	<b>4</b>
Electric Load and Electric Field, Gauss's Law, Electric Potential, Capacity, Dielectric, Electric Energy Storage, Electric Current and Resistance, DC Circuits, Magnetic Fields, Magnetic Fields and Source of Magnetic Fields, Electromagnetic Induction and Faraday's Law, Induction, Electromagnetic Oscillations and AA Circuits, Maxwell Equations and Electromagnetic Waves				
Textbook Supplementary Textbooks	PHYSICS, For Scientists and Engineers with Modern Physics, R.Serway, Saunders College Publishing, 1990.			

<b>KİM-102</b>	<b>Organic Chemistry</b>	<b>3</b>	<b>0</b>	<b>3</b>
Chemical reactivity and repetition of basic concepts, Behavior of organic compounds as acids and bases, Alkanes, Stereochemistry, Nucleophilic addition reactions and elimination reactions, Alkenes and alkin, Alcohols, ethers, Aromatic compounds, Aldehydes, Ketones, Carboxylic acids and derivatives, Amines				
Textbook	Solomon, T. W. G. 'Organic Chemistry' 9th edition, John Wiley & Sons Inc., New York, 2008			
Supplementary Textbooks	Seyhan Ege. 'Organic Chemistry: Structure and Reactivity' Houghton Mifflin Comp., New York, 2004. Ders Notu: Gülseren Pekin, 'Biyomühendisler için Organik Kimya, 2009 Organik Kimya, David R. Klein, John Wiley, High Education, New York 2011			

<b>MAT-102</b>	<b>Mathematics II</b>	<b>4</b>	<b>0</b>	<b>4</b>
Taylor and Maclaurin Series: Functions Series Expansion. Error Term Estimation and its Applications, Functions of multiple variables: Partial Derivatives, Minor Errors. Jacobian Matrix and Coordinate Transformation, Tangent Planes of Surfaces and Functional Variables in Two Variables, Definite Integrals in Plane and Solid Zones, Regions and Steep, Polar, Cylindrical and Spherical Coordinates, Green's Theorem: Line Integrals, Application to Some Physics Problems, Scalar and Vector Fields, Gradient, Divergence, Laplasian and Curl, Green's Theorem and Applications, Divergence Theorem and Applications, Stoke Theorem and Applications				
Textbook	Analiz I-II, Hasan Şenay, Ahmet Doğan, Hacı Sulak, Nobel Yayınevi, Ankara, 2004			
Supplementary Textbooks	İstatistik Analiz Metodları, Bilge Alova Köksal, Çağlayan Yayınları, İstanbul, 2003			

<b>MF-TRS</b>	<b>Technical Drawing</b>	<b>1</b>	<b>2</b>	<b>2</b>
The aim of the technical drawing, the usage places, the use of tools, writings and lines, scales, geometric drawings, traces, appearance removal, sectional view, perspective, dimensioning				
Textbook	Teknik Resim – Kemal TÜRKDEMİR			
Supplementary Textbooks	Teknik Resim – Doç. Dr. Abdurrahman KARABULUT			

## 2. CLASS 3. SEMESTER

<b>YD-201</b>	<b>Foreign language I</b>	<b>2</b>	<b>0</b>	<b>0</b>
Examination of the level, pronunciation (simple daily speech sentences), dictation exercises, simple sentence establishment, word types and characteristics, necessary grammar information, smooth shot verbs, oral and written simple expression exercises.				
Textbook Supplementary Textbooks	Reader At Work I-II, Bülent Kandiller, Aysun Velioglu, ODTÜ Yayinevi, Ankara, 1996			

<b>BM-201</b>	<b>Biochemistry for Bioengineers</b>	<b>3</b>	<b>2</b>	<b>4</b>
Water and chemical bonds, Amino acids, Peptides, Proteins, Enzymes, Enzyme Kinetics and Inhibition, Carbohydrates, Fats, Nucleic Acids, Nucleotides, DNA and RNA, Replication, Transcription and Translation, The laws of thermodynamics; ATP and energy; cell metabolism and fermentation; glycolysis; TCA cycle; oxidative phosphorylation; photosynthesis; amino acid metabolism, nucleic acid metabolism; fatty acid metabolism.				
Textbook Supplementary Textbooks	David L. Nelson, Michael M. Cox, "Lehninger Principles of Biochemistry". 4th edition, W.H. Freeman and Company, New York, 2006. Voet and Pratt, 'Fundamentals of Biochemistry: Life at Molecular Level, 3rd edition, 2008			

