ISTANBUL OKAN UNIVERSITY

COURSE CONTENTS OF INDUSTRIAL ENGINEERING

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COURSE CONTENTS OF INDUSTRIAL ENGINEERING

FIRST YEAR

FALL SEMESTER

MATH113 – MATHEMATICS - I

Functions and Their Graphs, Combiring 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.

IE103 - INTRODUCTION TO INDUSTRIAL ENGINEERING

Overview of the engineering, engineering functions, basic engineering disciplines. Development of Industrial Engineering (IE), definition of IE, study fields of IE, related disciplines. Basic concepts: system, business, business functions, decision making process, productivity, product life cycles, product design, process types, facility location and layout, production planning and control, automation in production systems, work study, total quality management, operations research, project management.

PHYS113 - PHYSICS – I

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.

ATA111 - HISTORY OF TURKISH REVOLUTION - I

This course covers the analysis of the causes and the consequences of the First World War; the searches for independence of the Turkish nation in Anatolia and salvation of the Turkish lands that were occupied after the Armistice of Montrose; the development and activities of Nationalist militias and the societies against them; the evaluation of the congress administrations that were formed after 19 May,1 919 in terms of their form and content; the structure of the Grand National Assembly and the process through which it gained legitimacy; the leadership of Turkish War of Independence; Treaty of Lausanne, and the Establishment of the Republic.

TRD111 - TURKISH – I

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).

CHM103 – CHEMISTRY

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

CLP001 – CAREER AND LIFE PLANNING

Professional and personal development, seminars, workshops, specialized certification programs, industry and business-field demonstrations, meetings with professionals, on-site training sessions, social-sporting events.

SPRING SEMESTER

ATA112 - HISTORY OF TURKISH REVOLUTION - II

Lausanne Peace Treaty resulting success that is being converted to a modern state via announcement of Republic, and being gained to this state a modern, convenient to development identity, and placing Ataturk's Thought System to the memories precisely by the following revolutions of this process, so that our young people are made conscious and durable against to the threats to their personalities and to their countries.

CMPE152 - COMPUTER PROGRAMMING

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

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.

TRD112 - TURKISH - II

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.

MATH114 – MATHEMATICS - II

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 Integration, fundamental theorem integral calculus. Application of definite integrals; area between curves, volumes calculation, lengths of plane curves, area of surfaces of revolution. Transcendental functions; exponential functions, logarithms, hyperbolic functions. Techniques of integration.

ECO102 -MACROECONOMICS

Introduction to elementary economic analysis and its applications. Definition of the main microeconomic and macroeconomic topics, including supply and demand model,costs,market structures,national income, aggregate demand and supply, an introduction to the real economy and money and prices in the long run and some basic concepts about inflation and unemployment trade-off. The material covered in this course will help the student to organize his/her ideas about economics.

This course in economics will include critical issues such as price determination under different market structures, relevance of microeconomic variables to macroeconomic environment, macroeconomic stabilization, distributional equity, the quality of employment, environmental considerations, the adequacy of living standards. This course will cover standard concepts and models, focuses on the crucial aspects of human well-being. The course also includes serious investigation of the environmental impacts of economic growth and the role of unpaid work in economic life.

SECOND YEAR

FALL SEMESTER

MATH265 PROBABILITY AND STATISTICS I
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, industrial applications.

MATH215 – MATHEMATICS - III
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

BBA222 – ENTREPRENEURSHIP APPLICATIONS
Principals of entrepreneurship, Strategic management for entrepreneurship, creativity, human resources management and communication for entrepreneurs, Business Planning, Entrepreneurship in Turkey / Success stories.

ACCA253 - FINANCIAL AND COST ACCOUNTING
Introduction to general accounting, cost concepts and cost types, cost accounting, aims of cost analysis, production costs, standard cost computing, profit function, profit analysis.

SPRING SEMESTER

IE230 – MATERIALS AND PROCESSES IN MANUFACTURING
Materials atomic structure, types, mechanical properties of materials, and all types of manufacturing processes,(Machining, Powder Metalurgy Technique, Welding, Plastic Shaping, casting,)

MATH216 – MATHEMATICS - IV
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

MATH266 PROBABILITY AND STATISTICS II

The relationship among Normal, Binomial, Poisson, Multinomial, Hypergeometric etc Distributions, Population and Sample, Statistical Inference, Population Parameters, Sample Statistics, Sampling Distribution of Means, Sampling Distribution of Proportions, Sampling Distribution of Variances, Frequency Distributions, Statistical Decisions, Statistical Hypotheses, Test of Hypotheses and Significance, Type I and Type II Errors, One Tailed and Two Tailed Tests, Special Test of Significance for Large Samples

ME201 COMPUTER AIDED TECHNICAL DRAWING

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

IE228 ERGONOMICS

Principles of ergonomics and human factors, industrial systems design and management of these principles and their application. Human performance, human-technology interaction, job, work environment and product design, safety and occupational health.

