Department of Food Engineering

COURSE DESCRIPTIONS

Contents

SEMESTER 1

MATH113 – Mathematics I (3+2):
Functions and Their Graphs, CombiJring Functions; Shifting and Scaling Graphs, Trigonometric Functions. Rates of Change and Tangents to Curves, Limit of a Function and Limit Laws, The Precise Definition of a Limit, One-Sided Limits, Continuity, Limits Involving Infinity; Asymptotes of Graphs. Tangents and the Derivative at a Point, The Derivative as a Function, Differentiation Rules, The Derivative as a Rate of Change, Derivatives of Trigonometric Functions, The Chain Rule, Implicit Differentiation, Related Rates, Linearization and Differentials. Extreme Values of Functions, The Mean Value Theorem, Monotonic Functions and the First Derivative Test, Concavity and Curve Sketching, Applied Optimization, Antiderivatives. Area and Estimating with Finite Sums, Sigma Notation and Limits of Finite Sums, The Definite Integral, The Fundamental Theorem of Calculus, Indefinite Integrals and the Substitution Method, Substitution and Area Between Curves, Volumes Using Cross-Sections, Volumes Using Cylindrical Shells, Arc Length, Areas of Surfaces of Revolution. Inverse Functions and Their Derivatives, Natural Logarithms, Exponential Functions, Indeterminate Forms and L'Hopitai's Rule, Inverse Trigonometric Functions, Hyperbolic Functions.

ATA111 – History of Turkish Revolution I (2+0):
The aim of the renovation and related topics, The decline and fall of Ottoman Empire, The First World War, Mondros and Sevr Agreement, Atatürk and the organization of the National Struggle, The last Ottoman Parliament and the proclamation of Misak-ı Milli , The establishment of Turkish Grand National Assembly.

CHM101 – Chemistry (3+0):
Properties of Matter, Fundamental Laws Of Chemistry, The Atomic Theory, Electron configuration, The concept of the mole, The Periodic Table, Chemical Compounds, Thermochemistry-enthalpy-entropy,internal energy , Solutions and their physical properties, Chemical Kinetics-Determination of the rate of reaction, Chemical equilibrium, Acids and Bases, Electrochemistry, Batteries and Electrolysis, Redox reactions.

PHYS113 – Physics I (2+2):
Vectors. Kinematics. Newton's Law of Motion. Work and energy. Conservation of energy. Linear momentum and its conservation. Rotation of rigid bodies about a fixed axis. Rotational kinetic energy.

FDE141 – Chemistry Laboratory (0+2):
This course is designated to enable the practice of the basic principles and theories in chemistry and to provide the essential knowledge in order to write a technical report based on observations, calculations and conclusions.

TRD111 – Turkish I (2+0):

What is language? Importance of language and its place in a nation's life, language-culture relationship. Definition of grammar, function of grammar and departments of grammar. Phonetics: sounds and audio features of Turkish. Morphology; formal properties of Turkish (roots-adds). Words and word phrases. General information about composition, subject, perspective, ideas, main and ancillary ideas, paragraphs, intellectual order. Written expression, paragraph, the content and types (entrance, development and conclusion paragraphs). Expression forms, explanatory, descriptive, argumentative, narrative expression. Written expression; petition writing, quoting, footnotes and bibliography writing. Oral expression; speech and speech types (prepared speeches, panel, and discussion policies). Literary types; artistic (poetry, short stories, novels, theater and intellectual (articles, paragraphs, essays, criticism, interviews…). Reading and studying the works that about literature and idea world. Analyzing an editing text (story, novel, theater).

Foreign Language Elective (2+2):

Every semester various foreign language classes (i.e. German, Russian, Chinese, Arabic, and advance English) offered at the university. Students can select the language of interest.

University Elective (3+0)

BST251 – E-Trade:

Digital world developments, e-commerce definition and scope, objectives, e-commerce models, types, e-marketing, permission marketing, social media, e-commerce planning, e-commerce applications, e-commerce and security, e-commerce and recognition.

UYG107 – History of Civilization:

In this course, starting from hunting and gathering in the course of the Sumerians, the Egyptian civilization, the Greek civilization as an important step in the history of civilization are introduced. Roman Empire, Christianity, Martin Luther and Protestantism European geography on effects, new age philosophy, the Age of Discoveries, the European Renaissance, European Enlightenment, German Romanticism, the Industrial Revolution, colonialism, Orientalism and Ottoman culture, Ottoman modernization and national identity in the construction quest issues will continue . Specified periods of art, literature, philosophy, science, religion, important developments in the fields of the 21st century to be examined. Read key texts discussed. Students to broaden intellectual perspectives and different information fields to be presented in a holistic manner.