<b>BM-203</b>	<b>Molecular Biology I</b>	<b>2</b>	<b>2</b>	<b>3</b>
Teaching some basic concepts in genetics, where genetic information is stored, how they are inherited, how genes become functional, what are genetic disorders, gene mutations, the structure of DNA, control of gene expression, genetic mapping. Current theories on cell evolution; organization of eukaryotic cells; cell nucleus; control of gene expression in prokaryotes and eukaryotes; cell signaling, cell skeleton and communication; cell cycle control and cancer; onkogenler; viruses.				
Textbook Supplementary Textbooks	A. Griffiths, Molecular genetics, 2001. A. Griffiths, Introduction to Genetic Analysis, 1999. L. Hartwell, Genetics: From genes to Genomes, 2000. Moleküler Biyoloji, Ahmet YILDIRIM, Fevzi Bardakçı, Mehmet Karataş, Bahattin TANYOLAÇ, Nobel Yayın Dağıtım, Ankara, 2007 Moleküler Hücre Biyolojisi, Lodish, Berk, Kaiser, Krieger, Scott, Bretscher, Ploegh, Matsudaira, Palme Yayıncılık, Ankara, 2011 Moleküler Genetiğin Esasları, Doç. Dr. H. Ümit Lüleyp, Nobel			



	<p>Kitabevi, Adana, 2008</p> <p>Moleküler Biyoloji, Prof. Dr. Nihat Dilsiz, PALME yayıncılık, Ankara, 2009</p> <p>Moleküler Biyoloji, P.C. Turner, A.G. MClennan, a. D. Bates,&amp; M.R.H. White, Nobel Yayın DAĞITIM, Ankara, 2004</p> <p>Moleküler Biyoloji, Prof Dr. Zafer Bahçeci, Gökтуğ Yayınevi, Amasya, 2007</p>
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<b>BM-205</b>	<b>Microbiology</b>	<b>3</b>	<b>2</b>	<b>4</b>
<p>Microorganisms and Microbiology; Prokaryotic Cell Biology; Microbial Nutrition Needs; Microbial Metabolism; Physical Needs of Microorganisms, Microbial Evolution and Systematic; Some Biotechnologically Important Bacteria and Archea Groups; Fungi; Microbial Ecology.</p> <p>Microbiology Lab; Introduction, Laboratory Equipment, Sterilization and Disinfection, Microscopes and Other Optical Instruments, Motion Examination, Paints, Dyeing Methods, Simple Staining, Gram Staining, Sport Staining, Giemsa Staining, Tuberculosis Staining, Media, Cultural and Biochemical Tests I-II, Antibioqram Test and Technique.</p>				
Textbook Supplementary Textbooks	<p>Atlas, R. M., “Principles of Microbiology”, Wm C. Brown Publishers, 1997.</p> <p>Bauman, R. W., “Microbiology”, Pearson Education, 2004.</p> <p>Gerhardt, P., Murray, R. G. E., Costilov, R. N., Nester, E. W., Wood, W. A., Krieg, N. R., Phillips, G. B., “Manual of Methods for General Bacteriology”, American Society for Microbiology, 1981.</p> <p>Madigan, M. T., Martinko, J. M., Parker, J., “Brock Biology of Microorganisms”, Pearson Education, 2006.</p> <p>Tortora, G. J., Funke, B. R., Case, C. L., “Microbiology an Introduction”, Pearson Education, 2002.</p>			

<b>MAT-201</b>	<b>Differential equations</b>	<b>3</b>	<b>0</b>	<b>3</b>
<p>General information about differential equations, general integral of differential equations, geometric interpretation of differential equations, special differential equations, incomplete differential equations, differential equations, homogeneous differential equations, linear differential equations, method of change of parameters for linear differential equations, Bernoulli equation, Darboux equation, Riccati equation, exact differential equations, the concept of integral multiplier, the existence and uniqueness of the solution of the Cauchy problem for ordinary differential equations, Peano entity theorem, Picard existence and uniqueness theorem, ordinary differential equations which cannot be solved according to the derivative, Lagrange equation, Clairaut equation.</p>				
Textbook Supplementary Textbooks	W.E.Boyce-R.C. DiPrima, “Elementary Differential Equations and Boundary Value Problems”, 6. Baskı			

<b>MF-205</b>	<b>Thermodynamics for Bioengineers</b>	<b>3</b>	<b>0</b>	<b>3</b>
<p>General principles of thermodynamics: Thermodynamics and energy. Types of energy. Closed and open systems. Processes and cycles, Properties of pure substances: Pure substance. Phases of pure substance. Phase change diagrams, Ideal gas state equations, Compressibility factor. Other state equations, First law of thermodynamics for closed systems: Heat transfer. Work. Internal energy, enthalpy. Specific heat of gas, liquid and solids, First law of thermodynamics for closed systems: Examples, First law of thermodynamics for open systems: Analysis of control volumes, First law of thermodynamics for some open systems (inserts, diffusers), First law of thermodynamics for some open systems (turbines , compressors)</p> <p>The second law of thermodynamics: Heat engines. Heat pumps. Reversible and irreversible processes, Carnot cycle. Thermodynamic temperature scale. Carnot heat engines, Carnot Heat Pumps and Refrigerators, Entropy: Kelvin - Planck and Clasius inequalities. Entropy. Entropy increase principle, Diagrams with entropy. TDS relationships. Entropy change of pure substances, second law analysis of engineering systems. Irreversibility. Exergy and exergy loss, the second law of some flow systems yields.</p>				

<b>MF-ELK</b>	<b>Electrical and Electronic Knowledge</b>	<b>2</b>	<b>0</b>	<b>2</b>
Electrical components Resistors Inductors Capacitors, Electric and force, Concept of magnetic circuits Magnetism Basics, DC Circuits, series voltages, currents and resistances, parallel and serial series-parallel circuits, power and energy calculations in electrical circuits, Ohm's law, Current waveform alternating C Circuits Fundamentals of current voltage and impedance calculations in ac circuits, Half-wave and full-wave rectifier applications, Numerical Electronic Number Systems (AND, OR, NOT, NAND, NOR, EX-OR) and applications basics.				

