



**BAYBURT UNIVERSITY ENGINEERING FACULTY
DEPARTMENT OF FOOD ENGINEERING UNDERGRADUATE PROGRAMME
(I. AND II. EDUCATION) COURSE CONTENTS**

MF-107 MATHEMATICS I (3-0) 3

Functions; Logarithm and exponential function; Trigonometry; Limit; Derivative; Applications of derivative; Integral; Methods of integration.

Textbook

❖ Genel Matematik, M. Kemal Saęel, Mine Aktaş, Pegema Yayıncılık, Ankara, 2008.

Supplementary textbook

❖ Genel Matematik, Ekrem Kadioęlu, Muhammet Kamali, Erzurum, 2005.

❖ Genel Matematik, Cilt I, Mustafa Balcı, Balcı Yayınları, Ankara, 2006.

❖ Temel ve Genel Matematik, Cilt I, Hilmi Hacısalihoęlu, Mustafa Balcı, Ankara, 1988.

❖ Temel Matematik, Genel Matematik veya Matematik Analiz isimli dięer Kitaplar.

MF-109 PHYSICS I (3-0) 3

Measurement; Vectors; Kinematics in one dimension; Statics of a rigid body; Particle dynamics; Work and Energy; Conservation of energy; Collisions; Rotation kinetics and dynamics

Textbook

❖ Fen ve Mühendislik için Fizik I, Serway Beicher, Palme Yayıncılık.

Supplementary textbook

❖ Fizięin Temelleri, Cengiz Yalçın

❖ Fizik İlkeleri, Kemal Çolakoęlu

GM-115 GENERAL CHEMISTRY (3-2) 4

Properties of matter; Classification; Basic laws; Structure of atoms; Periyodic table and properties of atoms; Chemical bonding; Molecular geometry; The Gaseous state, liquids and solids; Solutions; Acid and Bases; Chemical kinetics; Chemical equilibrium; Ionic equilibrium; Electrochemistry; Thermodynamics.

Textbook

- ❖ Genel Kimya (I. ve II. cilt) Prensipler ve Modern Uygulamalar, Tahsin Uyar, (6. Baskı).

Supplementary textbook

- ❖ Temel Kimya (I. ve II. cilt) Moleküler, Maddeler ve Değişimler, E. Kılıç, F. Köseoğlu, H. Yılmaz.

MF-113 INTRODUCTION TO COMPUTER (2-0) 2

General view of computer information technologies, definition and properties of computer, software, hardware, windows operating systems, introduction of word processing program (MS Word); Internet system, services, search engine and electronic mail; Introduction of MS Excel, tables and graphics preparations, numerical calculations; Introduction of MS PowerPoint, techniques of presentation design.

Textbook

- ❖ Bilgisayarın B'si., Ömer Bağcı, Seçkin Yayınları, Ankara, 2008.

Supplementary textbook

- ❖ Bilgisayarın B'si., Ömer Bağcı, Seçkin Yayınları, Ankara, 2008.
- ❖ Yardımcı Ders Kitapları:
- ❖ Bilgisayar 2, Selami Eryılmaz, Nobel Yayın Dağıtım, Ankara, 2005.
- ❖ Excel 7.0 ile Etkin Çözümler, Mithat Uysal, Beta Basım Yayın Dağıtım A.Ş. İstanbul, 1997.

MF-111 TECHICAL DRAWING (2-0) 2

General information about program, screen control commands, drawing preparation commands, drawing commands, commands of information on drawing, saving of drawings on hard disk or floppy disc, commands of drawing edit, commands providing easy-way and saving time, commands of measuring and writing on drawing, printing out drawings commands by using printer and plotter.

Textbook

- ❖ Ergüneş, G., Yardım, M. Teknik Resim I., Tokat, 2002.
- ❖ Teknik Resim, Saim Bastaban, İsmail Öztürk, Atatürk Üniversitesi, Aktif Yayınevi, Erzurum, 1999.

Supplementary textbook

- ❖ Teknik Resim-Temel Bilgiler, İ. Zeki Şen, Nail Özçilingir, Deha Yayıncılık, İstanbul, 2002.
- ❖ Engineering Drawing and Graphic Technology, French, T.E., Vierck, C.J., McGraw-Hill Book Company, ISBN 0-07-022158-8

GM-117 INTRODUCTION TO FOOD ENGINEERING (3-0) 3

History of Science and Engineering. Education, future needs, and career in food engineering. Importance of biological science in food engineering. Importance of chemistry in food engineering. Importance of quality control systems in food engineering. Food processing and Technologies. Turkish Food Industry. Seminars in food industry.

Textbook

- ❖ Gıda Mühendisliğine Giriş” basılmamış ders notları. Atatürk Üniversitesi Ziraat Fak., 2008.

Supplementary textbook

- ❖ Unit Operations of Chemical Engineering. McCabe, W.L., Smith, J.C., and P. Harriott, 5th Ed. McGraw-Hill Book Co., NY., 1993.

M-101 TURKISH LANGUAGE I (2-0) 2

What is language? The place and importance of the language as a social institution in life, relation between language and culture. Turkish Language. Speech language, written language, Turkish written language and Turkish of Turkey. Language and Culture. Punctuation marks and spelling rules. The position of Turkish language today and its invasion. Common language and culture. Structure of Turkish Language. Enhancement of

the language and its importance. Expression and sentence disorders. Varieties: a) Article, conversation, trails b) Story and novel c) Interview and reporting d) Conference, symposium, seminar e) Presentation. ATATURK and Turkish Language. To be simplified in Turkish Language. Occupational writings: Letter, report, minutes, curriculum Improvements in Turkish Culture From Reforms to Republic. Types in Turkish Literature.

Textbook

❖ Yüksek Öğretim Öğrencileri İçin Türk Dili Ve Kompozisyon Bilgileri, Korkmaz Z., Ercilasun A.B., Zülfikar H., Akalın M., Gülensoy T. Parlatır C., Birinci N.

Supplementary textbook

❖ Uygulamalı Türk Dili ve Kompozisyon Bilgileri, Prof.Dr. Yakup Krasoy, Yrd.Doç.Dr. Orhan Yavuz, Okt. Ahmet Kayasandık, Okt. Bekir Direkci.

❖ Üniversite Türk Dili ve Kompozisyon Dersleri (Yavuz K., Yetiş K., Birinci N.)

❖ Türk Dili ve Kompozisyon, Komisyon.

M-105 FOREIGN LANGUAGE I (2-0) 2

Personal pronouns; Verb “to be”; Have/has got; There is/are; Present progressive superlatives and other basic grammar structures.

Textbook

❖ Çakır, V., Yorgancı, N., Keskil, G., Full Stream Ahead, Gündüz Eğitim ve Yayıncılık, 2002.

Supplementary textbook

❖ Essential Grammer In Use.

❖ İngilizce-Türkçe, Türkçe-İngilizce Sözlük

2. SEMESTER

MF -108 MATHEMATICS II (3-0) 3

Personal pronouns; Verb “to be”; Have/has got; There is/are; Present progressive superlatives and other basic grammar structures.

Textbook:

- ❖ Genel Matematik, M. Kemal Sağel, Mine Aktaş, Pegema Yayıncılık, Ankara, 2008.

Supplementary textbook

- ❖ Genel Matematik, Ekrem Kadioğlu, Muhammet Kamali, Erzurum, 2005.
- ❖ Genel Matematik, Cilt I, Mustafa Balcı, Balcı Yayınları, Ankara, 2006.
- ❖ Temel ve Genel Matematik, Cilt I, Hilmi Hacısalihoğlu, Mustafa Balcı, Ankara, 1988.
- ❖ Temel Matematik, Genel Matematik veya Matematik Analiz isimli diğer Kitaplar.