SYT003 – Tennis:

The course content of the general characteristics of tennis, history of tennis, rules, strokes are related.

PSI105 – Behavioural Science:

Introduction to basic concepts of psychology, psychology of work areas at the entry level examination.

MATH114 – Mathematics II (3+2):
Integration by Parts, Trigonometric Integrals, Trigonometric Substitotions, Integration of Rational Functions by Partial Fractions, Improper Integrals. Sequences, Infinite Series, The Integral Test, Comparison Tests, The Ratio and Root Tests, Alternating Series, Absolute and Conditional Convergence, Power Series, Taylor and Maclaurin Series, Convergence of Taylor Series. Three-Dimensional Coordinate Systems, Vectors, The Dot Product, The Cross Product, Lines and Planes in Space, Cylinders and Quadric Surfaces. Functions of Several Variables, Limits and Continuity in Higher Dimensions, Partial Derivatives, The Chain Rule, Directional Derivatives and Gradient Vectors, Tangent Planes and Differentials, Extreme Values and Saddle Points, Lagrange Multipliers. Double and Iterated Integrals over Rectangles, Double Integrals over General Regions, Area by Double Integration, Double Integrals in Polar Form, Triple Integrals in Rectangular Coordinates, Triple Integrals in Cylindrical and Spherical Coordinates, Substitutions in Multiple Integrals.

ATA112 – History of Turkish Revolution II (2+0):
The Eastern Front, The struggle with Armanians and Gümrü Agreement, The Western Front, The Wars of İnönü, Sakarya and Dumlupınar, Mudanya Agreement and the end of sultanate, Lozan Peace Conference and the establishment of Republic, The New Republic, The opposition and Progressive Republican Party, The renovations in education and culture, The Mousul question, The experiment of Multiparty systemLiberal Republican Party.

CMPE152 – Computer Programming (2+2):
Computer architecture, RAM structure and structural programming concept. C Programming Language :Fundamentals, data types, control statements, loops, string functions, array manipulations, procedures, functions, units and recursion. Sort and search algorithms. Basic file applications. Dynamic variables and elementary data structures (Pointer, Stack, Queue, Linked list).

PHYS114 – Physics II (2+2):
Charge and matter. The electric field. Gauss' Law. Electrostatic potential. Capacitance. Current and resistance. Electromotive force and circuits. RC circuits. The magnetic field. Ampéré's law. Faraday's Law of Inductance.

FDE102 – Food Engineering Survey (1+0):
Scope of food engineering, food components, food spoilage, introduction to basic food processes, food quality, food safety, contemporary issues, engineering ethics, technical trips to food factories, invited guest speakers from industry.

TRD112 – Turkish II (2+0):
The place of Turkish language among the world languages, alphabets that Turks are used. The historical development of Turkish language, dialects of Turkish language. Turkish's syntax features, sentence analysis studies. Etymology, Semantics I (basic meanings,

connotations) and Sense Events (meaning contraction, meaning expansion, meaning shift), Words' meaning relationship. Semantics II, metaphors, transfers (name transfer, phrase transfer) words, idioms, proverbs, slogans and terms. Expression (language) mistakes and applications. Oral expression, speech and speech types (panel, discussion principles). Written expression; business letters, minutes, report and news writing techniques. Ways to improve thinking in the paragraph, identification, sampling, comparison, utilization of numerical data, producing a witness. Literary types; artistic(poetry, short stories, novels, theater) and intellectual (articles, paragraphs, anecdotes, essays, criticism, travel, biography, memoirs, letter…) Reading and studying the selected sample texts from the literature and idea world. Reviewing a scientific text.

Foreign Language Elective (2+2):
Every semester various foreign language classes (i.e. German, Russian, Chinese, Arabic, and advance English) offered at the university. Students can select the language of interest.

CLP001 – Career and Life Planning (0+2):
Professional and personal development, seminars, workshops, specialized certification programs, industry and business-field demonstrations, meetings with professionals, on-site training sessions, social-sporting events.