THIRD YEAR

FALL SEMESTER

IE321 - OPERATIONS RESEARCH - I

Definition of operation research, fundamental concepts, basic steps, mathematical model types, deciding process, linear programming and developing linear models. Optimization techniques to solve linear programming models, graphical method, simplex method, dual simplex method, duality and sensitivity analysis.

MATH220 NUMERICAL METHODS

This course is designated to provide the necessary knowledge and skills in analysis of numerical methods to investigate numerical errors, Taylor's theorem, numerical solutions of linear and nonlinear equations, interpolation and curve fitting methods, numerical differentiation and integration, numerical solutions of differential equations.

IE315 – QUALITY ENGINEERING

Quality-Quality Control-Quality Management-Quality Engineering, Total Quality Management, Quality management system standards, Processes-Processes Management-Statistical Processes Control, Processes capability analysis and control schemes, Quantitative control charts, Qualitative control charts, Other special control schemes (CUSUM, EWMA, Regression), Acceptance Sampling, One and two-stage sampling, Multi-stage and serial sampling, Quality improvement – Kaizen and Six Sigma, Quality economics

IE305 - PRODUCTION PLANNING - I

Production systems concepts , production management system and subsystems, production planning activities and periodic classification , demand forecasting notions and techniques aggregate production planning , master production planning , capacity planning, material requirements planning.

IE311 - WORK ANALYSIS AND DESIGN

Work and work systems, worker-workplace-job security, work processes and process arrangement, work sampling , time study, method study, method development, management of process data, numerical indicators in process assessment.

IE367 OCCUPATIONAL HEALTH AND SAFETY

Worker health and safety of the historical development, general information, business security concept, work-related accidents definition, causes and methods of prevention, safety studies, labor productivity in terms of importance, job security studies economic significance, the occurrence of industrial accidents and classification, hazards and dangers varieties accident research methods and solutions.

SPRING SEMESTER

IE322 - OPERATIONS RESEARCH - II

Transportation and assignment problems, definition of integer programming, types and assumptions of integer programming, application areas of integer programming , development of mathematical models of integer programming problem, special constraints using in integer programming, solution techniques of integer programming problems, some examples related with integer programming.

IE318 – ENGINEERING ECONOMY

The role of engineering economy, type of costs and methods of cost predictiin 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

IE306 - PRODUCTION PLANNING - II

Work sequencing and scheduling, assembly line balancing, stock management, enterprise resource planning, supply chain management.

IE308 - SIMULATION

Simulation concept, system simulation, simulation models, discrete event simulation, random number generation, random variables and probability distributions generation, output analysis, simulation language supports.

FOURTH YEAR

FALL SEMESTER

IE419 – FACILITY PLANNING

Structures and classification of production systems , production design, planning of capacity requirements, discrete and continuous layout models, factory planning and work station design facility planning, group technology and cellular design, material handling and storage systems.

IE497 –INDUSTRIAL ENGINEERING DESIGN

In this course which consists of the design of a complex system, process, device or product, within the framework of preferrably a multi-disciplinary engineering problem, under realistic constraints, and taking into consideration social, economic and environmental conditions as well as relevant national and international standards and characteristics of sustainability and manufacturability, without compromising ethical principles, the student is required to document the requirements specification and the design in conformance with international standards.

IE439 – COMPUTER INTEGRATED MANUFACTURING

Management concept and management activities, management levels in enterprises, importance of information, properties and organization, computer aided information systems, properties of information systems, data source management, basic information systems, functional enterprise information systems, information systems according to the responsibility levels, information management, artificial intelligence and management decision supports.

SPRING SEMESTER

IE498 –INDUSTRIAL ENGINEERING GRADUATION PRJECT

This course consists of the implementation based on accessible resources, then testing and validation of the level of satisfaction of the requirements followed by the documentation of all this process in conformance with international standards, and its defense in front of a jury, of a complex system, process, device or product, designed within the framework of preferrably a multi-disciplinary engineering problem, under realistic constraints, and taking social, economic and environmental conditions as well as relevant national and international

standards and characteristics of sustainability and manufacturability into consideration, without compromising ethical principles.

INT001 – INTERNSHIP

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.