MF-110 PHYSICS II (3-0) 3

Electric force and field, The electrostatic potential, Electric energy, Capacitors and dielectrics, Currents and Ohm's law, DC circuits, Magnetic force and field, Ampere's law; Faraday's induction law.

Textbook

- ❖ Fen ve Mühendislik için Fizik II, Serway Beicher, Palme Yayıncılık.

Supplementary textbook

- ❖ Fiziğin Temelleri, Cengiz Yalçın.

GM-116 ORGANIC CHEMISTRY (3-0)3

Introduction, alkanes (structure and nomenclature, stereochemistry and conformation for alkanes, physical properties, preparation, chemical properties), alkenes (structure of the C=C double bond, nomenclature, cis-trans-isomerism, physical properties, preparation, chemical properties), dienes (conjugated dienes and concept of resonance, nomenclature and physical properties, polymerization), alkynes (structure and nomenclature, physical properties), cycloalkanes (structure and nomenclature, cis-trans-isomerism in alicyclic compounds, physical properties), aromatic hydrocarbons (the structure of benzene, aromatic character, physical properties, electrophilic aromatic substitution, inductive effect and resonance effect, orientation rules and the mechanism of the electrophilic aromatic substitution), alkyl halides (structure and nomenclature, physical properties, nucleophilic aliphatic substitution), alcohols (structure and nomenclature, physical properties, hydrogen bond, preparation, chemical properties), ethers (structure and nomenclature, physical properties), aldehydes and ketones (structure and nomenclature, physical properties, preparation, chemical properties), monocarboxylic acids (structure and nomenclature,

physical properties, preparation, chemical properties), esters (structure and nomenclature, physical properties, preparation, chemical properties, fats and oils), amines (structure and nomenclature, physical properties), phenols (structure and nomenclature, physical properties).

Textbook

- ❖ Organik Kimyaya Giriş, İkizler, A. 3. baskı, Karadeniz Teknik Üniversitesi Basımevi, Trabzon, 1993.

MB - 108 COMPUTER-AIDED TECHICAL DRAWİNG (2-2) 3

General information about program, screen control commands, drawing preparation commands, drawing commands, commands of information on drawing, saving of drawings on hard disk or floppy disc, commands of drawing edit, commands providing easy-way and saving time, commands of measuring and writing on drawing, printing out drawings commands by using printer and plotter.

GM-114 FOOD ENGINEERING MATERIAL SCIENCE (2-0) 2

Metallurgy; Iron and steel metallurgy; Stainless-steel production and applications in food industry; Copper metallurgy and applications of copper in food industry; Aluminum and applications of aluminum in food industry; corrosion; Glasses and ceramics; plastics and applications in food industry; Special steels; Organic materials and applications in food industry.

Textbook

- ❖ Malzeme Bilimi, K. Onaran, Bilim Teknik Yayınevi, 2000.
- ❖ Metalürji ve Gıda Sanayinde Malzeme Bilgisi Ders Notları, Prof. Dr. Salih Özdemir.
- ❖ Malzeme Bilgisi. Erdoğan D., Ankara Üniversitesi, Ziraat Fakültesi, Yayın No:1537, Ders Kitabı:490, Ankara, 2003.

Supplementary textbook

- ❖ Malzeme Bilgisi ve Muayenesi, Wolfgang W ve Anık S, Birsen Yayınevi. ISBN: 975-511-002-X Çağaloğlu, İstanbul, 1984.
- ❖ Malzeme, Baydur G., Milli eğitim Bakanlığı Devlet Kitapları. No:32, Ankara, 1979.
- ❖ Malzeme Bilimi Ders Notları, Doç Dr. Gültekin Göller, Yrd. Doç Dr. Özgül Keleş, Araş. Gör. İpek AKIN, İstanbul Teknik Üniversitesi, İstanbul, 2009.

GM-118 GENERAL BIOLOGY (3-0) 3

Definition of biology; History of biology; Biologic units; Characteristics of alive; Classification of alive; physical and chemical structure of cell; Biomolecules; Cell organization; Photosynthesis; Cell division; Plant and animal tissues; Introduction to ecology; Food chain; carbon and nitrogen cycle; Phosphorus cycle.

Textbook

- ❖ Temel Biyoloji, Prof. Dr. Asım Kadioğlu, Prof.Dr. Zihni Demirbağ, Doç.Dr. Bülent Şahin, KTÜ Öğretim Üyeleri, Trabzon, 2005.

Supplementary textbook

- ❖ Genel Biyoloji (2 cilt), Keton Gould, Palme Yayıncılık.
- ❖ Genel Biyoloji, Prof.Dr. İlhami Kızıroğlu.
- ❖ Genel Zooloji, Prof.Dr. Remzi Geldiay, Prof.Dr. Semahat Geldiay.
- ❖ Genel Botanik, Prof. Dr. Asım Kadioğlu, Doç.Dr. Yusuf Kaya

M-101 TURKISH LANGUAGE II (2-0) 2

What is language? The place and importance of the language as a social institution in life, relation between language and culture. Turkish Language. Speech language, written language, Turkish written language and Turkish of Turkey. Language and Culture. Petition. Punctuation marks and spelling rules. The position of Turkish language today and its invasion. Common language and culture. Structure of Turkish Language. Enhancement of the language and its importance. Expression and sentence disorders. Varieties: a) Article, conversation, trails b) Story and novel c) Interview and reporting d) Conference, symposium, seminar e) Presentation. ATATURK and Turkish Language. To be simplified in Turkish Language. Occupational writings: Letter, report, minutes, curriculum Improvements in Turkish Culture From Reforms to Republic. Types in Turkish Literature.

Textbook

- ❖ Yüksek Öğretim Öğrencileri İçin Türk Dili ve Kompozisyon Bilgileri, Korkmaz Z., Ercilasun A.B., Zulfikar H., Akalın M., Gulensoy T.Parlatır C., Birinci N.

Supplementary textbook

- ❖ Uygulamalı Türk Dili ve Kompozisyon Bilgileri, Prof.Dr. Yakup KARASOY, Yrd.Doç.Dr. Orhan Yavuz, Okt. Ahmet Kayasandık, Okt. Bekir Direkci.
- ❖ Üniversite Türk Dili ve Kompozisyon Dersleri, Yavuz K., Yetis K., Birinci N.
- ❖ Türk Dili ve Kompozisyon, Komisyon.

M-105 FOREIGN LANGUAGE II (2-0) 2

Future tense; Future progressive tense; Was/were; Simple past tense; Present Perfect Tense; Past Perfect Tense; Relative Clauses; Passive voice.

Textbook

- ❖ Çakır, V., Yorgancı, N., Keskil, G., Full Stream Ahead, Gündüz Eğitim ve Yayıncılık, 2002.

Supplementary textbook

- ❖ Essential Grammar In Use.
- ❖ İngilizce-Türkçe, Türkçe-İngilizce Sözlük

3. SEMESTER**GM-201 FOOD SCIENCE AND TECHNOLOGY (3-0) 3**

Content and function of food technology; Food composition. Source and properties of raw material; Primary food and food groups; Cereal and cereal products; Meat and meat products; Milk and dairy products; Fruit-vegetables and products; Beverages; Vegetable oils; Fermented foods; Novel approaches in food technology.

Textbook

- ❖ Gıda Bilimi ve Teknolojisi, Zeki Ertugay, Ahmet Kurt vd., Erzurum, 1994.
- ❖ Gıda Bilimi ve Teknolojisi, Özkaya, H., Şahin, E., Türker, İ., Üniversitesi Ziraat Fakültesi Yayınları:1199, Ders Kitabı no: 350, Ankara, 1991.

