NEAR EAST UNIVERSITY

FACULTY OF ENGINEERING

INDUSTRIAL ENGINEERING DEPARTMENT

Course Structure Diagram with Course Credits

2021-2022

Courses List with Near East University credits and ECTS

Please see the attached example of the diploma supplement which is given to all graduates of our university free of charge. It is arranged in English.

The diploma supplement is a document the purpose of which is to provide sufficient independent data to improve the international "transparency" and fair academic and professional recognition of qualifications (diplomas, degrees, certificates, etc.). It is designed to provide a description of the nature, level, context, content and the status of the studies that were pursued and successfully completed by the individual named on the original qualification to which this supplement is appended. They are free from any value judgments, equivalence statements or suggestions about recognition

	Basic Departmental Courses Departmental Courses Departmental Elective Courses Non-Departmental Elective Courses		Credit	ECTS	Prerequisite
	Course Code	**Course Name**			
1. YEAR / 1. SEMESTER	PHY101	General Physics I	4	6	-
	CHM101	General Chemistry I	4	6	-
	MTH101	Mathematics I	4	6	-
	ENG101	English I	3	3	-
	IND 101	Fundamentals of Industrial Engineering	3	5	-
	YİT101	Turkish for Foreign Students I	2	2	-
	TUR 101	Turkish Language I	2	2	-
	CAM101	Campus Orientation	0	2	
			20	**30**	

1. YEAR / 2. SEMESTER	PHY102	General Physics II	4	6	PHY101
	MTH102	Mathematics II	4	6	MTH101
	ECC 103	Engineering Drawing	3	5	
	ENG 102	English II	3	3	ENG101
	YİT102	Turkish for Foreign Students II	2	2	YIT 101
	TUR 102	Turkish Language II	2	2	TUR 101
	CAR122	Career Planning	0	2	
	IND 102	Information Technologies for Industrial Engineering	3	6	
			19	**30**	

	Basic Departmental Courses Departmental Courses Departmental Elective Courses Non-Departmental Elective Courses		Credit	ECTS	Prerequisite
	Course Code	**Course Name**			
2. YEAR / 1. SEMESTER	AIT 101	Atatürk Principles and the History of Turkish Revolution I	2	2	-
	AIT 103	Principles of Atatürk and the History of Turkish Revolution I	2	2	
	ECC 101	Introduction to Computers and Programming	3	5	-
	IND 201	Elements of Linear Algebra	3	6	-
	IND 203	Statistics I	3	6	
	IND 205	Production & Operations Management I	3	6	
	NTE	Non-Technical Electives	3	5	
			17	**30**	

2. YEAR / 2. SEMESTER	AIT 102	Principles of Atatürk and Recent Turkish History II	2	2	AIT 101
	AIT 104	Principles of Atatürk and the History of Turkish Revolution II	2	2	AIT 103
	ECC 108	Object Oriented Programming	3	5	
	IND 202	Graphing & Optimization Principles	3	6	-
	IND 204	Statistics II	3	6	
	IND 206	Production & Operations Management II	3	6	
	IND 208	Factory Internship	0	1	
	NTE	Non-Technical Elective	3	4	
			17	**30**	

	Basic Departmental Courses Departmental Courses Departmental Elective Courses Non-Departmental Elective Courses		Credit	ECTS	Prerequisite
	Course Code	**Course Name**			
3. YEAR / 1. SEMESTER	IND 301	Analysis of Service Systems	4	7	
	IND 303	Operational Research I	4	7	
	IND 31X	Technical Elective	3	6	
	IND 31X	Technical Elective	3	6	
	NTE	Non-Technical Elective	3	4	
			17	**30**	
	Basic Departmental Courses **Departmental Courses** **Departmental Elective Courses** **Non-Departmental Elective Courses**		**Credit**	**ECTS**	**Prerequisite**
	Course Code	**Course Name**			
3. YEAR / 2. SEMESTER	IND 302	Entrepreneurship & Innovation	4	5	
	IND 304	Operational Research I	4	6	-
	IND 31X	Technical Elective	3	6	-
	IND 31X	Technical Elective	3	6	-
	NTE	Nontechnical Elective	3	6	-
	IND 306	Service Internship	0	1	-
			17	**30**	

