Ek-2: Ders İçerikleri

ALANYA ALAADDİN KEYKUBAT UNIVERSITY RAFET KAYIŞ FACULTY OF ENGINEERING DEPARTMENT OF MECHANICAL ENGINEERING (ENGLISH) COURSE CONTENTS						
YEAR I – SEMESTER I						
COURSE CODE	**COURSE NAME**	**COURSE HOUR**			**ECTS**	**CONTENT**
		T	**P**	**L**		
TDB 101	TURKISH LANGUAGE I	2	0	0	2	Definition of language, language and thought, language and culture, world languages (in point of origin and structure), the significance of Turkish language among world languages, the historical development of Turkish language, the structure of Turkish language, Turkish phonetics, today's Turkish language, the act of writing and the rules of writing (orthography), spelling rules, the right expression of thought, scientific language and Turkish as a scientific language, Turkish poetry.
MCE 101	INTRODUCTION TO MECHANICAL ENGINEERING	2	0	0	3	Overview of the major fields of mechanical engineering including design and manufacturing, theory of machines, solid mechanics, fluid mechanics, thermal sciences, and energy systems. Project planning and implementation. Introductory concepts of engineering design process and statistical methods. Oral and written presentation and professional writing. General and professional ethics. Invited speakers from graduates and industry.
MCE 103	TECHNICAL DRAWING	2	2	0	7	Technical drawing in engineering. Descriptive geometry. Line types and lettering. Fundamentals of dimensioning. Principles of projection. Orthographic views. Section views. Isometric perspectives. Symbols for surface finishing and welding. Mechanical assembly drawing. Fasteners, limits, and fits. Geometric tolerances.
MCE 105	PHYSICS I	3	0	1	5	Vectors. Motion in one and two dimensions. Newton's laws and its applications. Work and energy. Conservation of mechanical energy. Momentum and motion of systems. Static equilibrium of rigid bodies. Rotation and angular momentum. Newton’s law of universal gravitation. Laboratory applications.
MCE 107	MATHEMATICS I	4	0	0	5	Introduction to general mathematics with basic mathematical concepts. Single variable functions and some special functions. Limit and continuity. Derivatives and derivatives of some special functions. Maximum/minimum problems. Curve sketching. Indeterminate forms and l’Hopital’s rule. Indefinite integral. Integration rules.
MCE 109	INTRODUCTION TO COMPUTER AND INFORMATION SYSTEMS	1	1	0	2	Computer systems and applications. Input/output and storage. Internet, electronic mail, data and file transfer. Wired and wireless communication. Application software such as text editors, visualizations, spreadsheets, equation solvers, and databases. Computational error. Introduction to scientific problem solving through algorithms.
MCE 111	CHEMISTRY	3	0	1	4	The scope of chemistry and stoichiometry. Atoms and the atomic theories. The periodic table and some atomic properties. Chemical bonding. Molecular geometry. Gases and gas laws. Liquids, solids, and solutions. Thermochemistry. Chemical equilibrium. Acids and bases. Laboratory applications.
SEC 101	*NONTECHNICAL ELECTIVE I*	2	0	0	2	
KRP 101	*CAREER PLANNING*	2	0	0	2	Career concept, career planning, relationship between career planning and vocational counseling. Individual career development, CV preparation and CV types. Job interview, career planning process. Evaluation of the Turkish education system in line with career planning. Applicability of career counseling in schools, lifelong career planning, career planning in retirement.
SEC 101.1	*HISTORY OF ART*	2	0	0	2	The aim of the course is to give the students the first knowledge about the birth and development of art history and to teach the terminology of the history of art and the basic knowledge about Central Asian Turkish Art and Turkish Islamic Art which constitute the basis of Turkish Art.
SEC 101.2	*HISTORY OF PHILOSOPHY OF SCIENCE*	2	0	0	2	The aim of this course is to familiarize students with the basic concepts of art and aesthetics and to gain a perspective on the social history of art.
SEC 101.3	*DISASTER AWARENESS*	2	0	0	2	General information about disaster awareness, earthquake, flood, drought, landslide hazard and risk management.
SEC 101.4	*ELOQUENT SPEECH*	2	0	0	2	Basic concepts and terms related to speech, elements that make speech effective and beautiful, the fundamentals of speech, the types of speech, the issues to be considered for speaking correctly, beautifully and effectively, expression and language mistakes, speech disorders, effective speech techniques.