SEMESTER 3

MATH215 – Mathematics III (2+2):
Systems of linear equations; Solution sets of linear equations; Linear dependence and independence; Matrix Algebra; Inverse of a matrix and its characterization; Partitioned matrices; Determinants and their properties: Calculation of determinants; Column and row expansions; Minor and cofactors and inverse matrix; Cramer's rule; Vector spaces:Subspaces, null spaces and column spaces (Image); Basis and coordinate transformations; Linear transformations and their representations; Representation of coordinate transformation; Eigenvalues and eigenvectors :
Characteristic polynomial and Cayley-Hamilton Theorem; Diagonalization of linear transformations and matrices; Matrix polynomials; Diagonalizaton of symmetric matrices and projections; Generalized eigenvectors and eigenspaces; Inner product spaces : Orthonormal sets, Gram-Scmidt process; Singular value decomposition; Pseudo inverse; Least squares

FDE211 – Organic Chemistry (3+0):
Introduction to Organic Chemistry. A new mechanistic approach to the study of chemical reactions and survey of hydrocarbons, alcohols, esters, aldehydes, ketones, carboxylic acids (and their derivatives), amines. The course emphasizes the fundamental properties of organic compounds.

FDE221 – Transfer Processes in Food Systems (3+0):
Material and energy balances in food and biological systems. Introduction to heat, mass, momentum transfer. Psychrometrics and applications in conditioning of air.

FDE231 – Physical Chemistry (3+0):
Gasses, ideal gasses and real gasses, kinetic theory, Maxwell-Boltzmann Distribution, Transport Properties, The first Law of Thermodynamics, The Second Law of Thermodynamics, Application of the second law to physical and chemical processes, Phases, Chemical Potential, Colligative Properties, Roult and Henry rules, Simple and Complex reaction kinetics, Reaction rate theories, Electrochemistry, Polymers.

Faculty Elective (2+2):

GBE206 – Biomaterials:
Introduction to materials science and engineering, classification of materials. Atomic structure and interatomic bonding: ionic bonding, covalent bonding, metallic bonding, Van der Waals bond. The structure of crystalline solids: crystal structures, crystallographic points, directions and planes, crystalline and noncrystalline materials. Imperfections in solids: point defects, miscellaneous imperfection. Diffusion. Mechanical properties of metals: tensile test, stress-strain relations, brittle behavior, ductile behavior, shear effect, hardness. Dislocations and strengthening mechanisms: recovery, re-crystallization and grain growth. Failure: ductile fracture, brittle fracture, fatigue, creep. Phase diagrams.

<u>Faculty Elective (2+2):</u>

<u>ME201 – Computer Aided Technical Drawing:</u>
Introduction to computer aided technical drawing. Geometrical constructions. Principles of orthographic projection; projection of principal views from three dimensional models. Drawing techniques for basic manufacturing processes and standard features. Projection of third principal view from two given principal views; free hand drawing techniques. Three dimensional drawing techniques; simple shapes, inclined surfaces, skew surfaces. Principles of dimensioning. Principles of sectioning; full and half sections. Further work on sectioning, conventional practices. Solid Drawing.

MATH 216 – Mathematics IV (2+2):

Introduction and Classification of Differential Equations; First Order Differential Equations: Solution of Separable and Linear Differential Equations; Substitution Methods and Exact Differential Equations; Order reduction; Higher Order Differential. Equations:

Linear, homogeneous Equations with Constant Coefficients; Nonhomogeneous Equations and Method of Undetermined Coefficients; Method of Variation of Parameters; Laplace Transform:

Solution of initial value problems; Linear Systems of Differential Equations; Homogeneous Differential equations in R2; Solution via eigenvalues and eigenvectors; Homogeneous Differential equations in R3; Matrix exponential and Fundamental matrix solution; Solution of Nonhomogeneous Equations; Laplace transform methods; Power Series Method: Series Solution Near Ordinary Points; Regular Singular Points; Method of Frobenius

FDE232 – Thermodynamics (3+0):

Introduce the student basic concepts of thermodynamics; such as properties of pure substances with phase changes, energy transfer by heat, work and mass, 1st Law of Thermodynamics in open and closed systems, 2nd Law of Thermodynamics, and Entropy. This course is designated to provide the knowledge necessary to move from the role of a student to that of an engineer. The focus is directed toward the legal, ethical and professional responsibilities of an engineer.

FDE212 – Biology (2+2):

Includes organization of living matter, metabolism, reproduction, genetics, evolution and ecology. An introduction to the study of life with emphasis on basic concepts: energy relationships, cell biology, physiology, genetics, development, ecology, and evolution.