	Basic Departmental Courses Departmental Courses Departmental Elective Courses Non-Departmental Elective Courses		Credit	ECTS	Prerequisite
	Course Code	**Course Name**			
4. YEAR / 1. SEMESTER	IND 401	Transforming Ideas to Projects	4	7	
	IND 403	Auditing Productivity	4	7	
	IND 41X	Technical Elective	3	6	
	IND 41X	Technical Elective	3	6	
	NTE	Non-Technical Elective	3	4	
			17	**30**	
	Basic Departmental Courses **Departmental Courses** **Departmental Elective Courses** **Non-Departmental Elective Courses**		**Credit**	**ECTS**	**Prerequisite**
	Course Code	**Course Name**			
4. YEAR / 2. SEMESTER	IND 402	Strategy of Quality	4	4	
	IND 404	Designing the Factory	4	4	
	IND 41X	Technical Elective	3	4	
	IND 41X	Technical Elective	3	4	
	NTE	Non-Technical Elective	3	4	
	IND 400	Graduation Project	3	10	
			20	**30**	
Total			**152**	**240**	

Technical Elective Courses 31X

Course Code	Course Name	Credit	ECTS	Prerequisite
IND 311	Safety & Occupational Management	3	4	-
IND 312	Lean Thinking	3	4	-
IND 313	Implementing Industry 4.0	3	4	-
IND 314	Decision Theory	3	4	-
IND 315	Forecasting	3	4	-
IND 316	Supply Chain & Logistics	3	4	-
MTH323	Numerical Analysis	3	5	5
BME 340	Modeling of Biological Systems			
ECC 311	Management of Information Systems			

Technical Elective Courses 41X

Course Code	Course Name	Credit	ECTS	Prerequisite
IND 411	Six Sigma	3	4	-
IND 412	Digitalization & Industry 4.0	3	4	-
IND 413	Economic Principles in Industrial Engineering	3	4	-
IND 414	Scheduling	3	6	-
IND 415	Fuzzy Systems	3	6	-
IND 416	Advanced Operations Management	3	6	-
IND 417	Location Techniques & Problems	3	6	-
IND 434	Quality Engineering	3	6	-
EE 432	Mechatronics	3	6	-
EE 463	Image Processing	3	6	-
BME 448	Micro and Nano Technologies in Biomedical Engineering	3	5	-
BME 401	Instrumental Analysis			-
BME 431	Cardiac Mechanics			-
BME 441	Orthopedic Biomechanics			-
BME 446	Figure Analysis and Machine Vision			-
BME 435	Bioinformatics			
EE 437	Robotics Systems			-
ISE 412	Health Information Management	3	5	-
ISE 413	Strategic Information Systems Management	3	5	-
ECC 412	Database Applications			
PGE 436	Simulating of Geosystems	3	5	-
ME 426	Introduction to Finite Elements	3	6	
ME 429	Computer Aided Design (CAD)	3	6	-
ECC 404	Artificial Neural Network	3	6	-

Restricted Non-Technical Elective Courses

Course Code	Course Name	Credit	ECTS	Prerequisite
MAN101	Introduction to Management	3	5	-
ECON101	Introduction to Economics	3	5	-
FRE101	French I	3	5	-
FRE102	French II	3	5	-
GER101	German I	3	5	-
GER102	German II	3	5	-
PHIL101	Introduction to Philosophy	3	5	-
HIST103	History of Civilization	3	5	-
POL101	Political Science I	3	5	-
SOC101	Sociology	3	5	-

COURSE OBJECTIVES AND CONTENTS:

YEAR 1

General Physics I (course type: required; course code: PHY 101)

Course objectives: The objective of this course is to provide students with a thorough understanding of the basic concepts of physics, rigorous description of physical phenomena and to improve students' problem-solving abilities.

Course content: Measurement, Estimating, Kinematics in one Dimension, Vectors, Newton's Laws of Motion, Application of Newton's Laws, Work and Energy, Conservation of Energy, Linear Momentum and Collisions.

General Chemistry I (course type: required; course code: CHM 101)

Course objective: By the end of this course, students should understand the fundamental concept of atomic theory, chemical equations, thermochemistry and hands-on laboratory works.