GM- 203 ANALYTICAL CHEMISTRY (3-0) 3

Introduction to analytical chemistry, a review of some basic concepts (some important units of measurements, solutions and their concentrations), gravimetric methods of analysis, volumetric methods of analysis (some general aspects of volumetric titrimetry, standard solutions, volumetric calculations, normality and equivalent weight), aqueous solution chemistry (the chemical composition of aqueous solutions, chemical equilibrium), calculation of pH values for aqueous solutions (pH of buffer solutions, pH of polyfunctional acids).

Textbook

- ❖ Analytical Chemistry, Harris, D.C., Gazi Büro Kitabevi, Ankara, 1982.

Supplementary textbook

- ❖ Fundamentals of Analytical Chemistry, Seventh Edition, Skoog, D.A., West, D.M., Holler, F.J., Saunders College Publishing, 1996.

GM-205 GENERAL MICROBIOLOGY(2-2) 3

Introduction to microbiology, terminology, classification, the general properties of groups of microorganisms, the importance of these groups of microorganisms in food microbiology, microbial metabolism, microbial growth, the control of microorganisms, immunology, genetic structure and mutation.

Textbook

- ❖ Genel Mikrobiyoloji, Prof.Dr. Selahattin SERT, Atatürk Üni. Ziraat Fak. Yayınları, Erzurum, 2000.
- ❖ Genel Mikrobiyoloji Uygulama Teknikleri, Ayhan TEMİZ.

Supplementary textbook

- ❖ Genel Mikrobiyoloji, Prof.Dr. Mehmet ÖNER, Ege Üni.Fen Fak. Yayını, İzmir, 2001.

GM-207 MATERIAL AND ENERGY BALANCES (3-0) 3

Dimensions and units, Systems of units, Pressure, Temperature, Methods of expressing concentrations, Batch, Semi-batch and continuous operations, Material balances around single units and multi-unit systems, Material balances and chemical reaction, Combustion calculations, Gases and vapors, Psychrometry, Energy Balances for closed and open systems, Calculation of heating-cooling requirements for various food processing

operations, Energy balances and chemical reaction.

Textbook

- ❖ Material and Energy Balances in Food Engineering, Doç. Dr. Ali Esin. Orta Doğu Teknik Üniv. Gıda Müh. Böl., Ankara, 2003.

Supplementary textbook

- ❖ Fundamentals of Food Process Engineering, Third Edition, Toledo R.T. Springer Science-Business Media, LLC, New York, 2007.

GM-209 REACTION KINETICS (2-0) 2

Chemical and biological reactions, reaction types, determination of reaction rate constants, factors effecting reaction kinetics, microbial death and enzyme kinetics, batch, semi-continuous and continuous fermentation systems, design of a bioreactor, product, biomass formation kinetics, substrate consumption kinetics, inhibition kinetics, determination of oxygen transfer coefficient and specific oxygen consumption rate, determination of yield and productivity values in bioprocesses.

Textbook

- ❖ Kimyasal Kinetik ve Makromoleküller, C. Şenvar, Marmara Üniversitesi Yayın No: 435, İstanbul, 1986
- ❖ Chemical Kinetics, K. J. Laidler, Third Edition, Harper Collins Publishers, New York, 1987

Supplementary textbook

- ❖ J. E. House, 'Principles of Chemical Kinetics', Wm. C. Brown Publishers, Illinois Dubuque, 1997
- ❖ J. I. Steinfeld, J. S. Francisco, W. L. Hase, 'Chemical Kinetics and Dynamics' Prentice Hall, Englewood Cliffs, New Jersey, 1989.
- ❖ İleri Kimyasal Reaksiyon Kinetiği Ders Notları (Düzenleyen Y.Doç.Dr. Mesut AKGÜN)

GM-211 ENGINEERING THERMODYNAMICS (3-0) 3

Basic principles of thermodynamics, properties of pure substances, thermodynamic diagrams and tables of pure substances, heat and work, application of first law of thermodynamics to closed systems, application of first law of thermodynamics to control volumes, second law of thermodynamics, entropy, power cycles, refrigeration cycles.

Textbook

- ❖ Mühendislik Yaklaşımıyla Termodinamik. Çengel, Y.A. ve Boles, Michael A., Türkçesi: Derbentli, T., 1. Basım, McGraw-Hill Literatür Yayıncılık, 1996.
- ❖ Termodinamik Problemler., Öztürk, A ve Kılıç, A., Seç Kitap Dağıtım, Ankara, 1987.

Supplementary textbook

- ❖ Fundamentals of Classical Thermodynamics. Van, W., Gordon J. And Sonntag, R., 2nd Ed., John Wiley & Sons, Inc, 1978.
- ❖ Termodinamik ve Isı Geçişi Tabloları, Öztürk, A ve Kılıç, A, Hasbi, Y., Çağlayan Kitabevi, Ankara, 1996.

GM-213 MATHEMATICS III (3-0) 3

Definitions (examples of differential equations, the elimination of arbitrary constants), equations of order one (separation of variables, homogeneous equations, exact and linear equations of order one, the general solutions of linear equations, the determination of integrating factor, Bernoulli equations), Linear differential equations (linear independence, the wronskian, general solution of homogenous equations), Non-homogenous equations (undetermined coefficients, variation of parameters, inverse differential operators), Non-linear equations, Linear systems of equations, Power series solutions (regular singular point, irregular singular point), Laplace transforms.

Textbook

- ❖ Diferansiyel Denklemler ve Uygulamaları. M. Aydın, B. Kuryal, G. Gündüz, G. Oturaç, Fakülteler Kitabevi Barış yayınları, İzmir, 1995

Supplementary textbook

- ❖ Advanced Engineering Mathematics. P. V. O'Neil. Thomson Brooks/cole, 2003.
- ❖ Teori ve Problemleriyle Diferansiyel Denklemler. F. Ayres, Çev. E. Pakdemirli, Güven Kitabevi yayınları, Ankara, 1978.

M-217PRINCIPLES OF ATATÜRK AND RECENT TURKISH HISTORY I (2-0) 2

The objectives of teaching Atatürk's Principles and the History of the Revolution and the concept of Revolution, A General Look at the reasons leading to Collapse of the Ottoman Empire and laying the, Foundation of the Turkish Revolution, Ideological Movements during the late Ottoman Era, Disintegration of the Ottoman Empire, The Armistice of Mudros, The situation of the Country in the face of Occupations and Mustafa Kemal Pasha's, Reaction Mustafa Kemal's going ashore in Samsun, The First Step for the National Struggle, Organization through Congresses, National Forces and National Pact, Inauguration of the Turkish Grand National Assembly, The Turkish Grand National Assembly's Taking Charge of the Independence War, The National Struggle Until the Battle of Sakarya, The Battle of Sakarya and The Grand Assault, National Struggle in Education and Culture National Struggle in Social and Economic Arenas, From Mudanya to Lausanne, Atatürk's Life, The Strategy of the Turkish Revolution, Two major revolutions in the Political Arena, Progressive Republican Party and Establishment of Public Order Period, Turkish Legal Revolution and Advancement, Economic Revolutions, Abolishment of the Tithe Collection, Educational and Cultural Revolutions, An Attempt to Start a Multi-Party Political Era and its reactions, The Kemalist System of Thinking, Atatürk's Principles and Threats Directed Against These Principles, Revolutions in the Social Structure and Health, Internal and Foreign Policies of the Turkish Republic (1938-1950), The Democratic Party Period, Turkey's Foreign Policies After 1960, Geopolitics and Turkey's geopolitical position, Psychological Threat against the University Youth, Modern Turkey in the 21 century.

Textbook

- ❖ Atatürk İlkeleri ve İnkılap Tarihi-I, II, III. (Komisyon)

Supplementary textbook

- ❖ Nutuk I-II-III, Atatürk.