<b>MF-BİL</b>	<b>Computer Programming</b>	<b>1</b>	<b>2</b>	<b>3</b>
Promotion / Orientation; Concepts Computer; Introduction to C Programming; Control structures; Program control; Functions; Series; Multidimensional Arrays				
Textbook	Deitel, Harvey M., Paul J. Deitel, and T. R. Nieto. C++ how to program. Vol. 4. Englewood cliffs: Prentice Hall, 1994.			

## 2.CLASS 4. SEMESTER

<b>YD-202</b>	<b>Foreign language II</b>	<b>2</b>	<b>0</b>	<b>0</b>
Vocabulary. Non-verbal verbs. Common terms-phrases. Oral presentation-listening, speaking. Simple essay experiments. Grammar studies. Using practice-dictionary. Foreign language to main language translation applications.				
Textbook Supplementary Textbooks	Reader At Work I-II, Bülent Kandiller, Aysun Velioglu, ODTÜ Yayınevi, Ankara, 1996			

<b>MF-İST</b>	<b>Statistics and Probability</b>	<b>2</b>	<b>1</b>	<b>3</b>
Introduction to statistical analysis and general concepts, statistical data collection and production methods, basic statistical calculations (descriptive statistics), probability, distribution functions, hypothesis tests, confidence intervals and conditions.				
Textbook	Statistics for Engineers and Scientists, 3rd edition 2010. William Navidi.			

Supplementary Textbooks	Elementary Statistics, 2nd edition 2013. Mario F. Triola.
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<b>BM-204</b>	<b>Molecular Biology II</b>	<b>2</b>	<b>2</b>	<b>3</b>
Chromosome Structure; Distribution of DNA between Chromosomes; Organization of Chromosome Fibrils; Protein Content of Chromosomes; Functions of Chromosome in Cell Cycle; Gene Definition; Model Systems for the Control of Gene Expression; Operon Expression, Human Genome-Cell Signal System.				
Textbook Supplementary Textbooks	<p>A. Griffiths, Molecular genetics, 2001</p> <p>A. Griffiths, Introduction to Genetic Analysis, 1999</p> <p>L. Hartwell, Genetics: From genes to Genomes, 2000</p> <p>Moleküler Biyoloji, Ahmet YILDIRIM, Fevzi Bardakçı, Mehmet Karataş, Bahattin TANYOLAÇ, Nobel Yayın Dağıtım, Ankara, 2007</p> <p>Moleküler Hücre Biyolojisi, Lodish, Berk, Kaiser, Krieger, Scott, Bretscher, Ploegh, Matsudaira, Palme Yayıncılık, Ankara, 2011</p> <p>Moleküler Genetiğin Esasları, Doç. Dr. H. Ümit Lüleyap, Nobel Kitabevi, Adana, 2008</p> <p>Moleküler Biyoloji, Prof. Dr. Nihat Dilsiz, PALME yayıncılık, Ankara, 2009</p> <p>Moleküler Biyoloji, P.C. Turner, A.G. McLennan, a. D. Bates, &amp; M.R.H. White, Nobel Yayın DAĞITIM, Ankara, 2004</p> <p>Moleküler Biyoloji, Prof Dr. Zafer Bahçeci, Göktuğ Yayınevi, Amasya, 2007</p>			

<b>BM-206</b>	<b>Bioreactors</b>	<b>3</b>	<b>0</b>	<b>3</b>
Introduction to biochemical reactions, Reactor concept. Performances except ideal conditions. Total mass and energy balances and component balances. Bio-transformations and biocatalysis. Types of bioreactors. Bioreactor selection. Concept of process engineering, optimization and cost expectations, biochemical reactions and classification, properties and working conditions of bioreactors, mixing apparatus, application areas, biotechnological production techniques and examples				
Textbook Supplementary Textbooks	<p>Biyoreaktör Sistem Tasarımı, Juan A. Asenjo, CRC pres ,1994</p> <p>Biochemical Engineering Fundamentals, J. E. Bailey, D. F. Ollis, McGraw Hill, 1986.</p> <p>Biochemical Reactors, B. Atkinson, Pion Ltd., 1974</p> <p>Basic Bioreactor Design, K.van't Riet, J. Tramper, Marcel Decker Inc., 1991.</p> <p>Biological Reaction Engineering, I. J. Dunn, E. Heinzle, J. Ingham, J. E.</p>			

