# NEAR EAST UNIVERSITY

# DEPARTMENT OF Mechatronics Engineering

# *Course Structure Diagram with Course Credits*

## 2021-2022

**Courses List with Near East University credits and ECTS**

# CURRICULUM

| FIRST YEAR – FALL SEMESTER | | | | |
|---|---|---|---|---|
| **Code** | | **CourseName** | **Credit/ECTS** | **Prerequisite** |
| CHM | 101 | GENERAL CHEMISTRY | 4/6 | * |
| ECC | 101 | COMPUTER PROGRAMMING | 3/5 | * |
| ENG | 101 | ENGLISH I | 3/5 | * |
| MTH | 101 | CALCULUS I | 4/5 | * |
| PHY | 101 | GENERAL PHYSICS I | 4/5 | * |
| AİT | 101 | ATATÜRK İLKELERİ & İNKILAP TARİHİ I | 2/2 | * |
| TUR | 101 | TÜRK DİLİ I | 2/2 | * |
| YIT | 101 | TURKISH FOR FOREIGN STUDENTS I | 2/2 | * |
| AIT | 103 | PRINCIPLES OF ATATÜRK & THE HISTORY OF TURKISH REVOLUTION I | 2/2 | * |
| CHC | 100 | CYPRUS HISTORY AND CULTURE | 0/2 | * |
| CAM | 100 | CAMPUS ORIENTATION | 0/2 | * |
| | | | **22/34** | |

| FIRST YEAR – SPRING SEMESTER | | | | |
|---|---|---|---|---|
| **Code** | | **Course Name** | **Credit/ECTS** | **Prerequisite** |
| ENG | 102 | ENGLISH II | 3/5 | ENG 101 |
| MTH | 102 | CALCULUS II | 4/6 | MTH 101 |
| MTH | 113 | LINEAR ALGEBRA I | 3/5 | * |
| PHY | 102 | GENERAL PHYSICS II | 4/6 | PHY 101 |
| MCT | 102 | MECHATRONICS WORKSHOP PRACTICE | 3/5 | * |
| MCT | 100 | INTRODUCTION TO MECHATRONICS ENGINEERING | 1/3 | * |
| | | | **18/30** | |

| SECOND YEAR – FALL SEMESTER | | | | |
|---|---|---|---|---|
| **Code** | | **Course Name** | **Credit/ECTS** | **Prerequisite** |

| Code | | | Course Name | Credit/ECTS | Prerequisite |
|---|---|---|---|---|---|
| ECC | 216 | | CIRCUIT THEORY I | 4/6 | PHY 102,MTH 101 |
| ECC | 211 | | ENGINEERING MATERIALS | 3/5 | CHM 101 |
| ECC | 206 | | STATICS | 4/6 | PHY 101 |
| MTH | 201 | | DIFFERENTIAL EQUATIONS | 4/6 | MTH 102 |
| ECC | 207 | | THERMODYNAMICS | 4/6 | CHM 101 |
| ECC | 103 | | ENGINEERING DRAWING I | 3/5 | * |
| | | | | 22/34 | |

| SECOND YEAR – SPRING SEMESTER | | | | | |
|---|---|---|---|---|---|
| **Code** | | | **Course Name** | **Credit/ECTS** | **Prerequisite** |
| ECC | 213 | | STRENGTH OF MATERIALS I | 4/6 | ECC 206 |
| ECC | 212 | | DYNAMICS | 3/5 | PHY 101 |
| ECC | 209 | | MANUFACTURING TECHNOLOGY | 3/5 | * |
| ECC | 218 | | ELECTRONICS I | 4/6 | ECC 216, ECC 211 |
| ECC | 013 | | ENGINEERING DRAWING II | 4/6 | ECC 103 |
| MCT | 200 | | SUMMER TRAINING I | 0/2 | * |
| | | | | 18/30 | |

| THIRD YEAR – FALL SEMESTER | | | | | |
|---|---|---|---|---|---|
| **Code** | | | **Course Name** | **Credit/ECTS** | **Prerequisite** |
| ECC | 001 | | LOGIC CIRCUIT DESIGN | 4/6 | ECC 218 |
| MCT | 301 | | MECHATRONICS COMPONENTS & INTRUMENTATION | 3/5 | * |
| ECC | 008 | | SIGNALS & SYSTEMS | 4/6 | ECC 216 |
| MCT | 310 | | COMPUTER APPLICATIONS FOR MECHATRONICS ENG. | 3/5 | ECC 101 |
| ENG | 201 | | ENGLISH COMMUNICATION SKILLS | 3/5 | ENG 102 |
| NTE | | | NON-TECHNICAL ELECTIVE | 3/5 | * |
| CAR | 100 | | CAREER PLANNING | 0/2 | * |
| | | | | 20/34 | |

| THIRD YEAR – SPRING SEMESTER | | | | | |
|---|---|---|---|---|---|
| **Code** | | | **Course Name** | **Credit/ECTS** | **Prerequisite** |
| ECC | 301 | | MICROPROCESSORS | 4/6 | ECC 001 |
| ECC | 310 | | CONTROL SYSTEMS | 3/5 | MTH 201 |
| MCT | 311 | | MACHINE ELEMENTS | 4/6 | ECC 213 |