4. SEMESTER

GM-202 FOOD MICROBIOLOGY I (3-2) 4

Microorganisms and foods, Sources of contamination to foods. Factors that effect the growth of microorganisms in foods (Intrinsic factors, extrinsic factors) Food preservation methods (prevention of contamination and removal of contaminants from foods, inhibition of microbial growth, destruction of microorganisms in foods), Indicator organisms in foods (hygiene and sanitation indicators), foodborne diseases, epidemiology and control of

foodborne pathogens.

Textbook

- ❖ Gıda Mikrobiyolojisi ve Uygulamaları, Ank.Üniv.Ziraat

GM-204 BIOCHEMISTRY (3-0) 3

Cell and its chemical content; properties of water and aqueous solutions and importance for alive; amino acids, peptides and structure and functions of proteins, enzymes, co-enzymes and importance, structure and functions of carbohydrates, lipids and nucleic acids; metabolism of biomembrans, carbohydrates, lipids, proteins and nucleic acids, bioenergetics, arrangement of metabolisms with coordination.

Textbook

- ❖ Biyokimya, Prof.Dr.E.Edip Keha, Prof.Dr.Ö.İrfan Küfrevioğlu, Şafak Yayınları, Erzurum, 1997.
- ❖ Temel Biyokimya, Prof.Dr.Bahattin Adam, Nobel Yayınları, Ankara, 2000.

GM-206 COLD PRESERVATION TECHNOLOGY (2-0) 2

Basic concepts of refrigeration, and its importance; restrictions related to current environmental phenomena like ozone layer and greenhouse effect; Cold preservation of foodstuffs; Refrigeration cycles; Cold stores, modified atmosphere storage; Freezing; Energy conservation in cold stores; Product based applications; Process control equipments in refrigeration systems.

Textbook

- ❖ Besinleri Soğukta Saklama Teknolojisi, Suntutur, S.R., Çağlayan Kitabevi, İstanbul, 1982.

Supplementary textbook

- ❖ Uygulamalı Soğutma Tekniği, Özkol, N., Maya Matbaacılık, Ankara, 1985.
- ❖ Soğutma Makineleri, Aybers, N., Bayrak Matbaacılık, İstanbul, 1992.

GM-208 HEAT AND MASS TRANSFER (3-0) 3

Thermal energy balance. Heat transfer mechanisms. Steady state heat transfer: conduction thermal conductivity, resistances in series and parallel. Dimensionless variables. Unsteady

state heat conduction: negligible internal resistance, unidirectional and multidirectional heat conduction. Forced and free convection: correlations for convective heat transfer coefficients, boiling and condensation. Thermal radiation. Heat exchangers: double pipe, shell and tube, plate and scraped surface heat exchangers.

Fundamentals of mass transfer, Phase equilibrium and related diagrams, Molecular diffusion in gases, liquids and solids, Film (convective) and overall mass transfer coefficients, mass transfer models, correlations for convective mass transfer coefficients, analogies among heat, mass and momentum transfer, principles of unsteady state diffusion.

Textbook

- ❖ Introduction to Food Engineering. Second Edition, Academic Press Inc., San Diego, 1993.

Supplementary textbook

- ❖ Isı Transferine Giriş, Sadık Kakaç, Tıp ve Teknik Yayıncılık Bakanlıklar, Ankara, 1998.
- ❖ Introduction to Food Process Engineering, Smith, P.G. Kluwer Academic / Plenum Publishers, New York, 2003.
- ❖ Unit Operations in Food Engineering, Ibarz, A., Barbosa-Canovas, G. V., CRC Press, New York, 2003.

GM-210 COMPUTER-AIDED STATISTICAL ANALYSES (2-2) 3

Hypothesis tests; Planning of experiments; Full random test plan; Random complete block experimental plan; Continuous probability distributions; Discrete probability distributions, confidence intervals, hypothesis testing, variance analysis of the basic assumptions, multiple comparison tests, Latin square experimental plan; missing observations estimation; factorial experiments; Influence mix of arrangements made, the covariance analysis; Nested classification; repeated trials, Regression and correlation analysis.

Textbook

- ❖ Araştırma ve Deneme Metodları, Necati YILDIZ ve Hüdaverdi BİRCAN, Atatürk Üniversitesi Ziraat Fakültesi Ofset Tesisi, Erzurum, 2008.

Supplementary textbook

- ❖ Araştırma ve Deneme Metodları, Yüksel BEK ve Ercan EFE, Çukurova Üniversitesi Ziraat Fakültesi, Adana, 1995. CRC Press, New York, 2003.

GM-212 FLUID MECHANICS (3-0) 3

Fluid statistics, Flow of fluids, Viscosity, Newtonian and non-Newtonian fluids, Laminar and turbulent flow, Basic equations of fluid flow, Flow of incompressible fluids in pipes, Friction, Flow past immersed bodies, Transportation and metering of fluids, modeling of fluid mechanics

Textbook

- ❖ Akışkanlar Mekaniği Temelleri ve Uygulamaları. Y. A. Çengel ve J. M. Cimbala, çev. ed. T. Engin, İzmir Güven Kitabevi, İzmir, 2008.

Yardımcı Ders Kitapları:

Supplementary textbook

- ❖ Akışkanlar Mekaniği. F. M. White, çev. K. Kırkköprü ve E. Ayder, Literatür Yayınları, İstanbul, 2005.
- ❖ Akışkanlar Mekaniği Kavramlar, Problemler, Uygulamalar. S. Peker ve Ş. Ş. Helvacı. Literatür Yayınları, İstanbul, 2003.

GM-214 PLANT SANITATION (2-0) 2

Food industry and sanitation, microorganisms of special interest; Cleaning procedures and cleaning agents; Disinfection and disinfectants; Cleaning and disinfection procedures; Sanitation equipment and systems; special considerations for sanitation procedures; Personnel hygiene; solid waste disposal; pest management; Water and air hygiene

Textbook

- ❖ Gıda İşletmelerinde Sanitasyon, Prof. Dr. Mustafa Metin.
- ❖ Gıda Hijyeni ve Sanitasyonu, Doç. Dr. Semra Kayaardı.

M-218 PRINCIPLES OF ATATÜRK AND RECENT TURKISH HISTORY II (2-0)2

The objectives of teaching Atatürk's Principles and the History of the Revolution and the concept of Revolution, A General Look at the reasons leading to Collapse of the Ottoman Empire and laying the, Foundation of the Turkish Revolution, Ideological Movements during the late Ottoman Era, Disintegration of the Ottoman Empire, The Armistice of Mudros, The situation of the Country in the face of Occupations and Mustafa Kemal Pasha's, Reaction Mustafa Kemal's going ashore in Samsun, The First Step for the National Struggle, Organization through Congresses, National Forces and National Pact,

Inauguration of the Turkish Grand National Assembly, The Turkish Grand National Assembly's Taking Charge of the Independence War, The National Struggle Until the Battle of Sakarya, The Battle of Sakarya and The Grand Assault, National Struggle in Education and Culture National Struggle in Social and Economic Arenas, From Mudanya to Lausanne, .Ataturk's Life, The Strategy of the Turkish Revolution, Two major revolutions in the Political Arena, Progressive Republican Party and Establishment of Public Order Period, Turkish Legal Revolution and Advancement, Economic Revolutions, Abolishment of the Tithe Collection, Educational and Cultural Revolutions, An Attempt to Start a Multi-Party Political Era and its reactions, The Kemalist System of Thinking, Ataturk's Principles and Threats Directed Against These Principles, Revolutions in the Social Structure and Health, Internal and Foreign Policies of the Turkish Republic (1938-1950), The Democratic Party Period, Turkey's Foreign Policies After 1960, Geopolitics and Turkey's geopolitical position, Psychological Threat against the University Youth, Modern Turkey in the 21 century..