SEC 101.5	*BASIC FIRST AID AND EMAKERGENCY*	2	0	0	2	This course covers basic first aid knowledge and methods for responding to various emergency situations. Students are taught both theoretically and practically how to perform essential first aid interventions in cases such as loss of consciousness, airway obstruction, bleeding, injuries, fractures, burns, poisoning, and sudden illnesses. The course also addresses appropriate and safe response strategies in emergency scenarios such as earthquakes, fires, and traffic accidents. It aims to equip individuals with life-saving first aid skills and the ability to make effective decisions in emergencies.
SEC 101.6	*ARCHERY*	2	0	0	2	Collaborative teaching teamwork practices - Creative games and applications in sports - Learning Football Basic Skills with interdisciplinary teaching and collaboration - Teaching and applications of Basic Archery Skills.

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SEC 101.7	*BOXING, KARATE AND TAEKWONDO*	2	0	0	2	Collaborative teaching teamwork practices - Creative games and applications in sports - Learning Boxing, Karate and Taekwondo Basic Skills with interdisciplinary teaching and collaboration - Teaching and applications of Basic Boxing, Karate and Taekwondo.
SEC 101.8	*FOOTBALL*	2	0	0	2	Laws of the game; field of play, ball, players, equipment, referee, match officials, duration, start and restart, offside, fouls, free kicks, penalty kick, throw-in, goal kick, corner kick. Law changes, video assistant referee (VAR) protocol. History of football, world records. Football history in Türkiye, World cup and European cup adventures. Turkish football federation, history and achievements of big three clubs in Türkiye.
SEC 101.9	*VOLLEYBALL*	2	0	0	2	Characteristic features of volleyball, history and rules of the game, warm-up and exercise, ball, pass, cuff, service, dunk, block, defense techniques, game and game preparation work: 1. Simple movements to make constant, 2. To make the same movements, 3. Making individual techniques in team play form, 4. Repeating movements in difficult and different environments, 5. What is skill 6. How to gain skill.
SEC 101.10	*BASKETBALL*	2	0	0	2	History of basketball, game rules, knowledge and skills about basic techniques and tactics.
SEC 101.11	*TENNIS*	2	0	0	2	History of tennis, game rules, knowledge and skills about basic techniques and tactics.
SEC 101.12	*TABLE TENNIS*	2	0	0	2	History of table tennis, game rules, knowledge and skills about basic techniques and tactics.
SEC 101.13	*FOLK DANCES*	2	0	0	2	Local, national and international folk dance cultures and their basic dance steps are handled.
SEC 101.14	*MUSIC CULTURE*	2	0	0	2	Historical background of musical traditions in Turkey. Turkish folk music, composers, compositions and instruments. Turkish classical music, composers, compositions and instruments. General modes in Turkish music. Variation of music cultures in Anatolian regions. Structural comparison of Turkish music and Western music. Contemporary Turkish music composers.
SEC 101.15	*ARTS & PAINTING*	2	0	0	2	This course aims to teach the fundamental concepts of art and painting techniques. Students learn essential visual art elements such as color theory, composition, perspective, and texture, while practicing with various materials and techniques including pencil drawing, watercolor, acrylic, and oil painting. A brief overview of art history and different art movements helps students develop their artistic perspectives. The course encourages creativity and supports the expression of individual ideas through painting.
SEC 101.16	*THEATRE AND CINEMA*	2	0	0	2	This course firstly aims students to overcome their social habits, pattern attitudes and reactions. It emphasises on working as a group and learning to be creative collaboratively.
SEC 101.17	*HEALTHY LIVING*	2	0	0	2	Students who successfully complete this course; Knows the dynamics necessary for a healthy life,. Adopts the concept that a healthy life is one of the fundamental rights and freedoms of every citizen, Knows what are the duties of individuals and society to create and protect healthy life.
SEC 101.18	*NUTRITION*	2	0	0	2	This course examines the fundamental principles of nutrition and its effects on human health. It covers macro- and micronutrients, as well as the processes of digestion, absorption, and metabolism in detail. Nutritional needs during different life stages (childhood, adolescence, pregnancy, and old age), energy balance, the functions of nutrients, and the consequences of their deficiencies are discussed. The course also explores nutrition-related diseases, healthy meal planning, and current dietary approaches. It aims to help students develop informed eating habits for a healthy lifestyle.
SEC 101.19	*MEDIA LITERACY*	2	0	0	2	Media Literacy course in Turkey has entered into all over the world as well as elective courses in the curriculum. In this context, the importance of this course to the students of our university, to explain the method, methodology, and to provide information about Media Writing constitutes the content of the course.