| | | | | |
|---|---|---|---|---|
| MTH | 251 | PROBABILITY AND RANDOM VARIABLES | 3/5 | MTH 101 & MTH 102 |
| RE | | RESTRICTED ELECTIVE | 3/5 | * |
| MCT | 300 | SUMMER TRAINING II | 0/2 | MCT 200 |
| | | | **17/29** | |

| FOURTH YEAR – FALL SEMESTER | | | | |
|---|---|---|---|---|
| **Code** | | **Course Name** | **Credit/ECTS** | **Prerequisite** |
| MCT | 435 | MECHATRONICS | 3/5 | * |
| ECC | 429 | ENGINEERING ETHICS | 3/5 | * |
| TE | XXX | TECHNICAL ELECTIVE | 3/5 | * |
| TE | XXX | TECHNICAL ELECTIVE | 3/5 | * |
| TE | XXX | TECHNICAL ELECTIVE | 3/5 | * |
| MCT | 410 | INTRODUCTION TO CAPSTONE DESIGN | 4/6 | * |
| | | | **19/31** | |

| FOURTH YEAR – SPRING SEMESTER | | | | |
|---|---|---|---|---|
| **Code** | | **Course Name** | **Credit/ECTS** | **Prerequisite** |
| MCT | 411 | CAPSTONE TEAM PROJECT | 4/6 | * |
| ECC | 437 | ROBOTIC SYSTEMS | 3/5 | * |
| TE | xxx | TECHNICAL ELECTIVE | 3/5 | * |
| TE | xxx | TECHNICAL ELECTIVE | 3/5 | * |
| AIT | 102 | ATATÜRK İLKELERİ & İNKILAP TARİHİ II | 2/2 | AIT 101 |
| TUR | 102 | TÜRK DİLİ II | 2/2 | TUR 101 |
| YIT | 102 | TURKISH FOR FOREIGN STUDENTS II | 2/2 | YİT 101 |
| AİT | 104 | PRINCIPLES OF ATATÜRK & THE HISTORY OF TURKISH REVOLUTION II | 2/2 | AİT 103 |
| | | | **17/25** | |
| | | **Total** | **153/247** | |

# RESTRICTED NON-TECHNICAL COURSES

ECC 426        Economics for Engineers
ECC 427        Management for Engineers

**Objectives and contents of the course:**

The educational objectives of the Degree Program in Mechatronics Engineering reflect the mission of Near East University. The Bachelor of Science program in Mechatronics Engineering prepares the students to achieve the following career and professional objectives.

- To acquire a strong foundation in Mechatronics Engineering area relevant to the current needs of industry to allow them to successfully compete for demanding and high quality jobs
- Analyze problems, propose algorithmic solutions, and implement them correctly and efficiently by applying their knowledge of mathematics, computing, mechatronics systems and development tools.
- Propose engineering solutions using the information/tools and advanced technologies for the related problems of industry and government.
- To acquire clear communication abilities, ethical and social responsibilities for teamwork.
- Make positive contributions to their community and society by applying skills and abilities learned during their undergraduate program in mechatronics engineering
- Improve knowledge and skills through lifelong learning and graduate studies.

The individual courses are described below. These courses are offered by the Mechatronics Engineering Department together with the objective of each module.

<center>**COURSE DESCRIPTIONS**</center>

**Compulsory Courses**

**FIRST YEAR**

**CHM 101 General Chemistry, 4 credits, 5 ECTS**
**Objectives of the Course:**
Develop fundamental principles of theoretical and applied chemistry, Develop scientific inquiry, complexity, critical thinking, mathematical and quantitative reasoning. Explain the phenomena observed in the natural world. Develop basic laboratory skills
**Course Description**
Matter and measurement; atoms, molecules and ions; mass relations in chemistry, stoichiometry; gases; electronic structure and the periodic table; covalent bonding; thermochemistry; acids and bases.

**ECC 101 Computer Programming, 3 Credits, 5 ECTS**
**Objectives of the Course:**
To familiarise the students with computers and computing fundamentals. To be able to analyse and design a solution to a given problem. To enable the students to write structured programs using C programming Language.
**Course Description**
Algorithm development. Elements of C. Structure of a C program, data types, constants, input and output of integer numbers, real numbers. Variables, expressions and assignments. Input and output functions. Control Structures. Selection- If statement, multiple selection- switch statement. Iteration- while, do-while, for operators. User-defined functions, arrays and subscripted variables, single and multidimensional arrays. Array and functions. Pointers, pointers and strings. Structures, creating structures. Structure as function argument. Subprograms. Files. File operations. Application programs will be developed in a laboratory environment using the C language.

**ENG 101 English I, 3 Credits, 3 ECTS**
**Objectives of the Course:**
To create awareness on how to talk about people, objects, activities and situations in their immediate environment by choosing communicatively useful expressions. The course also aims to improve the ability to understand and follow basic conversations.
**Course Descriptions:**
This course aims to develop students' awareness of the language used in everyday life situations as well as the vocabulary items used in different topics. The course has been

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designed to show the students communicatively useful expressions in their immediate environment. Understanding how the language is used to maintain communication or convey meaning in specific situations is prior to how the structures are put together to form the language. The aim is to expose students to some basic functions in some specific situations and topics at A2/B1 level of the CEFR so that the students can easily communicate with the foreign people in their immediate environment and develop their ability to comprehend oral English.