	Prenosil, Bioreactor System Design, J. A. Asenjo, J. C. Merchuk, Marcel Dekker Inc., 1995	1992
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<b>MF-204</b>	<b>Numerical methods</b>	<b>2</b>	<b>1</b>	<b>3</b>
Error analysis, linear algebra numerical methods: linear equation systems, inverse matrix, eigenvalue problems, numerical methods, non-linear solutions, non-linear equations and non-linear equations systems, functions and interpolation solutions of point sets, least squares method, numerical derivative and integral, solutions of ordinary differential equations, solutions of partial differential equations.				
Textbook	Cebir, Ali Osman Asar, Ahmet Arıkan, Aynur Arıkan, Efil Yayınevi, Ankara, 2009			
Supplementary Textbooks	Lineer Cebir, Durmuş Bozkurt, Bahri Türen, Selçuk Üniversitesi, Konya, 2010			
	Diferansiyel Denklemler Teorisi, Elman Hasanov, Papatya Yayınevi, 2002			

<b>MF-204</b>	<b>Heat transfer</b>	<b>3</b>	<b>0</b>	<b>3</b>
Basic concepts of heat transfer, Thermodynamic relations, Heat transfer mechanisms, General equation of heat conduction, One dimensional heat conduction through plane walls, One dimensional heat conduction from cylindrical and spherical walls, Concept of thermal resistance, Application to composite walls, Total heat transfer coefficient, "Lumped Capacity Systems "One-dimensional transient transmission, Transient heat conduction: General solution, Convective Introduction: Basic principles, Boundary layer analysis, Laminar and turbulent flow, External flow. Convection on flat plates. Transport on cylindrical and spherical surfaces. Theoretical and empirical relations, internal flow. Theoretical and empirical relations, Convection of vertical / horizontal plates, Boiling: pool boiling and boiling of flow, condensation on droplets on film type and plate tubes, Heat exchangers: Classification. Shell and pipe heat exchangers, Shell and pipe heat exchangers. Multipass shell and pipe heat exchangers.				
Textbook	Physical Chemistry for the Life Sciences, 2nd Edition. 2011.			
Supplementary Textbooks	Peter Atkins, Julio de Paula. Oxford University Press General Chemistry: Principles and Modern Applications 2011.			

<b>MF-207</b>	<b>Mass Transfer</b>	<b>3</b>	<b>0</b>	<b>3</b>
Introduction to heat transfer and special laws, Introduction to heat transfer by conduction: Heat				

<p>conduction laws and boundary conditions, Heat transfer by conduction: One dimensional stable heat conduction in solids with different geometries, Heat transfer by conduction: Two-dimensional heat transfer analysis in solids numerical solutions with input and finite-difference method, Time-dependent heat transfer analysis: Heat dissipation by one-dimensional and two-dimensional conduction, Time-dependent heat transfer between solids and liquids, Introduction to heat transfer by propagation: Fundamentals of basic laws and propagation, Propagation of surfaces heat transfer analysis: boundary conditions, surface equations, geometry and flow analysis, heat transfer analysis with closed volumes: conservation of mass, conservation of momentum, conservation of energy, analysis of heat transfer with free conduct: Basic laws, geometry and flow analyzes, heat exchangers: wings, expanded surfaces, efficiency analysis, heat loss with condensation and evaporation, fundamentals of heat exchange with radiations: basic laws and surface properties, analysis of heat exchange with surfaces between radiation, introduction to mass transfer laws, conservation of substances.</p>	
<p>Textbook Supplementary Textbooks</p>	<p>Fundamentals of Heat and Mass Transfer, 5th Ed., Incorpora-DeWitt, John Wiley and Sons. Basic Heat and Mass Transfer, A. F. Mills, 2nd Ed., Prentice Hall. Transport Phenomena, Bird-Steward-Lightfoot, 2nd Ed., John Wiley and Sons. <a href="http://ocw.mit.edu/courses/mechanical-engineering/2-51-intermediate-heat-and-mass-transfer-fall-2008/">http://ocw.mit.edu/courses/mechanical-engineering/2-51-intermediate-heat-and-mass-transfer-fall-2008/</a></p>

<b>MF-PRO</b>	<b>Project Design Principles</b>	<b>2</b>	<b>0</b>	<b>1</b>
<p>To inform bioengineering students about project phases and management, to gain experience in preparing project proposal, to create awareness of team work, to contribute to professional development.</p>				

### 3. CLASS 5. SEMESTER

<b>BM-302</b>	<b>Applied Genomics and Proteomics</b>	<b>2</b>	<b>3</b>	<b>4</b>
<p>Promotion / Orientation; Overview of genome sequencing; Overview of genome sequencing; Comparison of genomes; Genome scanners; Relationship between genes and functions: genetic and</p>				

physical maps; Gene silencing; Single nucleotide polymorphisms, large-scale variations; Human genetic variation: the relationship between genotype and phenotype; Transcription analysis: transcriptomes; Sequence-based methods; Transcriptoma sequencing; Post-translational analysis: protein interactions; Epigenetic; Integrative studies: systems biology