Course content: Introduction to basic principles of chemistry, atomic structure, molecule and ions, chemical reactions and balancing chemical reactions, precipitation reactions. Acid-Base reactions, redox reactions and balancing. Redox reactions. Stoichiometric relationships in chemical reactions, concentration and dilution, Acid base titration, redox titration. Gases.

Calculus I (course type: required; course code: MTH 101)

Course objective: At the end of this course students are expected to have a clear understanding of the ideas of Calculus as a solid foundation for subsequent courses in mathematics and other disciplines as well as for direct application to real life situations.

Course content: Functions, limits and continuity. Derivatives. Mean value theorem. Sketching graphs. Definite integrals, infinite integrals (antiderivatives). Logarithmic, exponential, trigonometric and inverse trigonometric functions and their derivatives. L'Hospital's rule. Techniques of integration. Applications of the definite integral, improper integrals.

English I (course type: required; course code: ENG 101)

Course objective: This course aims at enabling students to understand their lessons and to express themselves in English Language.

Course content: Within a thematic approach, reading, writing, speaking, and listening skills will be developed, with a language component in order to build onto the foundation established at the Department of English. In speaking and writing, students will be encouraged to use language forms that they learn through reading and listening. Under broad themes (or threads), the students will be exposed to extensive reading both in and outside the

classroom. They'll be encouraged to read a variety of texts such as short stories, academic articles, research reports, reviews and journalistic texts as well as chapters from textbooks.

Fundamentals of Industrial Engineering course type: required; course code: IND 101)

Course objectives: The course is to avail the students the basic knowledge on industrial engineering concepts. The students will be taught rudiments of all the application areas in industrial engineering.

Course content: The history of Industrial Engineering, Industrial and System Engineering, Facility Planning, Material Handling Systems, Distribution and Rotation, Job Design, Quality Control, Wage System, CAD/CAM, Robotic and automation, Human Factors, Resource Management, Finance Management and Engineering Economy, Determinate Operation Research, Stochastic Models, Simulation, Project Management, Probability and Statistic, Staff Management, Computer and Information Systems, Management Systems.

Technical Drawing I (course type: required; course code: ECC 103)

Course objective: The aim of this course is to provide students with the basics of AutoCAD, be able to transform data into graphical drawings and also draw orthographic projections and sections, learn basic engineering drawing formats.

Course content: Introduction to CAD. Principles of engineering drawing (1st and 3rd angle orthotropic projections), drawing methodology stages, line work and lettering, isometric and oblique projections, drawing layouts (working drawings and assembly drawings), machine drawing features, sections and sectional views, geometrical constructions and dimensioning principles.

Turkish for Foreigners (course type: required; course code: YIT100)

Course objective: The aim of this course is to help students interact with non-English speaking people within their community.

Course content: Listening, written expression, oral expression, reading, conversation, grammar and translation.

Atatürk's Princip. & Turkish Reform(course type: required; course code: AIT 101)

The aim of Atatürk's Principles and Reforms History lesson and related terms; The reasons of Ottoman Empire's Fall; The process of passing from Ottoman Empire to the republic; Turkish Independence War, Atatürk's Principles and Reforms and Atatürkist Thought System.

General Physics II (course type: required; course code: PHY 102)

Course objectives: General Physics II is the second part of General Physics I. The aim of this course is to help students apply knowledge of physics everyday life activities and through problem solving exercises in the fields of Electrical and Electromagnetics point of view.

Course content: Centre of Mass, Rotation About a Fixed Axis (angular quantities, kinematic equations, torque, moment of inertia, rotational kinetic energy), General Rotation, (the torque vector, angular momentum, conservation of angular momentum) Static Equilibrium,

Elasticity and Fracture (statics, stability and balance, elasticity, stress, strain, fracture, trusses and bridges, arches and domes), Fluids (density, pressure, Pascal's principle, bouyancy and Archimedes principles, fluids in flow, Bernoulli's equation). Prerequisite: PHY 101

Calculus II (course type: required; course code: MTH 102)

Course objectives: This course aims at helping students further develop their problem solving and critical reasoning skills and to prepare them further study in mathematics, the physical sciences, or engineering.