Textbook

- ❖ Atatürk İlkeleri ve İnkılâp Tarihi-I, II, III. (Komisyon)

Supplementary textbook

- ❖ Atatürk ve Türkiye Cumhuriyet Tarihi, Hacettepe Üniv. Atatürk İlke ve İnkılâp tarihi Enstitüsü.
- ❖ Atatürk İlke ve İnkılâp Tarihi, Gazi Üniv. (Komisyon).

5. SEMESTER

GM-301 FOOD CHEMISTRY (2-0) 2

Water (structure of the water molecule, physical properties of water and ice, water activity, types of water, freezing, structure of ice, water activity and food spoilage), protein materials (properties and reactions of amino acids, classification of amino acids, separation and determination of amino acids, constitution of proteins, biological value of proteins, classification of proteins, reactions for the presence and determination of proteins), lipids (description and classification of lipids, fats and oils, chemical composition and properties of fats and oils, chemical properties of lipids, aliphatic and aromatic fatty alcohols, antioxidants in fats and oils), minerals (occurrence of minerals, anionic minerals, cationic minerals, minerals in canned foods, toxic minerals).

Textbook

- ❖ Gıda Kimyası, Prof. Dr. Mehmet Demirci.

Supplementary textbook

- ❖ Food Chemistry, Fennema, O.R., Marcel Deccer Inc. Newyork, 1985.
- ❖ Ransidity in Foods, Allen, J.C., Hamilton, R.J. Chapman and Hall., 1994.
- ❖ Food The Chemistry of It's Components, Coultate, T.P. Thomas Graham House, The Science Park, Cambridge, 1996

GM-303 FOOD ENGINEERING UNIT OPERATIONS I (2-0) 2

Preliminary preparative operations: Cleaning, sorting, grading methods. Size reduction: Size reduction equipment, disintegration of fibrous materials, energy requirements for communion of solids. Mixing and emulsification. Filtration theory and applications. Membrane separations. Centrifugation theory and applications: Separation of immiscible liquids, separation of insoluble solids from liquids, centrifugal filtration

Textbook

- ❖ Gıda İşleme Mühendisliği, Gürses, Ö.L. 1986. I. Ankara Üniversitesi Ziraat Fakültesi Yayınları: 973, 285,103 s.
- ❖ Gıda Mühendisliğinde Temel İşlemler, Cemeroğlu, B.(ed.)2005.

GM-305 DAIRY SCIENCE AND TECHNOLOGY (2-2) 3

Description of milk, milk constituents and factors affecting these constituents, the physicochemical properties of milk constituents and their technological importance, coagulation mechanisms of milk, reception and pretreatment of milk, processing of liquid milk, starter cultures, manufacturing processes for dairy products as yogurt, cheese, butter, milk powder and ice cream, evaluation of dairy by-products, chemical analyses of dairy products in laboratory and process lines and manufacturing practices in pilot plant.

Textbook

- ❖ Süt Teknolojisi (Sütün Bileşimi ve İşlenmesi). Prof. Dr. Mustafa Metin, Ege Üniversitesi Mühendislik Fakültesi Yayınları No: 33.

Supplementary textbook

- ❖ Süt Teknolojisi, Editör Prof. Dr. Atilla Yetişemiyen, Ankara Üniv. Ziraat Fak. Süt teknolojisine Bölümü, Ankara, 2007
- ❖ Süt Kimyası, Zühtü Yöney, Ankara Üniv. Ziraat Fak. Yay. No: 533.
- ❖ The Technology of Dairy Products, Early, R., Blackie and VCH Publishers, Inc, 1987.
- ❖ Süt Teknolojisine Giriş. Kurt, A., Atatürk Üniv. Yay., Erzurum, 1990.

GM-307 MEAT SCIENCE AND TECHNOLOGY (2-2) 3

Meat as food, structure and composition of muscle, the mechanism of muscle contraction. Glycolysis, Factors that affects the conversion muscle to meat, and the effects of glycolysis on meat quality. Properties of fresh muscle. Basic processing techniques in meat technology: Curing, smoking, emulsification and fermentation.

Textbook

- ❖ Et Bilimi ve Teknolojisi. Öztan, TMMOB. Gıda Mühendisleri Odası Yayınları, Kitaplar Serisi yayın No:1. Ankara, 2005.
- ❖ Lawrie's Meat Science, R.A. Lawrie, Woodhead Publishing Limited, İngiltere, 1998.
- ❖ Et Ürünleri İşleme Mühendisliği, H.Y. Gökalp, M. Kaya, Ö. Zorba, Atatürk Üniversitesi Yayınları No:786, Ziraat Fakültesi yayın No: 320, Erzurum, 2004.

Supplementary textbook

- ❖ Muscle Foods, D.M. Kinsman, A. W. Kotula, B.C. Breidenstein, Chapman & Hall, New York, 1994.
- ❖ Muscle and Meat Biochemistry, A.M. Pearson, R.B. Young, Academic Pres, 1989

GM-309 FRUIT AND VEGETABLE PROCESSING TECHNOLOGY (2-2) 3

Processing technologies of fruit juices, nectars and drink, processing of tomato products, especially paste processing, concentration techniques of fruit and vegetable juices, calculation of pasteurization and sterilization conditions in heat processing, production of special canned foods and ready to eat meals, processing of jam and marmalade, principle of

cold and frozen storage, freezing and thawing techniques, basic principles of dehydration, drying and dehydration methods, drying and processing of figs, sultanas, apricots, tomatoes etc., organic foods.

Textbook

- ❖ Meyve ve Sebze İşleme Teknolojisi, B. Cemeroğlu, F. Karadeniz ve M. Özkan. Gıda Teknolojisi Derneği Yayınları No:28, Ankara, 2003

GM-311 CEREAL AND MILLING TECHNOLOGY (2-2) 3

Bread production technology (basic ingredients, minor and other ingredients, bread production processes, bread production methods, bread types, bread faults); Macaroni production technology; Bulgur production technology; Biscuit production technology; Cracker and cake production technology; Starch, dextrose and glucose production technology; Breakfast cereals; Evaluation of other cereals (barley, rye, oat, corn, rice)

Textbook

- ❖ Tahıl İşleme Teknolojisi, Prof. Dr. Adem ELGÜN Prof. Dr. Zeki Ertugay Atatürk Üniversitesi Ziraat Fak Yayınları No:297

Supplementary textbook

- ❖ Öğütme Teknolojisi Prof. Dr. Hazım Özkaya Prof. Dr. Berrin Özkaya Gıda Teknolojisi Derneği Yayınları No:30

GM-313 VEGETABLE OIL TECHNOLOGY (2-0) 2

Oil-bearing materials, Handling and storage of oil-bearing materials, Preparatory treatments (cleaning, dehulling and separating processes, delinting, flaking, cooking), Mechanical oil extraction, Solvent extraction, Refining (degumming, neutralization, bleaching, deodorization, winterization), Quality control of the refining operation, Fat-modification processes (hydrogenation, interesterification, fractional crystallization), Production of margarines, Olive oil technology.

Textbook

- ❖ Bitkisel Yağ Teknolojisi, S. Nas, H.Y. Gökalp, M. Ünsal, Pamukkale Üniversitesi, Mühendislik Fakültesi Ders Kitapları, Denizli, 1998.

Supplementary textbook

- ❖ Modifiye Yağlar ve Üretim Teknolojileri, M. Kayahan, METU Pres, Ankara, 2002.
- ❖ Yağlı Tohumlardan Ham Yağ Üretim Teknolojisi, M. Kayahan, TMMOB Gıda Mühendisleri Odası Kitaplar Serisi, Ankara, 2006.
- ❖ Rancidity in Foods”, J.C. Allen, R.J. Hamilton, Elsevier Science Publishers LTD, England, 1989.