SEC 101.20	*MATHEMATICAL ESTHETICS*	2	0	0	2	The aim of this course is to familiarize students with the basic concepts of art and aesthetics and to gain a perspective on mathematical theories in aesthetics.
SEC 101.21	*INDUSTRIAL DESIGN*	2	0	0	2	Basic information about the discipline and the profession of industrial design, the phases of the industrial design process; concepts for form, function, use and user in industrial design, the relationship among industrial design, engineering, materials, manufacturing technologies, economy, marketing, innovation, culture and communication; introducing the history of the industrial design profession, the development of industrial design in Turkey.
SEC 101.22	*BASIC PHOTOGRAPHY*	2	0	0	2	Basic photography knowledge. The importance of photography in graphic design. Composition in photography. Machine use. Photography information in outdoor, indoor and studio.
SEC 101.23	*SURFING*	2	0	0	2	Definition, types, philosophy, basic concepts, programs and application principles of water sports; Basic concepts of windsurfing and definition and use of surf materials in water, knowledge about wind and direction, applying basic surfing learning techniques and demonstrating the ability to use basic surfing.
SEC 101.24	*JAPANESE I*	2	0	0	2	Reading and writing of the text books which include the structures and expressions that have to be learned at the lower intermediate level, and meaning of Kanji characters.
SEC 101.25	*JAPANESE II*	2	0	0	2	Japanese history, culture and civilization.

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SEC 101.26	*MYTHOLOGY*	2	0	0	2	Introduction to mythological thinking; the foundations of mythology; mythological divisions and inequalities; mythological structures.
SEC 101.27	*ANCIENT CITY*	2	0	0	2	With the settled life of humanity, civilizations and cities established by civilizations began to take shape in line with the availability of geographical locations. Cities have been developed with various business areas such as agriculture and trade. Cities, which reflect the characteristic identities of civilizations and which are the physical equivalent of living cultures, have reached our age for thousands of years. As a result of archaeological research and studies carried out in ancient cities, comprehensive information is obtained about the civilizations they founded. In the light of this information, major civilizations and ancient cities are examined within the scope of the course, and thus the connections between the past and our times are explained with both life styles and urban architecture and artistic features.
SEC 101.28	*SOCIOLOGY*	2	0	0	2	Introduction to sociological thinking; the foundations of society; social divisions and inequalities; social structures, social practices and social institutions; social change.
SEC 101.29	*PHILOSOPHY*	2	0	0	2	This course aims to introduce the fundamental concepts, problems, and intellectual approaches of philosophy. Core philosophical topics such as knowledge, reality, ethics, free will, existence, and justice are explored to help students develop critical thinking and analytical skills. The views of major philosophers and philosophical movements from Antiquity to the present are examined from a historical perspective. Throughout the course, students engage in intellectual discussions and gain the ability to develop and defend their own ideas.
SEC 101.30	*ANCIENT DNA: HISTORY OF THE PAST*	2	0	0	2	"Ancient DNA studies" are generally defined as an area that includes DNA harvesting and analysis studies from highly biological samples that have been severely damaged and have no protection. DNAs derived from materials found in archaeological excavations shed light on the past. Research on ancient DNA (aDNA) obtained from archaeological and paleontological remains allows direct access to genetic information in the past. In this context, ancient DNA (aDNA) studies have an interdisciplinary character. This course covers the researches on ancient DNA and how to make DNA isolation from fossils extracted from archaeological excavations (human, animal, plant, etc.), and later on how gender determination and bioinformatics-based polymorphism studies are conducted.
SEC 101.31	*GENETIC HERITAGE*	2	0	0	2	Mitosis and Meiosis, Mendelian Genetics, Extensions of Mendelian Genetics, Linkage, Crossing over and Mapping in Eukaryotes, Sex Chromosomes, Chromosome Mutations, DNA Structure and Analysis, DNA Replication and Recombination, Chromosome Structure and DNA Sequence Organization, Transcription, Translation and Proteins, Gene Mutation, DNA Repair and Transposable Elements, Genetics of Bacteria, Regulation of Gene Expression in Prokaryotes, Regulation of Gene Expression in Eukaryotes, Recombinant DNA Technology.
SEC 101.32	*MODERN GENETIC APPLICATIONS: GENE CLONNING*	2	0	0	2	History of gene cloning, cloning applications, and ethics in cloning.