**MTH 101 Calculus I, 4 Credits, 5 ECTS**
**Objectives of the Course:**
The course is standard first-year course on Calculus providing basic definitions, concepts and methods of limit, differentiation and integration. The objective is two-fold: To make students ready to see applications of calculus on subsequent courses and to enable them to continue their study on more advance level.
**Course Description:**
Limits and continuity. Derivatives. Rules of differentiation. Higher-order derivatives. Chain rule. Related rates. Rolle's and the mean value theorem. Critical Points. Asymptotes. Curve sketching. Integrals. Fundamental Theorem. Techniques of integration. Definite integrals. Applica L'Hospital's Rule.

**PHY 101 General Physics I, 4 Credits, 5 ECTS**
**Objectives of the Course:**
The objectives of this course are to provide the students with the fundamental principles of Mechanics to enable them to gain skills for problem solving and scientific thinking, and to establish the foundations for further studies in engineering.
**Course Description**
This is a fundamental physics course for the faculty of engineering. It covers basic physics subjects of mechanics and electrostatics. Topics include the description of motion, forces, gravitation, work, and energy, momentum, rotational motion, and Static equilibrium. Laboratory work is an important component of the course.

**ENG 102 English II, 3 Credits, 3 ECTS**
**Objectives of the Course:**
To create awareness on how to talk about people, objects, activities and situations in their immediate environment by choosing communicatively useful expressions. The course also aims to improve the ability to understand and follow basic conversations.

**Course Descriptions:**

This course aims to develop students' awareness of the language used in everyday life situations as well as the vocabulary items used in different topics. The course has been designed to show the students communicatively useful expressions in their immediate environment. Understanding how the language is used to maintain communication or convey meaning in specific situations is prior to how the structures are put together to form the language. The aim is to expose students to some basic functions in some specific situations and topics at A2/B1 level of the CEFR so that the students can easily communicate with the foreign people in their immediate environment and develop their ability to comprehend oral English.

## MTH 102 Calculus II, 4 Credits, 6 ECTS
**Objectives of the Course:**

The course continues Calculus I, where students have learned about limits and derivatives of functions of one variable. The main objectives of Calculus II include teaching the students the basic techniques of integration for functions of several variables, and introduce to them the notion of infinite series and their convergence and divergence criteria, and how they can be used in approximation techniques, as well as many applications of the integral to physical problems such as computing areas, surfaces and volumes.

**Course Descriptions:**

Sequences, Infinite series, Geometric series, The Integral test, The Comparison tests, Power series, Taylor and Maclaurin series, Lines and planes, Functions of several variables, Limits and Continuity, Partial Differentiation, Chain Rule, Tangent plane, Critical points, Global and Local Extrema, Directional Derivatives, Gradient, Divergence and Curl, Multiple integrals with applications, Triple integrals with applications, Triple integrals in Cylindrical and Spherical coordinates, Line-, Surface- and Volume Integrals, Independence of path, Green's Theorem, Conservative Vector Fields, Divergence Theorem, Stoke's Theorem**.**

## MTH 113 Linear Algebra, 3 Credits, 5 ECTS
**Objectives of the Course:**

The course is a standard first-year course on linear algebra providing basic definitions, concepts and methods. The main objectives are two: to make students ready to see applications of linear algebra on subsequent courses and to enable them to continue their study on more advanced level.

**Course Description**

System of linear equations: elementary row operations, echelon forms, Gaussian elimination method. Matrices: elementary matrices, invertible matrices, Determinants: adjoint and inverse matrices, Crammer's rule. Vector spaces: linear independence, basis, dimension. Linear mapping. Inner product spaces, Orthonormal Bases: Gram-Schmidt Process. Eigenvalues and eigenvectors, Cayley-Hamilton theorem, Diagonalisation.

## PHY 102 General Physics II, 4 Credits, 6 ECTS
**Objectives of the Course:**

The objectives of this course are to provide the students with the fundamental principles of static electric and magnetic to enable them to gain skills for problem solving and a scientific thinking, and to establish the foundations for further studies in engineering.

**Course Description:**
This is a fundamental physics course for faculty of engineering. It covers basic physics subjects of electromagnetics.

**MCT 102 Mechatronics Workshop Practice 3 credits 5 ECTS:**
**Course description**
This is to be conducted in the Mechatronic Engineering Department's workshops by all MechatronicEngineering students who have completed a minimum of three semesters in the program. Students will perform various hand and machine tool operations under staff supervision. It includes introduction to engineering materials, and selected practices on laying-out and setting out a job, using measuring devices. At the end of the training students will be required to complete a report regarding their training.

**MCT100 Introduction to Mechatronics Engineering 1 credit, 3ECTS:**
**Course Description:**
This course aims to familiarise first year mechatronics engineering students by introducing them to the fundamentals of discipline; job opportunities for mechatronics engineers; basic study skills; an overview of fundamentals laws and principles of mechatronics engineering; introduction to problem layout and problem solving methods; simplified engineering modelling and analysis of mechatronic systems; collection, manipulation and presentation of engineering data; ethical issues; and the importance of computers and language skills for effective communication.