MATH265 – Probability and Statistics (3+0):

Set Theory, Random Variable, Sample Space, Important Theorems on Probability, Conditional Probability, Bayes' Theorem, Tree Diagrams, Permutations, Combinations, Binomial Coefficients, Stirlings Approximation,Discrete and Continuous Probability Distributions, Mathematical Expectation,Variance and Standard Deviation, Joint Distributions, Normal , Binomial, Poisson, Multinomial, Hypergeometric etc. Distributions

Program Elective (2+0):

FDE214 – Food Engineering Economics:

The role of engineering economy, type of costs and methods of cost predictiın in investment projects, the time value of money, annuities, net present worth and future worth, depreciation, methods for an economic assessment of investment projects(internal-external rate of return, pay back period, benefit/cos analysis, capitalized cost, the consideration of inflation in feasibility reports, after tax cash-flow analysis, risk and uncertainty analysis.

SEMESTER 5

FDE321 – Transport Phenomena I (3+0):
Introduction to momentum transfer, Basic principles of fluid mechanics, properties of fluids, pressure and fluid statics, mass, Bernoulli and energy equations, pipe flow, differential flow analysis. Lab applications: measurement of viscosity, Bernoulli experiment, Reynolds experiment, energy losses in pipes.

FDE325 – Kinetics (3+0):
This course designed to teach students rate of a chemical reaction, kinetics of biological reactions, kinetics of biomass production, substrate utilization and product formation in cell cultures, kinetics of microbial death and enzyme inactivation, kinetics and shelf life of food.

FDE331 – Food Chemistry (2+2):
Comprehensive evaluation of individual components of foods, such as water, carbohydrates, proteins, lipids, enzymes, and vitamins giving particular attention to their chemical structures and reactions and to the role of each component on food quality.

University Elective (3+0):

BST251 – E-Trade:
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For more information and content:
http://bbs.okan.edu.tr/Ders_Plani.aspx?bno=206&bot=94

Foreign Language Elective (2+2):
Every semester various foreign language classes (i.e. German, Russian, Chinese, Arabic, and advance English) offered at the university. Students can select the language of interest.

INT001 – Internship (0+0):
Manufacturing or service sector businesses operating in the recognition of the place, the system described in the course of the investigation, and theoretical knowledge and experience in the application of methods to business.

SEMESTER 6

FDE322 – Transport Phenomena II (3+0):
Heat and mass transfer, basic principles developed and illustrated with problems from food engineering practice, modes of heat transfer: conduction, convection, radiation; conduction: fundamental principles and equations, steady and unsteady conduction; convection: fundamental principles and equations, forced and natural convection; radiation: fundamental principles and equations, radiation heat transfer; mass transfer: fundamental principles, mass diffusion and convective mass transfer.

FDE324 – Process Control (2+0):
Process control in food manufacturing, measurement instruments, control elements: valves, dosage elements, pumps, control systems, symbols, design, pipes.

FDE308 – Food Engineering Operations I (3+0):
This course designed to teach students basic unit operations in food processing such as preliminary preparative operations including cleaning, sorting, grading methods in food industry; size reduction and screening of solids; mixing and emulsification; power consumption in agitation systems; filtration theory and applications; membrane separations; centrifugation theory and applications: separation of immiscible liquids.

FDE304 – Food Quality (3+0):
Quality concept and related definitions; national and international standards and legislation concerning food quality. Quality assurance systems and total quality management in food industries; quality management tools; food safety systems; statistical quality control; quality criteria, their respective limits and quality monitoring systems for different food commodity groups; test methods for food quality control; food traceability and authenticity; relevant ethical issues.

FDE312 – Food Microbiology (3+2):
This course is designed to provide engineering undergraduate students with the basic knowledge about microbiology; microbial physiology and metabolism; human microbial interactions and their outcomes; food as an environment for microbial growth; and current laboratory techniques for the isolation, characterization and identification of microorganisms from various food environment.

FDE306 – Food Legislation (2+0):
This course is designated to provide the knowledge necessary to move from the role of a student to that of a graduate nurse. The focus is directed toward the legal, ethical and professional responsibilities of the nurse in managerial and coordinating roles.

SEMESTER 7

FDE401 – Food Product Development (3+0):
New food product development strategies; creating ideas and assessment, determination of prototype product and its design, assessment of specifications, formulations, process optimization, production, packaging, shelf-life, product-performance tests, tests for end product, marketing strategies, package choice, designing of label, launching and distribution.

FDE445 – Modelling and Design of Biological Systems (3+0):
An introduction of engineering concepts utilized in food systems design. The course includes exercises in problem solving and standard engineering computing techniques.

FDE425 – Food Engineering Operations II (3+0):
This course designed to give students the principles and calculation methods of important food engineering operations, containing heat and mass transfer applications, such as distillation, gas absorption, solid-liquid extraction, evaporation, crystallization, humidification and drying; to give the area of application of this operations in food industry, the information about the equipments used; to carry the students to a level that they can manage the process and equipment design.