SEC 101.33	*FOOD AND FOOD CULTURE*	2	0	0	2	This course covers the historical development of food culture, food habits in different cultures, cooking techniques, and healthy eating practices. It also examines the socioeconomic effects of food consumption and the connection between food and society. The course discusses the cultural and religious significance of food, the preparation and presentation of traditional dishes, and culinary traditions. Environmental topics such as sustainable food production, organic farming, and preventing food waste are also addressed. Students analyze the transformation of food culture in the modern world through examples from both local and international cuisines.
SEC 101.34	*DIET AND EFFECTS*	2	0	0	2	General principles of human nutrition, Food chemistry; Nutritional value of foods; Balanced diet; Possible alternative solutions to nutritional problems, Food technologies, Cooking technologies, Food in collective nutrition establishments, Hygiene and environmental health, Dry nutrition health. Types, quantity, properties and functions of nutrients essential in nutrition; Composition of foods, Physical and chemical properties; Common nutritional problems and solutions; Nutrition in diseases. Separation of foodstuffs according to their nutritional value.
SEC 101.35	*TRADITIONAL FOODS*	2	0	0	2	Our foods in Turkish nutritional culture and their detailed content.
SEC 101.36	*ORGANIC AGRICULTURE*	2	0	0	2	It contains information about the principles, objectives and rules of organic agriculture, processes of organic agriculture, control, certification and legal regulations, processing of organic foods and additives used.
SEC 101.37	*WESTERN CIVILIZATION HISTORY I*	2	0	0	2	The course aims to explore the foundations of Western societies and cultures and the transformations they underwent from prehistory up to Renaissance. Contains how ancient Mediterranean and Near East interacted, which political structures and cultures changed over time, and the development of Western religions and cultures.
SEC 101.38	*WESTERN CIVILIZATION HISTORY II*	2	0	0	2	The course aims to explore the foundations of Western societies and cultures and the transformations they underwent from Renaissance up to World Wars. Contains how colonialism, religious reforms and revolutions affected the civilization, which political structures and cultures changed over time, and the development of Western religions and cultures.

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SEC 101.39	*HISTORY AND TECHNIQUES OF FISHING*	2	0	0	2	The history of angling, fishing bans and regulations, fishing rod types, rod making, natural and artificial baits, feeding, hunting of some species living in fresh and salt water, and some dangerous fish species encountered in fishing will be explained.
YEAR I – SEMESTER II						
COURSE CODE	**COURSE NAME**	**COURSE HOUR**			**ECTS**	**CONTENT**
		T	**P**	**L**		
TDB 102	TURKISH LANGUAGE II	2	0	0	2	Written expression, method, and planning of written expression, writing exercise, scientific texts (article-report-critic), official texts (petition-resume), genres of literature, essay, column, travel writing, biography, story, novel, verbal literature, verbal expression, and communication.
MCE 102	STATICS	3	0	0	5	Fundamental concepts and principles of mechanics, vectors, and force systems. Free body diagram. Equilibrium of particles and rigid bodies in two and three dimensions. Analysis of structures, trusses, frames and machines. Shear and bending moments in beams. Center of gravity. Centroids. Area moment of inertia. Friction.
MCE 104	COMPUTER AIDED TECHNICAL DRAWING	2	2	0	5	Introduction to computer aided technical drawing. Performing the following functions via technical drawing software: Drawing, modifying, dimensioning, perspective drawings, multi-view projection, sectioning, drawing of machine elements, mechanical assemblies, general concepts in 3D modeling, creating parts in 3D design and solid modeling, transferring 3D parts to drafting detailing, assembly modeling and assembling parts, surface modeling.
MCE 106	PROBABILITY AND STATISTICS	2	0	0	3	Product rule. Permutation. Combination. Concept of probability (Kolmogorov axioms). Conditional probability and independence. Random variables. Probability density function, distribution function, and discrete distributions. Continuous distributions. Chebchev's inequality. Estimator and its properties. Maximum likelihood estimators. Confidence intervals. Hypothesis testing. One and two sample tests for means. Regression.
MCE 108	MATHEMATICS II	4	0	0	5	Definite integral and its applications. Improper integrals. Infinite sequences and series. Vectors in space. Vector-valued functions. Multivariable functions and partial derivatives. Multiple integrals. Integration on vector fields.
MCE 110	INTRODUCTION TO SCIENTIFIC PROGRAMMING	2	2	0	5	Numbering systems. Basic computer hardware. Programming with C, C++ or another appropriate programming language. Logic statements, constants, variables, expressions, loops, arrays, selective structures, functions and recursive programming. Pointers and computer interfacing.