<b>BM-303</b>	<b>Biomedical Engineering</b>	<b>3</b>	<b>0</b>	<b>3</b>
Biomedical engineering. Basic information about instrumental systems. Measurement errors. Statistics. Basic electronic science concepts for understanding biomedical instruments. Molecular analysis in clinical medicine. Spectrophotometry. Biosensors. Oxygen, glucose. Biotechnology measurements. Spectrometry. Chromatography. Electrophoresis. DNA sequence analysis. Measurements related to polymers. Surface analysis. Protein adsorption. Molecular size. Blood science. Measurements on blood components. Cellular measurements in biomaterials and tissue engineering. Measurements on the nervous system (brain, eye, ear, muscle). Heart and circulation. Heart biopotensive, pressure, systolic volume, sound, viability. Heart and circulation. Blood flow and pressure. Measurement of lung volume, flow, diffusion and airway resistance. Renal clearance, bone minerals, loss of water from the skin. Body temperature, fat and motion measurements.				
Textbook Supplementary Textbooks	Introduction to Biomedical Engineering, John Enderle, Susan M. Blanchard, Joseph Bronzino, Academic Press			

<b>BM-301</b>	<b>Biomaterials</b>	<b>3</b>	<b>0</b>	<b>3</b>
Properties of materials (chemical, physical, mechanical, electrical, thermal); Metals, crystal structure, molecular bonds, dislocations, deformation, metals, mechanical properties; Metals, biomaterial applications, shape memory alloys, corrosion and corrosion in physiological liquids; Ceramic, molecular bonding, mechanical properties, biomaterial applications, piezoelectric materials, coatings; Polymers, molecular structure, mechanical properties, biomaterial applications, biological degradation; Composites, production methods, mechanical properties, biomaterial applications; Hydrogels and smart materials; Physiological cascades initiated by biomaterials, immune and inflammatory reactions in biomaterials; Cytotoxicity, biocompatibility, hemocompatibility tests, standard tests of biomaterials; Prosthetics and implants; Tissue engineering				

Textbook Supplementary Textbooks	Buddy D. Ratner, Allan S. Hoffman, Frederick J. Schoen, Jack E. Lemons, “Biomaterials Science, Third Edition: An Introduction to Materials in Medicine”, Academic Press; 3 edition, 2010.
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<b>MF-MAT</b>	<b>Engineering Mathematics</b>	<b>3</b>	<b>0</b>	<b>3</b>
To make students perceive the importance of differential equations in engineering. To provide students with a systematic understanding of the mathematical model of a physical system. To introduce the Laplace transform which is suitable for the analysis of more complex problems besides the classical solution methods of differential equations and to use them in the solution of engineering problems.				
Textbook Supplementary Textbooks	Dennis, G. Zill, A First Course in Differential Equation with Modelling Applications, Brooks/Cole Publishing Comp. E. Keryszig, Advanced Engineerin Mathematics, Wiley			

<b>BM-304</b>	<b>Bioengineering Lab I</b>	<b>0</b>	<b>2</b>	<b>2</b>
Preparing media for bacterial cultures. Obtaining technical and theoretical knowledge in preparing media for bacterial cultures; Pure culture techniques; Staining of microorganisms; DNA isolation from plants. Discussion of DNA structure and function. To understand the basic structure and structure of DNA. Determining the quality and quality of DNA in the extracts; Heat degradation of vitamin C; Total sugar determination method; Understanding the steps and importance of PCR cycle. Chemicals used in PCR and their contents. How the thermal cycle device is used and important points during the PCR cycle; Mass transfer in bioreactors (determination of O2 mass transfer coefficient); Mixing and heat transfer effect in bioreactors; Microbial counting methods and biomass measurement; Laboratory-wide enzyme production; Microbial kinetic growth in culture colony.				
Textbook Supplementary Textbooks	Tortora, G. J., Funke, B. R., Case, C. L., “Microbiology an Introduction”, Tenth Ed., Pearson Education, (2010) Schaechter, M. “Encyclopedia of Microbiology” Third Ed., Elsevier, (2009) Okafor, N., “Modern Industrial Microbiology and Biotechnology”, Science Publishers, (2007) E.L.Cussier., “Diffusion: Mass Transfer in Fluid Systems”, 3rd Edition; (2007) Madigan., M. T., Martinko, J. M. and Parker, J., "Brock Biology of Microorganisms", tenth edition, Pearson Education, (2006)			



	<p>Peker S., Helvacı Ş., ‘Akışkanlar Mekaniği Kavramlar, Problemler, Uygulamalar” (2003)</p> <p>Jens Nielsen, John Villadsen, Gunnar Lidén; Bioreaction Engineering Principles”, Second Edition; (2002)</p> <p>Bailey, J.E., Ollis, D.F., "Biochemical Engineering Fundamentals", (1996).</p> <p>Pauline M. Doran ; Bioprocess Engineering Principles” (1995)</p>
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<b>BMS-301</b>	<b>Departmental Elective Course I</b>	<b>3</b>	<b>0</b>	<b>3</b>