INT002 – INTERNSHIP – II

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

SEMINAR

DEPARTMENTAL ELECTIVE COURSES

IE267 SYSTEM DYNAMICS

System structure and its dynamic behavior in order to understand the relationship between modeling and simulation of complex dynamic systems. Dynamic complexity, bounded rationality. The logic of failure. Learning of complex systems. Organisational learning and systems thinking. Continuous time simulation. Feedback and qualitative system dynamics. Stock and flow diagrams for modeling. Modeling methodology. Time delays, coflows, modeling of nonlinear systems. Model verification and validation.

IE269 SCIENTIFIC METHODS IN ENGINEERING

Introduction to Scientific Research Methods. The importance of quantification in research and analysis. The main problems of quantification. The scientific background of a research and analysis in Industrial Engineering topics.

ENG303 PROJECT MANAGEMENT

Project and project management processes, budgeting and cash flow analysis, the project team formation and building, CPM, PERT, GERT scheduling methods, resource constrained project scheduling algorithms, project progress and cost control, new product development project management.

IE390 SPECIAL TOPICS IN INDUSTRIAL ENGINEERING I

Human-machine systems, which are the basic subjects of Industrial Engineering, quantitative methods related to quality, manpower planning, qualification changes in production systems under changing conditions, process analysis and similar subjects.

IE433 SPECIAL TOPICS IN INDUSTRIAL ENGINEERING II

Advanced techniques in man-machine systems, high-level numerical methods related to quality, man power planning with advanced technique, contemporary competitive conditions in production and similar issues will be discussed.

ENG304 TECHNOLOGY MANAGEMENT

General concepts related to technology, Management of technology and science parks, The role of technology in managing information technology, Virtual companies and organizations cyberspace, Technology transfer.

IE426 PRODUCTIVITY MANAGEMENT

Productivity measurement and analysis techniques, effectiveness, performance measurement and evaluation, productivity improvement techniques.

IE425 ENTERPRISE RESOURCE PLANNING

On the basis of business processes in SAP ERP software Sales and Distribution, Materials Management, Production Planning, Financial Accounting, Management Accounting and Human Resources Management application consists of.

IE424 OPERATIONAL STRATEGIC PLANNING

Transferring culture of strategic thinking and strategic act. Creation the consciousness of strategic management process. Instructing the strategic planning process, and strategic planning stages. Instructing internal and external environment analysis. Defining Structure-Conduct-Performance Paradigm. Defining Industry Strategies. Operational Strategic Planning(3-0)3

IE423 HEURISTIC METHODS IN OPTIMIZATION

Common Concepts for Metaheuristics, Optimization Models and Other Optimization Models, Single-Solution Based Metaheuristics: Simulated Annealing Method, Tabu Search, Population-Based Metaheuristics: Evolutionary Algorithms, Swarm Intelligence, Hybrid Metaheuristics, MS. Excel applications of Metaheuristics Methods.

FACULTY ELECTIVE COURSES

ENG301 MANAGEMENT FOR ENGINEERS

Introduction to engineering management, engineering challenges and skills required of managers, organizational dependency, hybrid structures, the planning process, the planning system types, gradual approach, integrated project planning. WBS matrix task, task list, job description, specifications, evaluation and control of engineering activities.

IE302 FUZZY LOGIC AND ITS APPLICATIONS

Introduce fuzzy logic, fuzzy sets and decision making techniques with the fuzzy sets. The course is organized to let students understand the fuzzy set theory, fuzzy decision making techniques and fuzzy modeling.

FOREIGN LANGUAGE ELECTIVE COURSES

CORE201 ACADEMIC READING AND WRITING I

In this course, students write sentences and short paragraphs about writing skills with practice lessons will be logged. Subsequently, descriptive, expository paragraph writing including critical and more complex type will also have the opportunity to experiment. In terms of reading ability, reading strategies will focus on education. Students of different types of parts

and how to scan these parts will be spooned out how they learn. For their writings (source) how to read in order to get information to be made will also be displayed. Student achievement, Midterm Exam (30%), two Text Paper (20%) and final exam (50%) will be assessed on average.

CORE202 ACADEMIC READING AND WRITING II

In this course, students write sentences and short paragraphs about writing skills with practice lessons will be logged. Subsequently, descriptive, expository paragraph writing including critical and more complex type will also have the opportunity to experiment. In terms of reading ability, reading strategies will focus on education. Students of different types of parts and how to scan these parts will be spooned out how they learn. For their writings (source) how to read in order to get information to be made will also be displayed. Student achievement, Midterm Exam (30%), two Text Paper (20%) and final exam (50%) will be assessed on average.

UNIVERSITY ELECTIVE COURSES

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 BEHAVIORAL SCIENCE

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