MCE 112	PHYSICS II	3	0	1	5	Coulomb's law and electric fields. Gauss's law. Electric potential. Electrostatic energy. Properties of insulators. Flow and resistance. DC circuits. Magnetic field and sources of magnetic field. Faraday's law. Magnetic fields in matter. Electromagnetic oscillations. AC circuits. Laboratory applications.
YEAR II – SEMESTER III						
COURSE CODE	**COURSE NAME**	**COURSE HOUR**			**ECTS**	**CONTENT**
		T	**P**	**L**		
ATA 101	PRINCIPLES OF ATATURK AND TURKISH REVOLUTION HISTORY I	2	0	0	2	A definition of revolution/renovation, the aim and the importance of the Turkish history of renovation, general state of the ottoman empire, the reason for the decline, efforts to save the Ottoman Empire, the current ideals, the first world war, societies, Mustafa Kemal in Anatolia and the congresses, the opening of the great Turkish national assembly.
MCE 201	STRENGTH OF MATERIALS I	3	0	0	5	Concept of stress. Normal stress, shear stress, and stress components. Stress and strain in axial loading. Hooke's Law, Saint-Venant's Principle, deformations of members, Poisson's ratio, statically indeterminate problems, and shearing strain. Torsion of circular shafts. Stresses and deformations in a circular shaft, angle of twist, statically indeterminate shafts, and design of transmission shafts. Shear and bending-moment diagrams in the beams, bending of beams and normal stresses, bending of members made of several materials, eccentric axial loading in a plane of symmetry, shear flow and shear stresses in the beam.
MCE 203	DYNAMICS	3	0	0	6	Kinematics of particles, systems of particles, and rigid bodies. Moving reference frames. Kinetics of particles, systems of particles, and rigid bodies. Equilibrium, energy, linear momentum, and angular momentum.
MCE 205	THERMODYNAMICS I	3	0	0	5	Basic concepts of thermodynamics. Properties of pure substances, ideal gases and compressibility factor. Energy, energy transfer and the first law of thermodynamics. Energy analysis for closed systems and control volumes. The second law of thermodynamics. Heat engines and refrigerators. Carnot cycle. Entropy, entropy generation, and entropy balance. Isentropic efficiencies of steady-flow devices. Exergy analysis.
MCE 207	MATERIAL SCIENCE	4	0	0	5	Relationship between structure and properties of materials. Atomic bonding, crystalline structures, crystal defects and imperfections. Phase diagrams and equilibrium. Microstructural development. Properties of engineering materials. Metals and alloys. Production of iron, steel and non-ferrous metals. Steel alloys and nonferrous alloys. Deformation of metals. Failure and testing. Heat treatment of metals. Ceramics, mechanical properties of ceramics, and applications and processing of ceramic materials. Polymers, mechanical properties of polymers, and applications and processing of polymeric materials.

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MCE 209	DIFFERENTIAL EQUATIONS	4	0	0	5	Mathematical formulation of ordinary differential equations. Methods of solution and applications of first order and second order differential equations. Power series solutions. Solutions by Laplace transform. Solutions of first order linear systems. Solutions of initial value problems. Introduction to partial differential equations.
SEC 201	*NONTECHNICAL ELECTIVE II*	2	0	0	2	
SEC 201.1	*HISTORY OF ART*	2	0	0	2	The aim of the course is to give the students the first knowledge about the birth and development of art history and to teach the terminology of the history of art and the basic knowledge about Central Asian Turkish Art and Turkish Islamic Art which constitute the basis of Turkish Art.
SEC 201.2	*HISTORY OF PHILOSOPHY OF SCIENCE*	2	0	0	2	The aim of this course is to familiarize students with the basic concepts of art and aesthetics and to gain a perspective on the social history of art.
SEC 201.3	*DISASTER AWARENESS*	2	0	0	2	General information about disaster awareness, earthquake, flood, drought, landslide hazard and risk management.
SEC 201.4	*ELOQUENT SPEECH*	2	0	0	2	Basic concepts and terms related to speech, elements that make speech effective and beautiful, the fundamentals of speech, the types of speech, the issues to be considered for speaking correctly, beautifully and effectively, expression and language mistakes, speech disorders, effective speech techniques.
SEC 201.5	*BASIC FIRST AID AND EMAKERGENCY*	2	0	0	2	This course covers basic first aid knowledge and methods for responding to various emergency situations. Students are taught both theoretically and practically how to perform essential first aid interventions in cases such as loss of consciousness, airway obstruction, bleeding, injuries, fractures, burns, poisoning, and sudden illnesses. The course also addresses appropriate and safe response strategies in emergency scenarios such as earthquakes, fires, and traffic accidents. It aims to equip individuals with life-saving first aid skills and the ability to make effective decisions in emergencies.