<b>BMS-302</b>	<b>Departmental Elective Course II</b>	<b>3</b>	<b>0</b>	<b>3</b>

### 3.SINIF 6.YARIYIL

<b>BM-305</b>	<b>Genetic Engineering</b>	<b>3</b>	<b>0</b>	<b>3</b>
<p>Introduction to genetic and genetic history, Life cycle in sexual organisms, Genotype and phenotype concepts, Mendelian inheritance, Interaction between one gene alleles, Gender determination and gender-based inheritance, Cytoplasmic inheritance, Recombination, Linkage in eukaryotes and genetic mapping, Changes in the number of chromosomes, Changes in gene structure mutations, Quantitative genetics, Current developments in genetics, Principles of genetic engineering, working with nucleic acids, enzymes used in genetic studies, gene manipulations, biotechnology, medicine, genetic engineering in forensic medicine, transgenic plants and animals.</p>				
Textbook	<p>Genes IX, Benjamin Lenin, Oxford University Press, Amazon. Com, North Yorkshire, 2000</p> <p>Genetics, William S. Klug, Micheal R. Cummings, Prentice Hall, New Jersey, 2000</p> <p>Genetik, Jan M. Friedman, Fred J. Dill, Micheal R. Hayden, Barbara C. McGillivray, Saray Tıp Kitabevleri, 1995</p>			
Supplementary Textbooks	<p>Genetik Kavramlar , William S. Klug, Micheal R. Cummings, Charlotte A. Spencer, Palme Yayıncılık, Ankara, 2009</p> <p>Basic Genetics, Daniel L. HARTL, David Freifelder, Leon A. Snyder, Jones and Bartlett Publishers, Boston, 2000</p> <p>An Introduction to Genetic Engineering, Desmond S. T. Nicholl,</p>			

	Cambridge University Press; 3 edition (2008).
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<b>BM-306</b>	<b>Biomedical Physiology for Bioengineers</b>	<b>3</b>	<b>0</b>	<b>3</b>
Blood tissue, endocrine system, central nervous system; respiration, kidneys, digestive system, growth and reproduction, body defense mechanisms.				
Textbook	Guyton AC., Hall JE. 2006. "Tıbbi Fizyoloji 11th ed.", Çavuşoğlu H., Çağlayan Yeğen B., Aydın Z., Alican İ., Nobel Tıp Kitabevleri, İstanbul			

<b>MF-302</b>	<b>Fluid mechanics</b>	<b>3</b>	<b>0</b>	<b>3</b>
To give the definition of fluid and unit systems, To give the principles of hydrostatic and to calculate the forces of pressure, To obtain the basic equations of ideal and real fluids for one, two and three dimensional flows, (continuity, energy and impulse-momentum equations) and to apply, Potential and non-potential To examine the currents, to give the concept of boundary layer, dimension analysis and affinity.				
Textbook	Çengel, Yunus A., John M. Cimbala, and Tahsin Engin. Akışkanlar mekaniği: temelleri ve uygulamaları. Güven Bilimsel, 2008.			

<b>MF-GIR</b>	<b>Entrepreneurship</b>	<b>2</b>	<b>0</b>	<b>2</b>
Definition of entrepreneurship, social-economic entrepreneurship, entrepreneurship factors; Entrepreneurship and the economic development of this concept as a process; Concept of business idea and how to develop; Feasibility study and feasibility study; Implementation of a feasibility study; Marketing and marketing plan preparation basics; Marketing and marketing plan preparation basics; Fundamentals of financial and marketing plan preparation; Fundamentals of financial and marketing plan preparation; Basics of business management and managerial processes; Start a business within the legal framework and types of work; Patent and intellectual / industrial property rights; Writing business planning and business plan; Business planning and business plan writing.				

<b>BM-307</b>	<b>Bioengineering Lab II</b>	<b>0</b>	<b>2</b>	<b>2</b>
Introduction of plant cell and tissue culture laboratories; preparation of stock solution, preparation of semi-solid media and germination medium; Sterilization of seeds, seed transfer to germination environment and observation; Sterilization of nod explants from plants and transfer of sterile nodes to				

<p>medium; Establishing meristem cultures from potato and carnation; Selection of suitable flower seeds for anther culture and transfer of anthers to the environment; Isolation of protoplasts from leaf explants and transfer to medium; Establishment of cell suspension cultures from callus cultures; Introduction of animal cell culture laboratory, microscopic and morphological evaluation of various types of cells; Cell count, viability tests and giemsa staining; Single layer cell channel; Protection of cell cultures in liquid nitrogen; Preparing new cultures from stocks stored in liquid nitrogen; Preparation of mesenchymal stem cell culture; Preparation of mesenchymal stem cell culture.</p>	
<p>Textbook Supplementary Textbooks</p>	<p>Animal Cell Biotechnology, Methods and Protocols. Humana Press. New Jersey. Culture of Animal Cells: A manual of Basic Techniques, by Freshney, I.A., 2005</p> <p>Wiley-Liss, Inc., New York. Handbook of Industrial Cell Culture: Mammalian, Microbial, and Plant Cells (Hardcover) by Victor A. Vinci (Editor), Sarad R. Parekh (Editor), 2003</p> <p>Humana Press Inc. Mesenchymal Stem Cells: Methods and Protocols (Methods in Molecular Biology) (Hardcover) by Darwin J. Prockop (Editor), Donald G. Phinney (Editor), Bruce A. Bunnell (Editor), 2008</p>