GM-315 FOOD INDUSTRY MACHINES (2-0) 2

Basic properties of foods and basic principles in processing; Raw material processing machines; Package and packaging machines; System cleaning; Automation; Plant establishment techniques.

Textbook

- ❖ Gıda Endüstrisi Makineleri, Saldamlı, İlbilge ve Engin Saldamlı, Ankara, Savaş Yayınevi, 2004.

6. SEMESTER**GM-302 INSTRUMENTAL FOOD ANALYSES (2-2) 3**

Laboratory experiments for proximate analysis of foods (moisture, ash, fat, protein, sugar, starch), analysis of food additives (colorants, nitrite, etc.) and quality tests (peroxide, acidity, etc.), application of chemical, physical, instrumental, chromatographic and enzymatic methods used in food quality control. Course is supported with projects.

Textbook

- ❖ Enstrümental Analiz, Gündüz T., Bilge Yay., Ankara, 1990.
- ❖ Enstrümental Analiz Yöntemleri, Yıldız, A., Genç, Ö. ve Bektaş, S.. 2. Baskı, Hacettepe Üniv. Yayınları A-64. Ankara, 1997.
- ❖ Enstrümental Gıda Analizleri-I. Hışıl, Y.. E.Üniv. Müh. Fak. No:30. İzmir, 1994
- ❖ Enstrümental Gıda Analizleri-II. Hışıl, Y. E. Üniv. Müh. Fak. No:31. İzmir, 1994.
- ❖ Gıda Analizleri. Yetim, H. GM-316. Ders Notları Atatürk Üniversitesi Ziraat Fak. Erzurum, 2000.

Supplementary textbook

- ❖ Gıda Maddeleri Muayene ve Analiz Yöntemleri Kitabı. Anonim, Tarım Orman ve Köy İşleri

Bakanlığı Gıda İŖi. Gen. Md. Genel Yayın No. 65, 62-105, Ankara, 1983.

- ❖ Kantitatif Analiz Laboratuvar Kitabı. Gndz, T. Bilge Yay. Ankara, 1997.
- ❖ Laboratuvar Tekniđi. KeleŖ, F. Atatrk niv. Ziraat Fak. Erzurum, 1986.
- ❖ Laboratuvar Tekniđi. Trker. İ. A. niv. Ziraat Fak. No: 381. Ankara, 1992.
- ❖ Modern Nkleer Manyetik Rezonans Spektroskopisi ve Uygulamaları. Yelekçi. K. Marmara niv. Fen Ed. Fak. No: 516, İstanbul, 1991.

GM-304 FOOD ENGINEERING UNIT OPERATIONS II (2-0) 2

Examples of heat and mass transfer processes; gas absorption, distillation and its applications, leaching and its applications, evaporation and evaporators, crystallization and crystallizers, humidification and dehumidification, drying methods and driers.

Textbook

- ❖ Gıda İŖleme Mhendisliđi II, Grses, .L., Ankara niversitesi Ziraat Fakltesi Yayınları: 963., 1986.

GM- 306 DAIRY PRODUCTS PROCESSING ENGINEERING (2-2) 3

Drinking milk technology; Cheese making technology; Yogurt making technology; Cream and butter processing technology; Concentrated and dried milk technology; ice cream making technology.

Textbook

- ❖ St iŖleme teknolođisi, Prof. Dr. Mehmet Demirci ve Prof. Dr. Osman ŖimŖek
- ❖ St ve Mamulleri Analiz Yntemleri, Prof. Dr. Mustafa Metin, Doç. Dr. Gl Figen ztrk, Ege Meslek Yksek Okulu Basımevi, İzmir, 2002.

Supplementary textbook

- ❖ St Teknolođisi, Prof. Dr. Mustafa Metin, Ege niversitesi Mhendislik Fakltesi Yayınları, İzmir, 2003.
- ❖ St ve Mamulleri Muayene ve Analiz Metotları Rehberi, Prof. Dr. Ahmet Kurt, Prof. Dr. Songl akmakçı, Prof. Dr. Abdullah ađlar.

GM-308 MEAT PRODUCTS PROCESSING ENGINEERING (2-2) 3

Meat; Oil and additives; Curing and cured meat products; Emulsion meat products; Fermented meat products and Sucuk; Kavurma; Pastırma; Canned meat; Basic machines is

used in process; Smoking; Hygiene and sanitation in meat industry.

Textbook

- ❖ Et Ürünleri İşleme Mühendisliği, H.Y. Gökalp, M. Kaya, Ö. Zorba, Atatürk Üniversitesi Yayınları No:786, Ziraat Fakültesi yayım No: 320, Erzurum, 2004.

Supplementary textbook

- ❖ Meat Processing, J. Kerry, J. Kerry, D. Ledward, woodhead publishing Limited, İngiltere, 2000.
- ❖ Handbook of Fermented Meat and Poultry, F. Toldra, Blackwell Publishing, 2007

GM- 310 BEVERAGES TECHNOLOGY (2-2) 3

Introduction to fruit juice technology, nectar and drink technology, fruit juice and pulp yield of fruits, international fruit juice standards, pretreatments of fruits, pressing and pulp production, pretreatment of mash, clarification, deaeration and homogenization, concentration and storage, reconstitution and thermal treatment, packaging (bottling and aseptic packaging) and storage, manufacturing of other soft drinks, quality defects of fruit juices and other soft drinks.

Textbook

- ❖ Meyve Suyu Üretim Teknolojisi, B. Cemeroglu, ve F. Karadeniz, Gıda Teknolojisi Derneği Yayınları No:25 Ankara, 2001

Supplementary textbook

- ❖ Meyve ve Sebze Suyu Teknolojisi (Handbuch der Lebensmitteltechnologie, Frucht-und Gemüsesäfte ve Ulrich Schobinger tarafından hazırlanan kitabın çevirisi). Acar, J., Basım-Grafik Matbaası, Ankara, 1990.

GM-312 CEREAL PRODUCTS PROCESSING ENGINEERING (2-2) 3

The importance of physical, chemical and technological criteria of wheat varieties. Design of wheat/flour mixture. Design of wheat tempering. Determination of cleaning and milling capacities of the miller. Milling design of flour for bread-making and special type of flours. Production design of bread according to bread type and weight. Additives in bread-making industry. Importance of raw material, product weight and package material in bread-making. New technologies in pasta industry. New technologies in biscuit industry. Comparison of the traditional and novel production technologies of Bulgur.

Textbook

- ❖ Tahıl İşleme Teknolojisi, A.Elgün, Z. Ertugay, Atatürk Üniv. Ziraat Fak. 2006
- ❖ Baking Science and Technology, E.J.Peyler

Supplementary textbook

- ❖ Pratical Baking, William J. Sultan. 1969
- ❖ Techhology of Cereals, N.L.Kent
- ❖ Wheat Chemistry and Technolgy, Y.Pomeranz
- ❖ Hububat Teknolojisi, S.T.Tekeli

GM-314 FOOD BIOTECHNOLOGY (2-2) 3

Introduction to the basic concepts of biotechnology and fermentation, and their application's area, raw materials for fermentation, classification of microorganisms and microbial growth. Production of food and food ingredients through fermentation processes. Aerobic and anaerobic systems. Enzymes; structure and activity of enzymes, and application areas. Engineering principles of baker's yeast, pickles and olives, industrial enzymes, flavorings, vitamins, alcoholic beverages, high fructose corn syrup (HFCS), organic acid and amino acid production.