SEC 201.6	*ARCHERY*	2	0	0	2	Collaborative teaching teamwork practices - Creative games and applications in sports - Learning Football Basic Skills with interdisciplinary teaching and collaboration - Teaching and applications of Basic Archery Skills.
SEC 201.7	*BOXING, KARATE AND TAEKWONDO*	2	0	0	2	Collaborative teaching teamwork practices - Creative games and applications in sports - Learning Boxing, Karate and Taekwondo Basic Skills with interdisciplinary teaching and collaboration - Teaching and applications of Basic Boxing, Karate and Taekwondo.
SEC 201.8	*FOOTBALL*	2	0	0	2	Laws of the game; field of play, ball, players, equipment, referee, match officials, duration, start and restart, offside, fouls, free kicks, penalty kick, throw-in, goal kick, corner kick. Law changes, video assistant referee (VAR) protocol. History of football, world records. Football history in Türkiye, World cup and European cup adventures. Turkish football federation, history and achievements of big three clubs in Türkiye.
SEC 201.9	*VOLLEYBALL*	2	0	0	2	Characteristic features of volleyball, history and rules of the game, warm-up and exercise, ball, pass, cuff, service, dunk, block, defense techniques, game and game preparation work: 1. Simple movements to make constant, 2. To make the same movements, 3. Making individual techniques in team play form, 4. Repeating movements in difficult and different environments, 5. What is skill 6. How to gain skill.
SEC 201.10	*BASKETBALL*	2	0	0	2	History of basketball, game rules, knowledge and skills about basic techniques and tactics.
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SEC 201.16	*THEATRE AND CINEMA*	2	0	0	2	This course firstly aims students to overcome their social habits, pattern attitudes and reactions. It emphasises on working as a group and learning to be creative collaboratively.
SEC 201.17	*HEALTHY LIVING*	2	0	0	2	Students who successfully complete this course; Knows the dynamics necessary for a healthy life,. Adopts the concept that a healthy life is one of the fundamental rights and freedoms of every citizen, Knows what are the duties of individuals and society to create and protect healthy life.
SEC 201.18	*NUTRITION*	2	0	0	2	This course examines the fundamental principles of nutrition and its effects on human health. It covers macro- and micronutrients, as well as the processes of digestion, absorption, and metabolism in detail. Nutritional needs during different life stages (childhood, adolescence, pregnancy, and old age), energy balance, the functions of nutrients, and the consequences of their deficiencies are discussed. The course also explores nutrition-related diseases, healthy meal planning, and current dietary approaches. It aims to help students develop informed eating habits for a healthy lifestyle.

SEC 201.19	*MEDIA LITERACY*	2	0	0	2	Media Literacy course in Turkey has entered into all over the world as well as elective courses in the curriculum. In this context, the importance of this course to the students of our university, to explain the method, methodology, and to provide information about Media Writing constitutes the content of the course.
SEC 201.20	*MATHEMATICAL ESTHETICS*	2	0	0	2	The aim of this course is to familiarize students with the basic concepts of art and aesthetics and to gain a perspective on mathematical theories in aesthetics.
SEC 201.21	*INDUSTRIAL DESIGN*	2	0	0	2	Basic information about the discipline and the profession of industrial design, the phases of the industrial design process; concepts for form, function, use and user in industrial design, the relationship among industrial design, engineering, materials, manufacturing technologies, economy, marketing, innovation, culture and communication; introducing the history of the industrial design profession, the development of industrial design in Turkey.
SEC 201.22	*BASIC PHOTOGRAPHY*	2	0	0	2	Basic photography knowledge. The importance of photography in graphic design. Composition in photography. Machine use. Photography information in outdoor, indoor and studio.
SEC 201.23	*SURFING*	2	0	0	2	Definition, types, philosophy, basic concepts, programs and application principles of water sports; Basic concepts of windsurfing and definition and use of surf materials in water, knowledge about wind and direction, applying basic surfing learning techniques and demonstrating the ability to use basic surfing.
SEC 201.24	*JAPANESE I*	2	0	0	2	Reading and writing of the text books which include the structures and expressions that have to be learned at the lower intermediate level, and meaning of Kanji characters.
SEC 201.25	*JAPANESE II*	2	0	0	2	Japanese history, culture and civilization.
SEC 201.26	*MYTHOLOGY*	2	0	0	2	Introduction to mythological thinking; the foundations of mythology; mythological divisions and inequalities; mythological structures.