Course content: Plane and polar co-ordinates, area in polar co-ordinates, arc length of curves. Limit, continuity and differentiability of function of several variables, extreme values, method of Lagrange multipliers. Double integral, triple integral with applications. Line integrals, Green's theorem. Sequences, infinite series, power series, Taylor's series. Complex numbers. Prerequisite: Math 101

English II (course type: required; course code: ENG 102)

Course objective: This course aims to take students to intermediate advanced level of English.

Course content: This course will be a continuation of ENG 101, with greater emphasis on student autonomy, research skills and synthesizing ability. All the activities and tasks in ENG 101 will continue within a thematic approach. In Eng-102, the ability to evaluate, analyze and synthesize information in written discourse will be highlighted. Documentation in writing will be introduced at the beginning of the course, in order to solidly establish the skill by the end. Students will learn the discourse patterns and structures to be used in different essay types. Students will write two essays in ENG-102. 1. An academic essay with proper documentation. 2. A project report to be prepared throughout the course, including a literature review (displaying analysis/synthesis skills, and documentation), a definition/elaboration of a problem (using definition, description, cause/effect and comparison/contrast patterns) and suggestions for solution (including personal views and argumentation). Local and regional topics, personalizing the research and viewpoints will be recommended to prevent plagiarism. Instructors will have to keep in close contact with the students to guide them throughout the process.

Technical Drawing (course type: required; course code: TD 102)

Course Objectives: The goal of this course is to help the students understand techniques in engineering drawings, sketches, geometry and projections. Basically, students will learn fundamentals of scaling, dimensioning and projecting at various views.

Course content: Introduction to technical drawing. Drawing instruments and their use, lettering, lines, geometry of straight lines, scale drawing. Dimensions. Development of surfaces, shape description, selection of views, projecting the views. Pictorial drawing, diametric trimetric projection. Isometric projection, oblique projection. Perspective drawing cross section.

Information Technologies for Industrial Engineering (course type: required; course

code: IND 102)

Course Objectives: This course serves as an introduction to computer terminology and computer equipment and provides fundamental concepts for using PC-based software.

Course content: computer hardware and its operation, operating systems, application software, networks and computer communications, the Internet and the World Wide Web, development of information systems, and programming. Emphasis is placed on the use of computers to assist with business issues. The impact of computers on our lives is also explored.

YEAR 2

Elements of Linear Algebra (course type: required; course code: IND 201)

Course Objectives:

Course content: Vector, length and point multiplication, planes, Matrices and linear equations, Gauss elimination, elimination with matrix, the rules of matrix operations, taking the matrix inverse by Gauss-Jordan method, factorization, LU discrete upgrading, Transpose, Permutations matrices, vector spaces and sub-spaces, zero space, row, column and left zero space, Rank, Ax = b solution, Linear independence, bases and dimension, Orthogonality, projections, last-squares approximation, orthogonal bases and Gram-Schimidt, Determinants, Cofactors, Cramer's rule, Eigenvalues and Special vectors, diagonal matrix of upgrading, the application of differential equations, symmetric, positive defined and similar matrices, complex vectors and matrices, Hermityen and unitary matrices, Applications.

Introduction to Computers and Programming (course type: required; course code: ECC 101/COM 101)

Course objectives: The goal of this course is to help students know program language evolution and classification and basic computer architecture. Students will be able to solve basic numerical computation in binary, design and implement simple assembly language programs at the end of the course.

Course content: An introduction to fundamental concepts. Algorithms and flowcharts as tools of program design process. Basic program structure. Input/output statements. Control structures: Selection and repetition statements and arrays. Concept of modular programming: Procedures and Functions. An introduction to fundamental concepts, construction of digital computer system hardware and software. Machine language concepts and internal data representations, integer, real and character data types. Algorithms and flowcharts as tools of program design process. Basic program structure. Programming by using sequencing, alteration and iteration methods.

Statistics I (course type: required; course code: IND 203)

Course objectives:

Course content: Basic probability and random variables, specific distributions and their applications, relationships between distributions, functions of random variables, moment generating functions, random sampling, data description, and fundamental sampling distributions.

Production and Operation Management I (course type: required; course code: IND 205)

Course objectives:

Course content: Forecasting, , Long-Term Capacity Planning, Aggregate Production Planning, Inventory Management, Material Requirements Planning This course aims at teaching both basic production management concepts and also some quantitative methods used in solving various production planning problems.