<b>MF-EKO</b>	<b>Engineering Economics</b>	<b>2</b>	<b>0</b>	<b>2</b>
<p>Introduction to engineering economics, economic analysis of projects, macro and micro economy dimensions of biotechnology projects; Computer Aided Design; Basic principles of accounting income statements, balance sheets; Cost estimation; Interest and investment costs; Amortization, Profitability and Decision Making in Investments; Profitability and decision making in investments; Introducing events and building teams; Optimum design; Basic principles of project management; Presentation of teams and discussion case studies.</p>				

<b>BM-308</b>	<b>Academic English</b>	<b>3</b>	<b>0</b>	<b>3</b>
<p>Basic theories of translation. Simple sentence translations. Elements of the sentence (subject, predicate, object, etc.). Simple sentence analysis. Professional sentence translations. Reading and evaluation of literature. Academic writing theories. Creating the structure of academic writing. Academic writing example.</p>				
<p>Textbook Supplementary Textbooks</p>	<p>Academic Writing, A Handbook for International Students, Stephen Bailey, 2011, Routledge.</p> <p>GRAMMAR FOR ACADEMIC WRITING, Tony Lynch and Kenneth Anderson, 2013, English Language Teaching Centre University of</p>			

	Edinburgh
	Ulusal ve Uluslararası Makaleler, internet güncel kaynakları

<b>BMS-303</b>	<b>Departmental Elective III</b>	<b>3</b>	<b>0</b>	<b>3</b>

#### 4. CLASS 7. SEMESTER

<b>BM-402</b>	<b>Tissue Engineering</b>	<b>3</b>	<b>0</b>	<b>3</b>
Introduction to tissue engineering - cells; Extra-cellular matrix, extra-matrix analogs; Cells and cell culture; Synthetic polymers; Supporting materials - natural polymers; Approaches to Tissue Engineering and Cell-Biomaterial Interaction; Stem Cell, obtaining stem cells with tissue engineering applications; Tissue Improvement, Tissue Modeling, Tissue Renewal; Controlled drug delivery; Organ-stem cell transplantation and immune response; Tissue Engineering, the most recent patents and regulations in tissue engineering; Research, Discussions and Presentations.				
Textbook Supplementary Textbooks	Ulusal ve Uluslararası Makaleler, internet güncel kaynakları			

<b>BM-404</b>	<b>Graduation Thesis Project I</b>	<b>0</b>	<b>2</b>	<b>2</b>
Experimental or theoretical study of the synthesis of knowledge acquired in vocational education. Thesis; scientific article review, if necessary laboratory applications, evaluation of data and writing the project.				
Textbook Supplementary Textbooks	Ulusal ve Uluslararası Makaleler			

<b>BM-405</b>	<b>Introduction to Biotechnology</b>	<b>3</b>	<b>0</b>	<b>3</b>
Definition and history of biotechnology, The importance of biotechnology in the world, The developments in biotechnology, The application areas of biotechnology, The methods used in biotechnology (tissue cultures), Methods used in biotechnology (molecular), Enzymes, Vectors, Genetic transformation, Verification of genetic transformation, Molecular markers, Genetic mapping, Genetically modified organisms and their use in agriculture, the benefits and risks of genetically modified organisms in terms of environment and production. Microbial biotechnology, Herbal and Animal Biotechnology, Aquatic Biotechnology, Agricultural biotechnology, Medical biotechnology				
Textbook Supplementary Textbooks	W.J.Thieman and Michael A. Palladino “Introduction to Biotechnology”, Pearson Education, San Francisco, CA (2004).			

<b>BM-406</b>	<b>Bioengineering Main Design I</b>	<b>2</b>	<b>0</b>	<b>2</b>
Design principles and methodology, literature review of the given production process, evaluation of possible raw materials and processes, capacity determination, process flow tables, mass and energy balances of the selected system, equipment design, pre-production cost calculation.				
Textbook Supplementary Textbooks	Coulson, J. M., Richardson, J. F., Sinnott, R.K., "Chemical Engineering", 6 th volume, Pergamon Press, (1983). E. Bailey, D. F. Ollis,"Biochemical Engineering Fundamentals", J. McGraw Hill, 1986. Atkinson B. and F. Mavituna (1991). Biochemical Engineering and Biotechnology Handbook, 2nd edition, Stockton Press (MacMillan Publishers). M.W.Flickinger, S.M.Drew, “Encyclopedia of bioprocess technology”, John Wiley& Sons, 1999			

<b>MF-IGE</b>	<b>Occupational Safety and Engineering Ethics</b>	<b>2</b>	<b>0</b>	<b>2</b>
Promotion / Orientation; Basic concepts. Ethics and ethics; Ethical Resources; Human rights and responsibilities; Professions and professionalism. Engineer and his position in society; Short engineering history; Engineer responsibilities to colleagues; Workplace responsibilities; Responsibilities and responsibilities of the engineer against his / her employees and customers; Environmental ethics; code of ethics for engineers in Turkey; Ethics for engineers prepared by different engineering societies and institutions; ABET criteria; Gift, bribe, commission; Case studies from around the world and Turkey; Case studies from around the world and Turkey.				