## SECOND YEAR

**ECC 216 Circuit Theory I, 4 Credits, 5 ECTS**
**Objectives of the Course:**
Introduce students the fundamentals of circuit theory

**Course Description**
This course studies the system of units. Charge, current, voltage and power. Types of circuits and circuit elements. Ohm's law. Kirchhoff's law. Analysis methods, Inductance and capacitance. The unit-step forcing function. The natural and forced response of the first-order and second-order circuits.

**ECC211 -EngineeingMaterials 3credits, 5ECTS:**
Materials and properties. Atomic structure and interatomic bonding, crystal structure, crystal imperfections, solid solutions. Mechatronic properties of materials, elastic and plastic deformation. Behaviour of materials under tension, compression and shear.Hardness and hardness measurement. Dislocation and strengthening mechanism. Phase equilibria, phase

diagrams, their carbon system, solid reactions, microstructures. Structure and properties of ceramics. Polymer structure.

### ECC206- Statics 3 credits, 6 ECTS:
**Course Description**

Composition and resolution of forces, equilibrium of particles and rigid bodies, centroids and centre of gravity. Analysisoftrusses, frames and machines. Moments and products of inertia, method of virtual work. Friction.

### MTH 201 Differential Equations 4 Credits, 6 ECTS
**Objectives of the Course:**

Introducing first, second and higher order differential equations, and the methods of solving these equations. Emphasising the important of differential equations and its engineering application. Introducing the Laplace transform and its applications in solving differential equations and other engineering applications.

**Course Description**

Ordinary and partial differential equations. Explicit solutions, Implicit Solution. First-order differential equations, separable, homogenous differential equations, exact differential equations. Ordinary linear differential equations. Bernoulli differential equations. Cauchy-differential equations. High-order ordinary differential equations. Introduction to Laplace transforms.

### ECC207-Thermodynamics  3 credits, 6 ECTS:
**Course Description**

Basicconceptsanddefinitionsofclassical thermodynamics. Thermodynamic processes, work and heat interactions. First law for systems and for flow processes. Second law and entropy, irreversibility and availability.

### ECC 103- EngineeringDrawingI3 credits 5 ECTS:
**Course Description:**

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

### ECC 213- Strength of Materials I 4credits 6 ECTS:
**Course Description**

Introduction.Internalforcediagrams. Analysisofstressandstrain.Hooke'slaw.Yieldcriteriaandplasticity.Axial force.Pure shear. Torsion of circular bar sand thin-walled tubes. Moment of inertia of cross-sections. Simple bending. MTH 201 Differential Equations 3 Credits, 5 ECTS
**Objectives of the Course:**

Introducing first, second and higher order differential equations, and the methods of solving

these equations. Emphasising the importance of differential equations and its engineering application. Introducing the Laplace transform and its applications in solving differential equations and other engineering applications. Introducing the series method in solving differential equations.

**Course Description**

Ordinary and partial differential equations. Explicit solutions, Implicit Solution. First-order differential equations, separable, homogenous differential equations, exact differential equations. Ordinary linear differential equations. Bernoulli differential equations. Cauchy-differential equations. High-order ordinary differential equations. Introduction to Laplace transforms. Introduction to series method for solving differential equation.


**ECC212 -Dynamics 3 credits, 5 ECTS:**
**Course Description**

A study of motion particles and rigid bodies. Application of Newton's second law to planar motions of rigid bodies, energy and momentum principles. Free, forced and damped vibrations of particle. Central force motions.Inertia tensor. Euler's equation of motion.


**ECC – 209  Manufacturing Technology    3 Credits**
**Objectives of the Course:**

Students can explain how safety issues were addressed in a manufacturing process; identify the impacts of new technologies and/or techniques on the suitability of different types of manufacturing methods.

**Description of the Course**

Plastic forming of metals, hot and cold working, annealing and recrystallisation. Technology of deformation processes. Forging and pressing, extrusion and rolling. Pipe manufacturing. Sheet metal working processes. Cutting, bending, deep cup drawing. Basic machine tool elements, metal cutting, turning, drilling and boring machines, milling machines, and cutters; shapers and planers, grinding machines. Engineering analysing of the cutting force and power.


**ECC 218 Electronics I, 4 Credits, 6 ECTS**
**Objectives of the Course:**

- Provide students with knowledge of semiconductors and their applications
- Explain the diodes and their applications
- Provide the knowledge of BJTs, their applications and analysis
- Explain the different applications and importance of BJT in electronics

**Course Description**

Understanding the basics of semiconductor technology and elements. Identify and explain diodes and their applications, switching and rectification of AC signals. Understanding different clippers and clampers circuits. Understanding the theory of Bipolar Junction Transistor operation, CB, CE and CC configurations. Studying BJT bias circuits. FET operation and biasing. Applying small-signal BJT and FET analysis using re- and h-parameters. Studying amplifier frequency response.

**ECC 013 – Engineering Drawing II 3 credits**
**Objectives of the Course:**
To teach the principles of CAD and to teach/develop drawing techniques using CAD and design thinking and visualisation process in CAD, to teach the students the use of tolerances (Limits and Fits) when generating assembly/sub-assembly drawing and the areas of use for geometric tolerances and for students to gain techniques and the understanding of Torque transfer components.
**Course description**
Working with CAD, screw threads and threaded fasteners, locking and retaining devices, keys and keyways, limits and fits, unilateral and bilateral limits, geometrical tolerancing and applications, gears, springs and spring calculations, weld types and symbols, dimensioning, bearings.
**Prerequisite: ECC 103**

**MCT200– Summer Training, Non-credit, 4 ECTS:**
**Course Description**
ThisistobecompletedintheDepartment'sworkshopsbyallMEstudents.Studentswillspendatleast80hoursintheworkshops, and perform various hand and machine tool operations under staff supervision. At the end of the training, students will be required to complete a report regarding their training.