Graphing and Optimization Principles (course type: required; course code: IND 202)

Course objective:

Course content: Graphing elementary and high order functions, local minima and maxima, using first and second derivative information, convexity and applications, model building and optimization principles, saddle point conditions, exact solution procedures, applications to engineering and business problems.

Object Oriented Programming (course type: required; course code: ECC 108)

Course objective:

Course content: Fundamental ideas, object-oriented concept, meaning of modeling the real world. Encapsulatıon, Information hiding. Abstraction, Classes, Constructors, Default, parameterized, copy constructors. Metaclass, Object lifetimes, Dynamic objects, Inheritance, Single and Multiply inheritance, Inheriting constructor, Associations and Aggregations, Polymorphism, Operator overloading, Virtual Function, Friend functions, Streams and files, File organisation. Class templates.

Statistics II (course type: required; course code: IND 204)

Course objectives:

Course content: Parameter estimation, hypothesis testing, one-factor experiments, two-factor experiments, simple linear regression and correlation, multiple linear regression, and nonparametric statistics.

Production and Operation Management II (course type: required; course code: IND 206)

Course objectives: This course aims at teaching how to utilize various production management techniques such as line balancing, scheduling, bottleneck station identification and maintenance management in improving the performance of the production systems.

Course content: Operations Scheduling, Assembly Line Balancing, Mixed Model Assembly Lines, Transfer Lines, Automated Assembly Systems, Maintenance Management.

YEAR 3

Analysis of Service Systems (course type: required; course code: IND 301)
Course objectives: This is a survey course of the technical tools available to operations managers in a variety of service and public sector organizations.
Course content:

Operational Research I (course type: required; course code: IND 303)
Course objectives:
Course content: Problem solving and decision making, Linear Programming: Graphical solution, Linear Programming: The Simplex method, Application of Linear Programming, Sensitivity analysis and duality, Linear programming: Computer solution, Transportation, Assignment and Transshipment Problems.

Entrepreneurship and Innovation (course type: required; course code: IND 302)
Course objectives:
Course content: entrepreneurial perspective, creating and financing new venture; business plan organizational plan, marketing plan source of capital, opportunity analysis informal risk; international entrepreneurship opportunities going public, ending venture.

Operational Research II (course type: required; course code: IND 304)
Course objectives: The purpose of this course is to make the students familiar with the quantitative methods available to decision makers.
Course content: Integer Linear Programming, Network Models, Decision Analysis, Multi Criteria Decision Making, Dynamic Programming.

YEAR 4

Transforming Ideas to Projects (course type: required; course code: IND 401)
Course objectives: The purpose of this course is to emphasis the better coordination of a whole project.
Course content: Project proposal analysis, feasibility, management planning, project scheduling, project controlling like claim management, project risk management, project quality management, team management, documentation, organizational learning, communication management and presentation techniques.

Auditing Productivity (course type: required; course code: IND 403)

Course objectives:
Course content: Productivity and overview of method engineering, method study and graphical analysis tools, method improvement, time study (rating, allowance calculation, standard time), work sampling, predetermined time studies, job evaluation and performance appraisal.

Strategy of Quality (course type: required; course code: IND 402)
Course objectives:
Course content: Basic topics in quality assurance and statistical quality control. Terms in quality management, historic approaches, quality management systems, product inspection, acceptance inspection, modeling process quality, statistical process control.

Designing the Factory (course type: required; course code: IND 404)
Course objectives:
Course content: Product, Process and Schedule design for the Facilities Planning requirements./Man-Machine Charts and equipment requirements. Developing Alternatives (concepts and techniques) Quantitative, Qualitative and Computerized Facilities Planning Models/Evaluating, Selecting, Preparing, Presenting, Implementing and maintaining the facilities plan.

TECHNICAL ELECTIVE COURSES

Safety and Occupational Management (course type: required; course code: IND 311)
Course objectives:
Course content: This course is an introductory identifying appropriate procedure to minimize or eliminate injuries and illness in the workplace, incorporate job safety analysis (JSA) and appropriate training, and name elements of an effective safety culture.