FDE497 – Food Engineering Design (0+2):
In this course every student will make design and search literature for their food engineering graduation project in food engineering area to apply their technical knowledge and develop their professional abilities.

BBA222 – Entrepreneurship Applications(2+0):
Principals of entrepreneurship, Strategic management for entrepreneurship, creativity, human resources management and communication for entrepreneurs, Business Planning, Entrepreneurship in Turkey / Success stories.

Program Elective (2+0): 1 course will be selected among the courses listed below.

FDE411 – Fundamentals of Food Marketing:
Gain expertise in food marketing, business management and food product design and development; learn how to identify market niches and work with marketing teams and food technologists to develop products that satisfy consumer needs.

FDE415 – Food Biotechnology:
Introduction basic concepts of food biotechnology, Microorganisms of biotechnological importance: properties; Fermentation technology: production of fermented foods: pickle and olives; meat products; alcoholic beverages; baker's yeast, Production of Single Cell Protein, Single Cell Oil and food ingredients from microorganisms, Utilization of enzymes in food industry; basic immobilization techniques applied to enzymes and microorganisms, Basic concepts in the field of immunology and genetic, Immunological and genetic techniques for food analysis, r-DNA technology: and applications in agriculture and food industry, Detection of genetically modified organisms; discuss with

respect to legal, biosafety and ethical aspects, Plant cell and tissue cultivation, Waste management and food processing.

FDE419 – Food Packaging:
Essential functions of food packaging on food spoilage; Physical, chemical and quality properties, types, and utilization of paper-, glass-, metal- and plastic based packaging materials, multi-layer combination; Examples of food packaging technologies including aseptic packaging and modified atmosphere packaging; Bar-code system in packaging; Packages and recycling; Migration from food packing material to food; Regulations on food packing, food contact material and labelling.

FDE421 – Cereal Technology:
Cereal grains (General composition and structure, utilization), Bread wheat quality, Storage of cereals, Modern milling, Breadmaking technology, Durum wheat quality, Pasta production technology, Soft wheat products, Bulgur production technology.

FDE405 – Food Technology:
This is the capstone course for Food Engineering majors integrating principles of food chemistry, food microbiology, food engineering unit operations and quality control through discussion of food processing operations. Areas covered include processing of cereals, fruit and vegetables, milk, and fats and oils. Chemical, biochemical, physical and microbiological properties of raw materials and their relationship to current processing methods to obtain the desired products will be discussed.

SEMESTER 8

FDE494 – Capstone Design Project (2+4):
A course delaing with general plant design concepts and economic aspects; A plant to produce a food product will be designed in this course.

Program Elective (2+0):
3 courses will be selected among the courses listed below.

FDE408 – Human Health & Nutrition:
This course aims to offer a broad education on how to stay health in today's hectic, fast-paced world. The course discusses life expectancy, healthcare, and individual's dietary needs. It considers the recommended ratio of fats, carbohydrates and proteins in human diet and examines the consequences of dietary imbalances. It is suitable for anyone in healthcare, as a revision aid, and for anybody interested in staying healthy.

FDE412 – Novel Food Technologies:
Introductory course on novel food preservation technologies, such as pulsed electric fields (PEF), high hydrostaci pressure (HHP), ohmic heating, etc.

FDE414 – Risk Evaluation for Foods:
This course provides students with an overview of risk analysis and its role in food hazards. Understanding the food supply chain and the steps involved in food recall will be introduced. The analysis, recognition and management of food hazards and risk will be discussed using case studies.

FDE416 – Food Additives:
Classification of food additives: preservatives, acids, colours, emulsifiers, flavours and flavour enhancers, gelling agents, sweeteners, antioxidants; Legislation used for food additives; Toxicological evaluation of food additives.

FDE418 – Functional Foods:
Classification of functional foods and related definitions; The role of new consumer trends in development of functional foods; Functional food groups according to production methods and to usage purposes; Ingredients used in functional food production; Health related functional foods; Life style related functional foods; Genetically modified functional foods; Bioavailability of nutrients in functional foods; Safety and toxicology of functional foods; Current regulations; Specific production techniques of functional foods; Present market value of functional foods; Potential effects of functional foods on public health; Future prospects for functional foods, new product designs and expected new regulations.

FDE498 – Food Engineering Graduation Project (0+4):
In this course every student will do a project in food engineering area to apply their technical knowledge and develop their professional abilities.