**THIRD YEAR**


**ECC 001 Logic Circuit Design, 3 Credits, 6 ECTS**
**Objectives of the Course:**
To develop a thorough understanding of combinational digital circuit design using logic gates. To develop a thorough understanding on sequential digital circuit design using flip flops. Simplify logic functions using Boolean algebra methods. Simplify logic functions using Karnaugh maps. Design of digital building blocks such as adders, multiplexers and decoders. Analysis of number systems
**Course Description**

Topics include number systems, Boolean algebra, truth table, minterms, maxterms, don't cares, Karnaugh maps, multi-level gate circuits, combinational circuit design, gate delays, timing diagrams, hazards, multiplexers, decoders, programmable logic devices, latches, flip-flops, registers, counters, analysis of clocked sequential circuits, Mealy machine, Moore machine, derivation of state graphs and tables.

**MCT 301 Mechatronics Components and Instrumentation 3 credits, 5 ECTS:**
**Course Description**
Basic applied concepts in mechatronic components and instruments. Mechatronic components, systems, instrumentation, transducers and sensors. Hands-on experiments on: identification and classification of mechatronic components, sensors and transducers, machine vision, actuating systems, information and cognitive systems, mechatronic instrumentation, evaluation of mechatronic systems.

**ECC 008  Signals and Systems, 4 Credits, 7 ECTS**
**Objectives of the Course:**
Teaching the basic of Signals and Systems. To understand mathematical descriptions and representations of continuous and discreet time signals and systems.To develop input-output relationships for Linear Time Invariant Systems (LTIS). To understand the impulse response of a system and the convolution operator.To teach analysis of the signals in time domain, z domain and frequency domain. To teach Fourier and Laplace Transform analysis for continuous-time LTIS. To teach z-Transform analysis for discrete time systems. To understand sampling theory; To teach the basic of filtering, the basic of feedback concepts. To provide a modeling of the systems in time domain, z domain and frequency domain using software programs
**Course Description**
The following main topics are covered: Classifications of signals, basic operations on signals, elementary signals, properties of systems, impulse response, convolution, step response, systems described by differential and difference equations, frequency response, Fourier series and transform, Fourier analysis of discrete-time signals and systems, properties of Fourier representations, Fourier representations for mixed-signal classes, sampling, reconstruction, z-Transform

**MCT 310 Computer Applications for Mechatronics Eng. 3 Credits, 6 ECTS**
**Objectives of the Course:**
Provide the students with a basic knowledge of MATLAB as a programming and simulation environment. Provide students with tools of problems analysis and solving using MATLAB

Provide students with basic understanding of simulation and electrical systems representation

**Course Description**

This course provides the students with the important tools for programming using MATLAB environment; it covers the basic concepts of programming in MATLAB using repetitive and conditional structures, the operations of vectors and matrices in MATLAB. The Solution of different numerical analysis problems using MATLAB. The design of User interfaces and communication abilities of MATLAB. An introduction of the simulation of different electrical power and control systems. The use of multisim as an electronic simulation tool.

**ENG 201 English Communication Skills, 3 Credits, 3 ECTS**

**Objectives of the Course:**

The course provides the students with an understanding of the essential elements of a presentation. The participants will practice skills that will make them better speakers and presenters, preparing them for their further academic career and enabling them to function successfully in professional environments.

**Course Description**

The course aims to develop students' oral communication skills. To achieve this aim, the course has been designed to teach presentation skills. The course starts from the very basics of developing presentation skills such as using your body language, tone of voice and eye contact. It then develops into how to do research for a presentation, how to prepare drafts, how to put it all together, how to use PowerPoint to support a presentation, how to prepare effective visuals and finally how to present. To support all these, the syllabus aims to teach the phrases used for opening and structuring a presentation, emphasising important points, making recommendations during a presentation and summarising and concluding a presentation. Additionally, the course also includes guidance about how to respond to comments or how to answer questions during a presentation.

**ECC 301 Microprocessors, 4 Credits, 6 ECTS**

**Objectives of the Course:**

Teaching the microprocessor as a programmable digital system element. To illustrate some basic concepts of microprocessors through the use of assembly language programming. To give the principles of hardware design; To provide an understanding of a microprocessor based system as a combination of hardware and software subsystems and their interactions

**Course Description**

Introduction to microprocessors. Architecture of microprocessors and instruction sets.

Interrupts. Memories. Parallel and serial input/output programming. Microprocessor based system design. Microprocessors applications.