Lean Thinking (course type: required; course code: IND 312)
Course objectives: The purpose of this course is to provide the student with the fundamental knowledge of current continuous process improvement methodologies in use today within competitive manufacturing environments. This introductory course will expose the student to the basic concepts of Lean Manufacturing theory and the various tools and techniques involved with a lean implementation.
Course content: Lean-six sigma process methodology of DMAIC (Define, Measure, Analyze, Improve, Control) to ensure that at the completion of the course, the student will be competent to participate effectively as a team member in lean implementation projects.

Implementing Industry 4.0 (course type: required; course code: IND 313)
Course objectives: This course is designed to help students implement large scale technological change. Topics discussed include: New business models and forms of operations that are currently being enabled by technological innovations such as the Industrial Internet of Things (IIoT). The "hidden factory" that results from a counterproductive and unpredictable mix of old and new technologies. The importance of decoding cultural and workforce factors prior to making an investment in new technologies. Ways to increase a factory's "IQ," leading to more productive and safer operations. The role of the front-line leader in the adoption and successful execution of the new technology.
Course content:

Decision Theory (course type: required; course code: IND 314)
Course objectives: This course will teach the skills and concepts that engineers need to make better decisions. Students will learn quantitative techniques for identifying good decisions in complex situations, but also general such as uncertainty about future outcomes, tradeoffs between competing objectives and nonlinearity of preferences.
Course content:

Forecasting (course type: required; course code: IND 315)
Course objectives:.
Course content: Regression methods and moving averages, Exponential Smoothing Methods, Discounted Least squares and direct smoothing, Smoothing models for seasonal data, Forecasting, Analysis of forecast errors, Adaptive-Control forecasting methods, The Box-Jenkins models.

Supply Chain and Logistics (course type: required; course code: IND 316)

Course objectives: Today competition takes place between supply chains, and no longer at the inter-firm level. Enabled through information technology, supply chain management addresses the integrative approach of managing all activities related to products/services from the point of origin to the point of consumption. Basic methods of analysis in planning, organizing and controlling supply chain operations will be taught to ensure that the right product/service, in the right quantity, in the right condition, is delivered to the right customer at the right place, at the right time, at the right cost.
Course content:

Six Sigma (course type: required; course code: IND 411)
Course objectives: Six Sigma course has been designed to provide the student, with strong theoretical knowledge of the Six Sigma Green Belt Body of Knowledge as defined by the American Society of Quality (ASQ) and practical experience with the Six Sigma DMAIC (Define, Measure, Analyze, Improve, and Control).
Course content:

Digitalization and Industry 4.0 (course type: required; course code: IND 412)
Course objectives: The aim of the course is to give information about the basic concepts of the digitalized industry, advanced concepts of the digitalized industry and the digital factory.
Course content: Development of the industry 4.0 concept, Basics of digitalization, Big Data, Internet of Things and Services, Industry 4.0 Matrix, Horizontal and vertical integration, Research & Development 4.0, Production 4.0, Logistics 4.0, Business model innovation 4.0, Quality management 4.0, Maintenance 4.0, Business analytics and data mining, Ecosystems 4.0, Horizontal and vertical integration II, Robotics 4.0, Autonomous Systems, Employment and workplace 4.0, Change management for I4.0, Additive manufacturing and 3D printing.

Economic Principles in Industrial Engineering (course type: required; course code: IND 413)
Course objectives: The course focuses on the efficient allocation of scarce resources in circumstances in which alternatives can be enumerated. The course provides engineers with skills to assess the costs and benefits of engineering investments, such as product and technology development programs and capital purchases. It will also provide the framework for selecting among alternative designs, for managing technologies over their lifecycles, and for evaluating the finances of new ventures.
Course content:

Scheduling (course type: required; course code: IND 414)
Course objectives:
Course content: Job shop scheduling rules & Gantt chart, Algorithms for one machine problems, Algorithms for two machine problems, Heuristic Approaches, Flow Shop Scheduling, Parallel Machine Scheduling, Batch processing.

Fuzzy Systems (course type: required; course code: IND 415)

Course objectives:
Course content: Fuzzy set theory, rules, reasoning and inference systems. Regression and optimization, derivative-based optimization – genetic algorithms, simulated annealing, Neural Networks, adaptive networks.