SEC 201.27	*ANCIENT CITY*	2	0	0	2	With the settled life of humanity, civilizations and cities established by civilizations began to take shape in line with the availability of geographical locations. Cities have been developed with various business areas such as agriculture and trade. Cities, which reflect the characteristic identities of civilizations and which are the physical equivalent of living cultures, have reached our age for thousands of years. As a result of archaeological research and studies carried out in ancient cities, comprehensive information is obtained about the civilizations they founded. In the light of this information, major civilizations and ancient cities are examined within the scope of the course, and thus the connections between the past and our times are explained with both life styles and urban architecture and artistic features.
SEC 201.28	*SOCIOLOGY*	2	0	0	2	Introduction to sociological thinking; the foundations of society; social divisions and inequalities; social structures, social practices and social institutions; social change.
SEC 201.29	*PHILOSOPHY*	2	0	0	2	This course aims to introduce the fundamental concepts, problems, and intellectual approaches of philosophy. Core philosophical topics such as knowledge, reality, ethics, free will, existence, and justice are explored to help students develop critical thinking and analytical skills. The views of major philosophers and philosophical movements from Antiquity to the present are examined from a historical perspective. Throughout the course, students engage in intellectual discussions and gain the ability to develop and defend their own ideas.
SEC 201.30	*ANCIENT DNA: HISTORY OF THE PAST*	2	0	0	2	"Ancient DNA studies" are generally defined as an area that includes DNA harvesting and analysis studies from highly biological samples that have been severely damaged and have no protection. DNAs derived from materials found in archaeological excavations shed light on the past. Research on ancient DNA (aDNA) obtained from archaeological and paleontological remains allows direct access to genetic information in the past. In this context, ancient DNA (aDNA) studies have an interdisciplinary character. This course covers the researches on ancient DNA and how to make DNA isolation from fossils extracted from archaeological excavations (human, animal, plant, etc.), and later on how gender determination and bioinformatics-based polymorphism studies are conducted.
SEC 201.31	*GENETIC HERITAGE*	2	0	0	2	Mitosis and Meiosis, Mendelian Genetics, Extensions of Mendelian Genetics, Linkage, Crossing over and Mapping in Eukaryotes, Sex Chromosomes, Chromosome Mutations, DNA Structure and Analysis, DNA Replication and Recombination, Chromosome Structure and DNA Sequence Organization, Transcription, Translation and Proteins, Gene Mutation, DNA Repair and Transposable Elements, Genetics of Bacteria, Regulation of Gene Expression in Prokaryotes, Regulation of Gene Expression in Eukaryotes, Recombinant DNA Technology.
SEC 201.32	*MODERN GENETIC APPLICATIONS: GENE CLONNING*	2	0	0	2	History of gene cloning, cloning applications, and ethics in cloning.
SEC 201.33	*FOOD AND FOOD CULTURE*	2	0	0	2	This course covers the historical development of food culture, food habits in different cultures, cooking techniques, and healthy eating practices. It also examines the socioeconomic effects of food consumption and the connection between food and society. The course discusses the cultural and religious significance of food, the preparation and presentation of traditional dishes, and culinary traditions. Environmental topics such as sustainable food production, organic farming, and preventing food waste are also addressed. Students analyze the transformation of food culture in the modern world through examples from both local and international cuisines.

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SEC 201.34	*DIET AND EFFECTS*	2	0	0	2	General principles of human nutrition, Food chemistry; Nutritional value of foods; Balanced diet; Possible alternative solutions to nutritional problems, Food technologies, Cooking technologies, Food in collective nutrition establishments, Hygiene and environmental health, Dry nutrition health. Types, quantity, properties and functions of nutrients essential in nutrition; Composition of foods, Physical and chemical properties; Common nutritional problems and solutions; Nutrition in diseases. Separation of foodstuffs according to their nutritional value.
SEC 201.35	*TRADITIONAL FOODS*	2	0	0	2	Our foods in Turkish nutritional culture and their detailed content.
SEC 201.36	*ORGANIC AGRICULTURE*	2	0	0	2	It contains information about the principles, objectives and rules of organic agriculture, processes of organic agriculture, control, certification and legal regulations, processing of organic foods and additives used.
SEC 201.37	*WESTERN CIVILIZATION HISTORY I*	2	0	0	2	The course aims to explore the foundations of Western societies and cultures and the transformations they underwent from prehistory up to Renaissance. Contains how ancient Mediterranean and Near East interacted, which political structures and cultures changed over time, and the development of Western religions and cultures.