**ECC 310 – Control Systems 3 credits**
**Objective of the control system:**
A control system consisting of interconnected components is designed to achieve the desired purpose. It is useful to examine examples of control systems through the course of history. Regulation keep controlled variable near a constant target value (e.g. process control: pressure, concentration etc.). Tracking keep controlled variable near a time-varying target value (e.g. antenna positioning, robotic manipulator point-to-).
**Course description**
Introduction to automatic control. Mathematical modelling of dynamic systems. Response analysis using Laplace transform method. Transfer functions and block systems. Feedback control systems. Typical actuators and transducers. Control law. **Prerequisite: MTH 201**

**MCT 311 Machine Elements 4 credits 5 ECTS:**
**Course Description**
The course covers fundamentals of machine design which include: general design rules, load analysis, materials selection, stress, strain and deflection anal mechatronics components, sensors, instrumentation analysis, failure theories, the concepts of reliability and safety, tolerances and fits; and introduces design guidelines, mathematical models and equations for: fasteners and power screws, springs, bearings, gears, shafts, clutches and brakes, and chain drives. Students will have an opportunity to work on a design project using learned knowledge.

**MTH 251 Statistics & Probability for Engineering Students, 3 Credits, 5 ECTS**
**Objectives of the Course:**
The objective of this course is to provide an understanding for the graduate engineering student on statistical concepts to include measurements of location and dispersion, probability, probability distributions, sampling, estimation, hypothesis testing, regression, and correlation analysis, multiple regression and engineering Forecasting.

**Course Description**
This course covers the role of statistics in engineering, probability, discrete random variables and probability distributions, continuous random variables and probability distributions, joint probability distributions, random sampling and data description.

**MCT300-SummerTrainingNon-credit 4 ECTS:**
**Course Description**
This is a period comprising a minimum of 30 days training to be completed in an industrial organization by all students who are effectively in their junior or senior year. Studentsshouldobtainapprovalof the Department before commencing training. Following this training, students will be required to write a formal report and give a short presentation before a committee regarding the irtraining.

**<u>FOURTH YEAR</u>**

**MCT 435 Mechatronics, 3 Credits, 5 ECTS**
**Course description:**
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.

**ECC 429-Engineering  Ethics, 3 credits, 5 ECTS:**
**Course Description**
An Overview of Ethics, Ethics for IT Professionals, Computer and Internet Crime, Privacy, Freedom of Expression, Intellectual Property, Software Development, The Impact of Information Technology on the Quality of Life, Social Networking, Ethics of IT Organizations.

**MCT410 Introduction to Capstone Design, 1 credit 0 ECTS:**
**Course Description**
The course aims to prepare the senior year students for their capstone design projects, and to provide guidance with the selection of their project advisors, topics and teams. The students are introduced to the basic features of the Capstone Design process, elements of a Capstone Project Report and written oral presentation techniques.

Probability and counting, permutation and combination. Some probability laws, Axioms of probability. Random variables and discrete distributions. Continuous distributions. Joint distributions. Mathematical Expectation, Some Discrete Probability Distributions, Some Continuous Probability Distributions.

**MCT411-Capstone Team Project, 3 credits, 12 ECTS:**
**Course Description**
The purpose of the course is to develop an understanding of independent research through the study of a particular Mechatronics Engineering topic of interest. The special project is an exercise in the professional application of specialist skills and experience developed in Mechatronics Engineering program. Research topics, which may be principally experimental, theoretical or applied, will be chosen in consultation with a project supervisor.

**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.

## Restricted Non-Technical Courses

**ECC 426 Engineering Economy, 3 Credits, 5 ECTS**
**Objectives of the Course:**
Discuss principles and economic analysis of decision making. Discuss cost concepts, make-versus purchase studies; Analyse principles of money-time relationships. Work on cash flow analysis. Analyse application of money-time relations. Analyse supply and demand relations. Analyse price and demand relations. Analyse breakeven point analysis and effects of inflation on money-time relationships

**Course Description**
Principles and economic analysis of engineering decision making. Cost concept. Economic environment. Price and demand relations. Competition. Make-versus-purchase studies. Principles and applications of money-time relationships. Depreciation. Money and banking. Price changes and inflation. Business and company finance

**ECC 427 Management for Engineers, 3 Credits, 5 ECTS**
**Objectives of the Course:**
Discuss principles of management, Discuss functions of managers, Discuss organisation and environment, Discuss marketing, production and personnel management, Discuss marketing control, Discuss accounting and financial reports, Discuss budgeting and overall control/

**Course Description**
Principles of management. Functions of managers. Organisation and the environment. Marketing management. Production management. Personnel management. Managerial control. Accounting and financial reports. Budgetting and overall control.

**AİT 101  Atatürk İlkeleri Ve İnkılap Tarihi I,  2 Kredi, 2 AKTS**
**Ders Tanımı**
İnkılap Tarihi ilgili kavramlar ve kaynakların açıklanması. Osmanlı Devleti'nin yıkılışını ve Türk İnkılâbını hazırlayan sebeplere toplu bir bakış (İç sebepler, Dış sebepler, Osmanlı Devleti'nin jeopolitik ve ekonomik durumu) 19. yüzyılda Osmanlı Devleti'nde yenileşme hareketleri (Tanzimat, Islahat ve I. Meşrutiyet dönemleri) Birinci Dünya Savaşı öncesi askeri ve siyasi gelişmeler (Osmanlı Devleti'nin Dağılması sürecinde meydana gelen iç ve dış olaylar (Kırım Savaşı, 1877-78 Osmanlı-Rus Savaşı, Makedonya meselesi, 31 Mart olayı, Girit ve Bosna- Hersek'in elden çıkışı, Trablusgarp Savaşı, Balkan Savaşları) Osmanlı Devleti'nin son dönemindeki fikir akımları (Osmanlıcılık, İslamcılık, Türkçülük, Batıcılık, Adem-i Merkeziyetçilik, Sosyalizm) ve II. Meşrutiyetin sürecinde Osmanlı Devleti Birinci