Advanced Operations management (course type: required; course code: IND 416)
Course objectives:
Course content: Autoregressive models, Box-Jenkins method, advanced inventory systems, instantaneous systems, stochastic inventory systems, aggregate planning models, advanced ERP environment.

Location Techniques and Problems (course type: required; course code: IND 417)
Course objectives: Industrial location, retailing and public facility location approaches, GISbased techniques, overview of location theories, basic techniques for location analysis.
Course content:

Graduation Project (course type: required; course code: IND 400)

Course objective: The course is intended to evaluate students' ability to complete a project without a given detailed structure usually found in undergraduate courses.
Course content: Design or research projects are assigned including application and synthesis. The projects including prototype production are especially encouraged. Students may work alone or as a team. Supervisors and jury members grades the projects by considering the studies during the semester, project report and presentation.

Mechatronics (course type: elective; course code: EE 435)

Course objective: The aims are to give students necessary knowledge in using sensors, and actuators, electrical equipment and microprocessors for designing and building intelligent mechatronic systems
Course content: Introduction to Mechatronics and measurement systems. Sensors and transducers: Sensors and transducers, Performance terminology, Examples of sensors, Selection of sensors. Signal conditioning: Signal conditioning, The operational amplifiers for analog signal processing, Protection, Filtering, Digital circuits and systems. Measurement systems: Designing measurement systems, Data presentation systems, Measurement systems, Testing and calibration. Mechanical actuation systems: Mechanical systems, Kinematic chains, Cams, Gear trains, Ratchet mechanisms, Belt and chain drives. Electrical actuation systems: Electrical systems, Switches, Solenoids, Motors, Stepping motors. Basic system models: Mathematical models, Mechanical system building blocks, Electrical system building blocks, Fluid system building blocks, Thermal system building blocks. Simulation of simple mechanical systems by electrical elements (circuits). Design and mechatronics: Designing, Mechanisms, Examples of designs.

Image Processing (course type: elective; course code: EE 463)

Course content: Introduction to Image Processing, Digital Signal Processing. D- T and C- T signals and systems. Digital System features. Linearity and S -I. get the picture. Image Processing Techniques; Image Compression, Image Enhancement, Image Restoration and Image Identification. Corner Detection Techniques; Differential approach and identify the model. Mathematical Model of the image. Image Sampling and Quantum renovation. Fold and Digital Image Correlation. Matlab is used in laboratory studies.

ECC 404 Artificial Neural Network (3 credits) (5 ECTS)

The Neural network paradigm and fundamentals. Training by error minimization. Back propagation algorithm. Feedback and recurrent networks. Hopfield network, Genetic algorithms. Probability and neural networks. Optimizations and constraint. Introduction to Neural Networks, Supervised/Unsupervised learning algorithm, Introduction to back propagation algorrithm, Applications of back propagation algorithm, XOR problem, Introduction to adaline, Practical application of adaline, Application of hopfield algorithm.

ME 429 Computer Aided Design (CAD) (3 credits) (5 ECTS)

Introduction and principles of CAD, Stages in CAE, Hardware Components, Fundamentals of CAD, Design Process, Application of Computers for Design, Geometrical Transformations, (3D transformation, scaling, rotation), Representation of 3D objects, 3D. Solid Modeling, (Boolean operations), Representation schemes. Parametric Design, brief description of FEA (finite element analysis), Merits and Limits of CAD.

Simulating of Geosystems (course type: elective; course code: PGE 436)

Course Description: Simulation in general (incentives for simulation, planning a simulation study). Equations for mass/heat flow in permeable/porous media. Modeling concepts (finite differences, 1D, 2D and 3D mass/heat flow domains). Selecting reservoir-rock and fluid-properties data. Selecting grid block and time steps. Placement of wells in grid blocks. History matching and predicting future performance of geosystems by numerical simulation. Applications of simulation to oil and gas reservoirs as well as geothermal reservoirs.

ISE412 Health Information Management (course type: elective) (3 Credits)

Course objective: The aim of this course is to give details about information systems used in health services.

Course Content: Health Care Delivery Systems, Health Information Management Professionals, Health Care Settings, The Patient Record, Electronic Health Records, Content of the Patient Record, Numbering Filing Systems and Record Storage and Circulation, Indexes, Registers and Health Data Collection, Legal Aspects of Health Information Management, Coding and Reimbursement.