Textbook

- ❖ Biyoteknoloji, Prof. Dr. Mustafa Arda, KÜKEM Derneği Bilimsel Yayınları No:2, 1994.
- ❖ Biyoteknoloji, Prof.Dr. Zeki Ertugay-Prof. Dr. Muharrem Certel Atatürk Üniv. Ziraat Fak. Yayınları, 1995.
- ❖ Biyogüvenlik ve Biyoteknoloji, Prof. Dr. R. Şeminur Topal, 2006. **Supplementary textbook**
- ❖ Biotechnologie mit Pilzen-Eine Einführung, M. Wainwright, Springer-Verlag Berlin Heidelberg, 1992.
- ❖ Biotechnologie in der Lebensmittel-industrie, M.P. Tombs, Springer-Verlag Berlin Heidelberg, 1990.

7. SEMESTER

GM-401 FOOD ADDITIVES AND TOXICOLOGY (2-0) 2

General information on toxicology and toxins, branches of toxicology, classification of toxins, toxic doses, toxication, mechanism of toxic effects, mutagens, carcinogens, and teratogens in foods, toxicity tests-acute, sub-acute, chronic toxicity tests, end-points of assessment in food toxicology- NOAEL, ADI, MTD values, inherent toxicants in foods- definition, classification, toxic effects, food contaminants- definition, classification, toxic effects,, food additives- definition, classification, safety and legal aspects, functions, common uses.

Textbook

- ❖ Gıda Katkı Maddeleri (6. Baskı), Prof. Dr. Songül Çakmakçı, Atatürk Üniversitesi Ziraat Fakültesi Yay. No:164, Ziraat Fak. Ofset Tesisi, Erzurum, 2007.

Supplementary textbook

- ❖ Furia, T.E. Handbook of Food Additives, 2 nd ed. CRC, Cleveland.
- ❖ Altuğ, T. Gıda Katkı maddeleri, META Basım, Bornova, İzmir, 2001,

GM-405 PLANT MANAGEMENT (3-0) 3

Introduction to management, , the objective of the firm, the cost concepts and analysis, production, productivity, layout patterns, control tools for production, location of the plant, time value of money, determining of credit, entrepreneurship, benchmarking, project management, management by objectives.

Textbook

- ❖ İşletmelerde Yönetim ve Organizasyon, İsmail Elif, Alfa Basım Yayım Dağıtım.

GM-403 FOOD AND NUTRITION (2-0) 2

What is food made of; The role of production and processing operations; The significance of food composition; Nutrients, carbohydrates, lipids, proteins, other energy yielding components, fiber, minerals, vitamins, other beneficial components; Their chemical nature and role in the body; Nutrition labeling and chemical composition, nutrition claims; Technological factors in development of low-calorie foods.

Textbook:

- ❖ Beslenme, Prof.Dr. Mehmet Demirci, Rebel Yayıncılık, Tekirdağ, 2003.
- ❖ Beslenme, Prof.Dr. Ayşe Baysal, Hatiboğlu Basım, Ankara, 2007.

Supplementary textbook

- ❖ Besinler ve Beslenme, Hikmet Yaşar, Suat Melek, Ankara, 2003.
- ❖ Genel Beslenme Bilgisi, Prof.Dr. Ayşe Baysal, Hatiboğlu Basım, Ankara, 1985.

GM-407 SPEAKING AND PRESENTATION SKILLS (2-0) 2

Communication: Basic Communications Skills, Kinds of Communications, Rules of Effective Communication. Target Groups of Public Relations: Media, Employee, General Public, Competitive, Government, Financial Groups. Methods of Public Relations: Sponsorship, Media Relationship, Seminars, Trade fairs, Public Relations Campaign Planning Model.

Textbook

- ❖ Temel Konuşma Teknikleri ve Diksiyon, Sırrı Er, Hayat Yayınevi, 2009.
- ❖ Diksiyon / Güzel Konuşma Sanatı, Suna Okur, Lamia Yayınları, 2008.

Supplementary textbook

- ❖ Furia, T.E. Handbook of Food Additives, 2 nd ed. CRC, Cleveland.
- ❖ Altuğ, T. Gıda Katkı maddeleri, META Basım, Bornova, İzmir, 2001,

GM-400 GRADUATION EXERCİSE (ANNUAL) (0-2) 0

Students will do the research work for the Graduation Project. The topics are suggested by any professor and carried out under his/her supervision. The student may apply for the topics.

7. SEMESTER ELECTIVE COURSES

MEAT PLANT ESTABLISHMENT AND ORGANIZATION (2-0) 2

General conditions of meat plants in Turkey; Meat plants that should be taken into account in establishing the basic criteria; General features and definitions about meat plants; Functions and importance of meat plants; General features and units of meat plants; Slaughterhouse and meat combines design specifications; cattle and sheep slaughter hall design; slaughtering, maturation, storage, meat processing and quality control units; Definitions of tools and equipment used in meat industry and their technical properties; Red and poultry meat and meat products manufacturing plants plan, establishment.

Textbook

- ❖ Et Ürünleri İşleme Mühendisliği. H.Y. Gökalp, M. Kaya, Ö. Zorba, Atatürk Üniversitesi Ziraat Fakültesi Yayın No: 320., Erzurum, 2004.
- ❖ Et Bilimi ve Teknolojisi, Öztan, TMMOB- Gıda Mühendisleri Odası Yayınları, Kitaplar Serisi yayın No:1., Ankara, 2005.

Supplementary textbook

- ❖ Kırmızı et ve et ürünleri üretim tesislerinin çalışma ve denetleme usul ve esaslarına dair yönetmelik. Tarım ve Köy İşleri Bakanlığı, 2005.
- ❖ Kanath et ve et ürünleri üretim tesislerinin çalışma ve denetleme usul ve esaslarına dair yönetmelik. Tarım ve Köy İşleri Bakanlığı, 2005.

DAIRY BY-PRODUCTS PROCESSING ENGINEERING (2-0) 2

Introduction to the evaluation of dairy by-products; Usage areas of whey; Industrial evaluation of whey; Lactose production from whey; Use of whey in various foods; Various beverages production from whey; Lactic acid production from whey; Curd production from whey; Purification of whey from minerals by electro dialysis; Production of dairy protein products; Production of casein; Production of co-precipitate; Production of lactoalbumin; Functional properties of milk proteins; Usage areas of milk proteins.

Textbook

- ❖ Süt Esası Ürünler Teknolojisi, Prof. Dr. Asuman Gürsel

TEA PROCESSING TECHNOLOGY (2-0) 2

Tea biochemistry and processing; Processing of black tea; Tea withering; Curling; Fermentation (Enzymatic oxidation); Drying; Classification and grading of tea; Green tea production; Quality control.

Textbook

Çayın Biyokimyası ve İşleme Teknolojisi, Burhan KACAR, Çaykur Yayını No:6 Ankara, 1987.

SUGAR AND CANDIED PRODUCTS TECHNOLOGY (2-0) 2

State of sugar industry in Turkey; Anatomy of sugar beet and sugar cane; Sugar production from sugar beet and sugar cane; Cocoa and chocolate technology; Confectionery Technology; Confectionery components; Some varieties of candy and production methods; Jam; Marmalade; Halva; Molasses; Component of honey and its effects on health; Turkish delight production.

Textbook

- ❖ Özel Gıdalar (Şeker, Kakao ve Çikolata, Şekerleme, Çay, Kahve) Teknolojisi, Ali Altan. Ç. Ü. Ziraat Fakültesi Genel yayın No: 178. Ders Kitapları yayın No: A-55.

Supplementary textbook

- ❖ Meyve ve Sebze işleme Teknolojisi, Bekir cemeroglu, Feryal Karadeniz, Mehmet Özkan. Gıda teknolojisi Derneği Yayınları. No: 28. Ankara.

FOOD SAFETY (2-0) 2

Food hygiene and sanitation, food and food poisoning, microorganisms that cause infections and intoxications, personal hygiene, kitchen hygiene, food plants hygiene, cleaning of food plants, disinfection of food plants, Hygiene and sanitation of equipments and systems, *Legionella* control and precautions to be taken, possible food poisoning and the path to be followed, pest control, hygiene control list, ISO 2200 applications.