Textbook Supplementary Textbooks	<p>Baskent University: Regulations concerning ethical committee on animal experiments, 2003, Baskent University Press.</p> <p>Bilimsel Arastirmalarda Etik ve Sorunlari, 2002 Turkiye Bilimler Akademisi Yayinlari</p> <p>Biyoloji Budur-Canlı Dünyanın Bilimi. Ernst Mayr, TÜBİTAK, ISBN 978-975-403-481-3, 2008.</p> <p>Engineering Ethics: An Industrial perspective (Hardcover) by Gail Dawn Baura, 2006, Elsevier Inc.</p> <p>NanoEthics, Springer Netherlands, ISSN 1871-4757 (Print) 1871-4765 (Online)</p> <p>National Institute of Health. Public Health Service: Do We Care About Research Animals. NIH Publications 79-355.</p> <p>Practical Ethics, Singer, P., Cambridge University Pres, (1993).</p> <p>Resmi Gazete, 15.02.1954; 20.02.1954 tarihli 8639 sayılı.</p> <p>The Social Implications of Bioengineering, Beck-Gernsheim, E. Mazarins, L., Humanities Press, (1995).</p>
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<b>BMS-401</b>	<b>Departmental Elective Course IV</b>	<b>3</b>	<b>0</b>	<b>3</b>

<b>BMS-402</b>	<b>Departmental Elective Course V</b>	<b>3</b>	<b>0</b>	<b>3</b>

#### 4. CLASS 8. SEMESTER

<b>BM-407</b>	<b>Graduation Thesis Project II</b>	<b>0</b>	<b>2</b>	<b>2</b>
Experimental or theoretical study of the synthesis of knowledge acquired in vocational education. Thesis; scientific article review, if necessary laboratory applications, evaluation of data and writing the project.				
Textbook Supplementary Textbooks	Ulusal ve Uluslararası Makaleler			

<b>MF-TS</b>	<b>Faculty Technical Elective</b>	<b>3</b>	<b>0</b>	<b>3</b>

<b>BM-409</b>	<b>Bioengineering Main Design II</b>	<b>2</b>	<b>0</b>	<b>2</b>
Design principles and methodology, literature review of the given production process, evaluation of possible raw materials and processes, capacity determination, process flow tables, mass and energy balances of the selected system, equipment design, pre-production cost calculation.				
Textbook Supplementary Textbooks	Coulson, J. M., Richardson, J. F., Sinnott, R.K., "Chemical Engineering", 6 th volume, Pergamon Press, (1983). E. Bailey, D. F. Ollis,"Biochemical Engineering Fundamentals", J. McGraw Hill, 1986. Atkinson B. and F. Mavituna (1991). Biochemical Engineering and Biotechnology Handbook, 2nd edition, Stockton Press (MacMillan Publishers). M.W.Flickinger, S.M.Drew, "Encyclopedia of bioprocess technology", John Wiley& Sons, 1999			

<b>BM-410</b>	<b>Academic Writing</b>	<b>3</b>	<b>0</b>	<b>3</b>
What is scientific writing; origin of scientific writing; what is a scientific article; types of scientific articles; articles and theses. How to prepare the title; how the authors and addresses are sorted; how to prepare a short summary; How to prepare a long summary. How to write the introduction section. How to type the method section. How to write the Findings section; how the findings are effectively presented; table chart examples. How to write a discussion section; how to write the result section. Ethics, rights and permits, Abbreviations and when used. Examples in academic article writing.				
Textbook Supplementary Textbooks	Murray, R. ve Moore, S. (2006). The handbook of academic writing: A fresh approach. Berkshire: McGraw-Hill Hartley, J. (2008). Academic writing and publishing: A practical handbook. London: Routledge.			

<b>BM-411</b>	<b>Bioinformatics</b>	<b>2</b>	<b>2</b>	<b>3</b>
The concept of bioinformatics and its application areas, information theory, gathering, processing and sharing of information, data bank creation and usage, investigation of protein and nucleotide databases, primary design, evaluation of nucleotide and protein sequence analysis results.				

Textbook	Introduction to Bioinformatics, Arthur M. Lesk, Oxford University Press, New York, 2002.
Supplementary Textbooks	Bioinformatics: A Practical Approach, Shui Qing Ye, Chapman and Hall/CRC, London, 2007.

<b>BMS-403</b>	<b>Departmental Elective Course VI</b>	<b>3</b>	<b>0</b>	<b>3</b>

<b>BMS-404</b>	<b>Departmental Elective Course VII</b>	<b>3</b>	<b>0</b>	<b>3</b>