ISE413 Strategic Information Systems Management(course type: elective) (3 Credits)

Course Objective: The aim of this course is to give details about strategic information systems.
Course Content: Business Strategy for the Digital World, Business Exploitation of Information and Communication Technology, Information Systems Development Approaches, Disruptive Technologies and Applications, Business IT/IS Alignment, Strategic IS/IM in Context, Global Issues in Information Management, Strategic Knowledge Management, Organizational Change, Culture and Strategic IS/IT Led Change, IS/IT Benefits Management and Realization, Strategic IT/IS Leadership and IT Governance, IT/IS Professionalism,

ECC311 Management Information Systems (course type: required) (3 Credits) Course objective: The aim of the course is to provide knowledge about MIS.
Course Content: Introduction to Management Information Systems, Global E-Business, Foundations of Business Intelligence, Documenting Information Systems, Decision Making and Managing Knowledge, Building Information Systems and Managing Projects, Ethical and Social Issues in Information Systems.

BME435 – Bioinformatics
This course is a graduate level bioinformatics course, which emphasizes as a basis for understanding bioinformatics and their applications. The course focuses on a general introduction to the uses of biological databases in generating biological knowledge to better understand living systems, for the purposes of aiding healing of diseases. Topics include Genomic Era, the anatomy of genome, probabilistic models of genome sequences, biological databases, sequence alignment, gene and promoter prediction, molecular phylogenetics, post-genomic epidemic, structural bioinformatics and proteomics. This course covers the fundamental concepts molecular biology, database management systems, and probabilistic models.

BME401 – Instrumental Analysis
This course is designed to give students practical experience using modern analytical instrumentation and to provide students with the background theory and principles of operation.

BME340 – Modelling of Biological Systems
This course introduces the current approaches for mathematical modelling and analysis of biological systems using both computer simulation and mathematical techniques. The course reviews the basics of modelling methodology, stochastic and deterministic models, numerical and analytical methods, and model validation. Examples throughout the course are drawn from population dynamics, biochemical networks, ecological models, neuronal modelling, and physiological systems.

ECC 437 Robotic Systems, 3 Credits, 5 ECTS

Course description: Components and subsystems: vehicles, manipulator arms, wrists, actuators, sensors, user interface,controllers. Classifications of robots. Coordinate transformations. Dynamic model of robots .Kinematics: manipulator position, manipulator motion. Sensors, measurement and perception. Computer vision for robotics. Hardware and software considerations.

IND 434 – Quality Engineering 3 credits

Objectives of Course: The purpose of the course is to make an introduction and lay the foundation of modern methods of statistical quality control and improvements that are used in the manufacturing and service industries along with basic concepts of reliability. The students will first be introduced to some of the philosophies of quality control experts and their impact on quality.

Description of the Course: The students will first be introduced to some of the philosophies of quality control experts and their impact on quality. This course familiarizes students with quality control techniques, quality assurance issues and quality management methods. Finally basic concepts of reliability of systems will be introduced.

ECC 412 Database Application: This course provides students with a general understanding of the Oracle database system and a thorough understanding of SQL. The student will learn the fundamentals of database design, a structured approach to system development, creation and manipulation of data, and retrieval of information from an Oracle database. Numerous concepts of the Structured Query Language (SQL) and Programming Language/Structured Query Language (PL/SQL) will also be covered.

ECC 404 Neural Networks: The Neural network paradigm and fundamentals. Training by error minimization. Back propagation algorithms. Feedback and recurrent networks. Hopfield network, Genetic algorithms. Probability and neural networks. Optimizations and constraint.

MTH 323 – Numerical Analysis 3 credits

Objectives of the Course: The course will be develop an understanding of the elements of error analysis for numerical methods and certain proofs. It also derive appropriate numerical methods to solve algebraic and transcendental equations.

Course description: Approximations and errors.Accuracy and precision. Finite divided difference and numerical differentiation. Roots of equations, bracketing methods and open methods, systems of nonlinear equations. Systems of linear algebraic equations. Curve fitting, interpolation. Numerical integration. Ordinary differential equations.