Textbook

- ❖ Auditing in the Food Industry; from safety and quality to environmental and other audits, Dillon, M., Griffith, C., CRC Pres & Woodhead Publishing Ltd., 2001.

WATER IN FOOD ENGINEERING (2-0) 2

Importance of water in human life; Origin of water; Water requirement; functions of water in organism; Reasons of water pollution; physical, chemical and microbiological properties of water; quality properties of drink water; source of drink and utility water; water purification methods; specifications of water in food industry; national and international drink and utility water Standard; between water activity and foods relationship.

Supplementary textbook

- ❖ Wasserversugung, R. Karger, F. Haffman, C. Landwehr, Wieweg+Teubner Verlag, Wiesbaden, 2008.
- ❖ Wasseroufbereizung, S. Wilhelm, Springer-Verlag, Berlin, Germany,2008.

CONVENIENCE FOODS TECHNOLOGY(2-0) 2

Food industry and sanitation, microorganisms of special interest; Cleaning procedures and cleaning agents; Disinfection and disinfectants; Cleaning and disinfection procedures; Sanitation equipment and systems; special considerations for sanitation procedures; Personnel hygiene; solid waste disposal; pest management; Water and air

hygiene.
<p>Textbook</p> <ul style="list-style-type: none"> ❖ Toplu gıda tüketimi yapılan kuruluşlarda insangücü verimliliğini artırmaya yönelik beslenme teknikleri. Milli Prodüktivite Merkezi Yayınları:325, Ankara, 1989. ❖ HACCP in der Praxis, H.J., Sinell, H.Meyer. Behr's Verlag, Hamburg, 1996.
<p>Supplementary textbook</p> <ul style="list-style-type: none"> ❖ Meyve ve Sebze işleme Teknolojisi, Bekir cemeroğlu, Feryal Karadeniz, Mehmet Özkan. Gıda teknolojisi Derneği Yayınları. No: 28. Ankara.
<p>FOOD MICROBIOLOGY II (2-2) 3</p>
<p>Vegetable originated foods, animal originated foods, canned foods, fruit juices and concentrates, non alcoholic drinks, oils and fats, spices and salts, drinking water, microorganisms used in food fermentation, food fermentation, usage of microorganisms in the organic acid-enzymes-vitamin production, indicators for microbial degradation of foods, sampling for microbiological analysis, traditional methods of microbiological analysis of food, food safety and quality management systems.</p>
<p>Textbook</p> <ul style="list-style-type: none"> ❖ Jay, J. M., "Modern Food Microbiology" AVI book, New York, (1992).
<p>ENERGY ANALYSES AND MANAGEMENT IN FOOD PLANTS (2-0) 2</p>
<p>Plant foundation studies; Operating functions of production; Management structure of plants; Management accounting; Business preliminary study and planning; Charge systems and managements; Usage of direction-action research in management; Statistical analyses methods for management.</p>
<p>Textbook</p> <ul style="list-style-type: none"> ❖ Sanayide Enerji Yönetimi ve Tasarrufu, İbrahim Kavrakoğlu, İstanbul, 1983.
<p>FOOD ECONOMICS (2-0) 2</p>
<p>Basic concepts in economics; problems of economic organization. Supply and demand, utility and consumer behaviors, price and elasticity. Production and marginal products; cost theory and decision of the firm. Perfect and imperfect competition,</p>

measurement of national output and income.

Textbook

- ❖ Genel Ekonomi Ders Notları, Editör: Fahri YAVUZ, 2008.

Supplementary textbook

- ❖ İktisadın ABC'si, M İlker Parasız, Ezgi Kitabevi Yayınları.
- ❖ Mikroiktisat, Muammer Yaylalı, Beta Basım yayım Dağıtım A.Ş., İstanbul, 2004.
- ❖ Makro İktisat, Aziz Köklü, Sevinç Matbaası, Ankara, 1984.

SENSORIAL ANALYSES (2-0) 2

Sensory Quality Characteristics, Definition Of Sensory Evaluation, Sensory Evaluation Laboratory, Selection Of Panelists in Sensory Evaluation, Discriminative Tests, Scalar Used in Sensory Evaluation, Descriptive Tests, Flavor Profile Analysis, Texture Profile Analysis, Analysis Of Consumer Preferences

Textbook

- ❖ Sensory Analysis of Dairy Product. Body Field, TP. 1986.

8. SEMESTER

GM-402 FOOD PACKAGING (3-0) 3

Definitions of packaging and expectations from packaging, Choice of food packaging materials, Paper and paper based packaging materials, cardboard and pasteboard boxes, Glass packaging, wood packaging and aluminum packaging, Tinplate packaging and production of tinplate box, Plastics and the plastic materials used in packaging, Multilayer packaging and covering processing and variety of covering processing, Suggestion of packaging according to product properties, Using of preservative gases in packaging, Barcode system and aseptic packaging, Odor problems of packaged foods, Plastic packaging and relations of health-environment, Safety and Legislative Aspects of Packaging.

Textbook

- ❖ Gıdaların Ambalajlanması, Üçüncü, M., Ege Üniversitesi Basımevi, 2000.
- ❖ Gıdaların Ambalajlanması, Üçüncü, M., Ege Üniversitesi Basımevi, 2000.

Supplementary textbook

- ❖ Gıda Ambalajlama İlkeleri, Fevzi Keleş, Atatürk Üniversitesi Ziraat Fakültesi Ofset Tesisi No:189, Erzurum, 2008.
- ❖ Gıda Maddelerinin Ambalajlanması, Üçüncü, M., E. Ü. Müh. Fak. Gıda Müh. Böl. Yayın No: 66, İzmir, 1989.

GM-404 FOOD LEGISLATION AND QUALITY CONTROL (3-0) 3

The content of the course are; the basics of the law, food law and food regulation, the need for food control and the organization of the food control system, presentation of the Turkish Food Law and Regulations, international food regulation.

Textbook

- ❖ Anon., Türk Gıda Mevzuatı, Globus Dünya Basımevi, İstanbul, 2003.
- ❖ Boutrif, E., The new role of Codex Alimentarius in the context of WTO/SPS agreement, Food Control, 14:81-88., 2003.
- ❖ Türk Gıda Mevzuatı, Sağlam F.Ö., ÇEV-SAĞ Yayınları, Ankara, 1999.

Supplementary textbook

- ❖ Gıda Kalite Kontrolü, Prof.Dr.Tomris Altuğ, 2000.

GM-406 NEW PRODUCT DEVELOPMENT (2-0) 2

Pulsed electric field technology; High Pressure processing; Magnetic field; Infrared; Radio frequency; Ohmic heating; Irradiation; Ultraviolet light; Ultrasound; Non-thermal processing; Super critical fluid extraction; Microwave technology; Predictive microbiology

Supplementary textbook

- ❖ Lebensmittel-technologie, R. Heiss, Springer-Verlag Berlin,1996.
- ❖ Die Wärmebehandlung von Fleischwaren, J.E. Reichhert, Hans Holzmann Verlag, Bad Wörishofen, Germany, 1995.

GM-408 BASIC CONCEPTS OF LAW (2-0) 2

Defining law: characteristics which distinguish legal rules from other social rules;

branches of law, sources of Turkish positive law: statute law, traditional law, judicial decisions and interpretation. Persons and personality in law; legal persons, the beginning and the end of the personality, persons as subjects of rights and their legal capacity of act, the protection of personality. Rights: kinds of rights; acquisition, usage, and loss of rights. Legal events: legal actions and their results. Obligations: sources and types of obligations; torts.

Textbook

- ❖ İş Kanunu Kitabı