Dünya Savaşı,(Savaşın çıkışı, Osmanlı Devleti'nin savaşa dâhil oluşu, cepheler ve savaşın sonu),Osmanlı Devletini Paylaşma Projeleri ile Mondros Mütarekesi Milli Mücadele Dönemi askeri ve siyasi gelişmeler İşgallerin başlaması, Azınlıkların Faaliyetleri ve ayrılıkçı cemiyetler, milli cemiyetler Mustafa Kemal Paşanın İstanbul'daki faaliyetleri, Mustafa Kemal Paşanın Samsun'a çıkması. Amasya Genelgesi, Erzurum,Batı Anadolu ve Sivas Kongreleri. Son Osmanlı Mebusan Meclisi'nin toplanması, İstanbul'un işgal edilmesi. T.B.M.M.'nin toplanması ve niteliği. T.B.M.M.'nin açılmasından sonraki askeri ve siyasi gelişmeler. T.B.M.M.'nin açılmasından sonraki askeri ve siyasi gelişmeler. Mudanya Mütarekesi

### AİT 102 Atatürk İlkeleri Ve İnkılap Tarihi II,  2 Kredi, 2 AKTS
**Ders Tanımı**
Lozan Barış Konferansı ve sonuçları,Türk İnkılap Hareketleri. Siyasi Alanda Yapılan İnkılaplar (Saltanatın kaldırılması, Ankara'nın başkent oluşu, Cumhuriyetin ilanı ve Halifeliğin kaldırılması). Çok Partili Rejim Denemeleri ve Sonuçları. (Terakki perver Cumhuriyet Partisi, Serbest Cumhuriyet Partisi, Şeyh Sait isyanı,Menemen Olayı, Atatürk'e karşı suikast girişimi) Hukuk Alanında Yapılan İnkılaplar. Eğitim ve Kültür alanında gerçekleştirilen inkılâplar (Tevhid-i Tedrisat kanunu, Latin harflerinin kabulü, Millet mektepleri, Türk Tarih ve Dil kurumlarının kurulması ve faaliyetleri, Türk tarih tezi, güneş-dil teorisi, 1933 Üniversite reformu, Halkevleri), Sağlık alanındaki gelişmeler, Sosyal Alanda Yapılan İnkılaplar. Ekonomi ve Sağlık Alanında Yapılan İnkılaplar. Atatürk Dönemi Türk Dış Politikası. (1923-1932 dönemi) Atatürk Dönemi Türk Dış Politikası. (1932-1938 dönemi) Atatürkçü Düşünce Sistemi'nin tanımı, kapsamı, Atatürk İlkeleri (Cumhuriyetçilik, Milliyetçilik Halkçılık) Atatürkçü Düşünce Sistemi'nin tanımı, kapsamı, Atatürk İlkeleri(Devletçilik, Laiklik, İnkılapçılık) Atatürk'ten sonraki Türkiye (İnönü'nün Cumhurbaşkanlığı, II. Dünya Savaşı ve Türkiye, Demokrat Parti'nin kuruluşu ve çok partili hayata geçiş)

### TUR 101 Türk Dili I,  2 Kredi, 2 AKTS
**Ders Tanımı**
Sözlü anlatım ve konuşmanın insan hayatındaki önemi, Konuşma becerilerinin geliştirilmesi, Doğru telaffuzda dikkat edilmesi gereken hususlar. Konuşma ile ilgili Temel Kavramlar; Konuşma, Ses, Boğumlanma, Sıklık,Tonlama, Ezgi, Vurgu, Duraklama, Tını, Pes ve Tiz ses. Doğru, Güzel ve Etkili Konuşmanın Temel İlkeleri; Açıklık, Doğallık,İnandırıcılık, İlginçlik, Konuşmacının bilgi ve donanımı, Ön çalışma, Konuşmayı destekleyen yardımcı unsurlar. Konuşma bozuklukları ve giderilmesi; Kişilik ve davranışla ilgili konuşma bozuklukları, Söyleyişle ilgili konuşma yanlışlıkları, Bilmemekten kaynaklanan konuşma yanlışlıkları, Başarılı bir konuşma için gerekli unsurlar. Beden dili kullanımının önemi, Konuşmacının beden dili özellikleri, Bazı beden dili sinyalleri ve bunların anlamları. Dinleme nedir? Dinlediğini anlama, dinlemeyi belirleyen etkenler, Dinlediğini anlama becerisini kazandırma. Hazırlıksız Konuşmalar; Telefonda konuşma, Özür dileme, Kutlama, Sohbet etmek, Adres sorma, Tanışma tanıştırılma,Yer yön tarifi. Hazırlıklı konuşmalar; Konunun belirlenmesi, Konuşma planının çıkarılması, Konuşmanın denenmesi, Sunum sırasında yapılması gerekenler. Tartışma Konuşmaları; Açık oturum, Sempozyum, Panel, Forum, Münazara. Topluluk Konuşmaları; Nutuk, Konferans, Seminer, Kurultay. İletişim ve Anlama,  Etkili Dinleme, Not Alma Yöntem ve Teknikleri, Sese Dayalı Dil Yanlışları

**TUR 102 Türk Dili II, 2 Kredi, 2 AKTS**
**Ders Tanımı**
Sözlü anlatım ve konuşmanın insan hayatındaki önemi, Konuşma becerilerinin geliştirilmesi, Doğru telaffuzda dikkat edilmesi gereken hususlar. Konuşma ile ilgili Temel Kavramlar; Konuşma, Ses, Boğumlanma, Sıklık, Tonlama, Ezgi, Vurgu, Duraklama, Tını, Pes ve Tiz ses. Doğru, Güzel ve Etkili Konuşmanın Temel İlkeleri; Açıklık, Doğallık,İnandırıcılık, İlginçlik, Konuşmacının bilgi ve donanımı, Ön çalışma, Konuşmayı destekleyen yardımcı unsurlar. Konuşma bozuklukları ve giderilmesi; Kişilik ve davranışla ilgili konuşma bozuklukları, Söyleyişle ilgili konuşma yanlışlıkları, Bilmemekten kaynaklanan konuşma yanlışlıkları, Başarılı bir konuşma için gerekli unsurlar. Beden dili kullanımının önemi, Konuşmacının beden dili özellikleri, Bazı beden dili sinyalleri ve bunların anlamları. Dinleme nedir? Dinlediğini anlama, dinlemeyi belirleyen etkenler, Dinlediğini anlama becerisini kazandırma. Hazırlıksız Konuşmalar; Telefonda konuşma, Özür dileme, Kutlama, Sohbet etmek, Adres sorma, Tanışma tanıştırılma,Yer yön tarifi. Hazırlıklı konuşmalar; Konunun belirlenmesi, Konuşma planının çıkarılması, Konuşmanın denenmesi, Sunum sırasında yapılması gerekenler. Tartışma Konuşmaları; Açık oturum, Sempozyum, Panel, Forum, Münazara. Topluluk Konuşmaları; Nutuk, Konferans, Seminer, Kurultay. İletişim ve Anlama, Etkili Dinleme, Not Alma Yöntem ve Teknikleri, Sese Dayalı Dil Yanlışları

**YIT 101 Turkısh for Foreıgn Students I, 2 Credits , 2 ECTS**
**Course Description**
Türkçenin temel kuralları, ses bilgisi(sesler, alfabe okuma kuralları), kelime bilgisi (Kelimelerin yapı olarak tanınması, kelimeler arası ilişkiler), cümle bilgisi(cümle kuruluşları, genel yapı ve cümle türleri), okuma –yazma( okuma kuralları ve yazı teknikleri, yazım kuralları, konuşma ve yazı dilinin kavranması, yazım kuralları.), okuma –anlama (okuduğunu anlama teknikleri, metinleri üzerinde uygulamalar), dinleme( dinlediğini anlama, dinlediğini not alarak gerekli yorumu yapma, öğrencilerin kendi mesleklerine uygun metinler üzerinde uygulamalar), konuşma(konuşma tekniklerini öğrenme, belirli vurgu, tonlama gibi şekillerin öğrenilmesi uygun metinler üzerinde uygulamalar), Uluslararası dil düzeyine göre A1 başlatılmıştır.

**YIT 102 Turkısh for Foreıgn Students II,  2 Credits , 2 ECTS**
**Course Description**
Türkçenin kelime bilgisi (Kelimelerin yapı olarak tanınması, kelimeler arası ilişkiler), cümle bilgisi(cümle kuruluşları, genel yapı ve cümle türleri), okuma –yazma( okuma kuralları ve yazı teknikleri, yazım kuralları, konuşma ve yazı dilinin kavranması, yazım kuralları.), okuma –anlama (okuduğunu anlama teknikleri, metinleri üzerinde uygulamalar), dinleme( dinlediğini anlama, dinlediğini not alarak gerekli yorumu yapma, öğrencilerin kendi mesleklerine uygun metinler üzerinde uygulamalar), konuşma(konuşma tekniklerini öğrenme, belirli vurgu, tonlama gibi şekillerin öğrenilmesi uygun metinler üzerinde uygulamalar)Uluslararası düzeye göre A1 devam etmektedir.

**AIT 103 Principles of Ataturk and the History of Turkish Revolution I, 2 Credits , 2 ECTS**
**Course Description**

A Concise Political History of Ottoman Empire 1300-1914. Decline and the Ottoman Modernization. Ottoman State and Society in Classical Period. The organisation of National Resistance Movement: The Circular of Amasya. The Congresses of Erzurum and Sivas Invasions, Mustafa Kemal and National Resistance Movement Ottoman Empire in the First World War I Armistice of Mudros. The Treaty of Sevres and the National Liberation War against the Armenians and Greeks I. The Armistice of Mudanya and the Peace Treaty of Lausanne

**AİT 104 Principles of Ataturk and the History of Turkish Revolution II, 2 Credits , 2 ECTS**
**Course Description**
The political, social, economical and cultural transformation in the Republic of Turkey; The six principles of Atatürk and Kemalizm; Turkish Foreign Policy during the Atatürk period.