SEC 201.38	*WESTERN CIVILIZATION HISTORY II*	2	0	0	2	The course aims to explore the foundations of Western societies and cultures and the transformations they underwent from Renaissance up to World Wars. Contains how colonialism, religious reforms and revolutions affected the civilization, which political structures and cultures changed over time, and the development of Western religions and cultures.
SEC 201.39	*HISTORY AND TECHNIQUES OF FISHING*	2	0	0	2	The history of angling, fishing bans and regulations, fishing rod types, rod making, natural and artificial baits, feeding, hunting of some species living in fresh and salt water, and some dangerous fish species encountered in fishing will be explained.
YEAR II – SEMESTER IV						
COURSE CODE	**COURSE NAME**	**COURSE HOUR**			**ECTS**	**CONTENT**
		T	**P**	**L**		
ATA 102	PRINCIPLES OF ATATURK AND TURKISH REVOLUTION HISTORY II	2	0	0	2	The declaration of the Republic, the importance of the leader and the staff in the revolution constitutional solutions to the problems related to the Lausanne conference, the participation of Turkey in pacts and international organizations, reactions to the new governmental structure, trials in the multiparty system, the home and foreign policy of the Republic of Turkey.
MCE 202	STRENGTH OF MATERIALS II	3	0	0	5	Transformations of stress and strain, principal stresses, Mohr's circle, yield criteria, and fracture criteria under plane stress. Deflection of beams, equation of the elastic curve, method of superposition, and statically indeterminate beams. Columns, stability of structures, Euler's Formula, and design of columns under acentric load. Energy methods, strain energy, work and energy under a single load, deflection under a single load by the work-energy method, Castiglione's theorem, deflections by Castiglione's theorem, and statically indeterminate problems.
MCE 204	FLUID MECHANICS I	3	0	0	5	Classification of fluid flows. Properties of fluids. Pressure, fluid statics, forces on plane and curved surfaces, and buoyancy. Kinematics of fluid motion. Bernoulli and energy equations. Momentum analysis of flow systems. Dimensional analysis and modeling. Internal flow, head losses, and minor losses in pipes.
MCE 206	THERMODYNAMICS II	3	0	0	5	Gas power cycles. Vapor and combined power cycles. Refrigeration cycles and heat pump systems. Thermodynamic property relations. Gas mixtures. Gas-vapor mixtures, psychrometry, and air conditioning processes. Chemical reactions.
MCE 208	NUMERICAL METHODS	3	0	0	4	Basic concepts of computational methods. Error analysis. Numerical solutions of linear and nonlinear algebraic equations. Numerical approximations: regression and interpolation. Numerical differentiation and integration. Numerical solution of ordinary differential equations: initial and boundary value problems, eigenvalue problems. Introduction to the numerical solution of partial differential equations. Applications using appropriate software.
MCE 210	LINEAR ALGEBRA	3	0	0	5	Introduction to Linear Algebra. Systems of linear equations. Matrices. Solving linear systems. Determinants and their properties. Vector spaces. Inner product spaces. Linear transformations. Eigenvalues and eigenvectors.
SEC 212	*TECHNICAL ELECTIVE I*	2	2	0	4	
MCE 212.1	*COMPUTER AIDED DESIGN*	2	2	0	4	Introduction to CAD and 2D drawing techniques. Introduction to a 3D and CAD-based popular computer-aided design programs such as SolidWorks, Catia, Autodesk Fusion, etc. Sketch-based draft drawing, basic solid modeling method, and 3D solid modeling. Principles of sectioning. Dimensioning in perspective drawing. Assembly and machine elements. Assemblies and working drawings.
MCE 212.2	*COMPUTATIONAL TOOLS IN MECHANICAL ENGINEERING*	2	2	0	4	Introduction to fundamental computing principles and programming concepts. Introduction to computational engineering software (MATLAB, Phyton, Mathcad, EES, Mathematica, etc.) with a wide range of applications. Basic programming concepts covered include algorithm design, data types, flow control, functions, sorting, plotting, simulation, and numerical methods. Program environment and commands, linear algebra, and matrices. Communication with Excel. 2D and 3D plotting. Solutions to systems of linear equations. Polynomials, differentiation, and integration. Solving various mechanical engineering problems.
YEAR III – SEMESTER V						

Ek-2: Ders İçerikleri

COURSE CODE	COURSE NAME	COURSE HOUR			ECTS	CONTENT
		T	P	L		
MCE 301	INTERNSHIP I	0	0	0	3	This is the first of the two internships. Students are required to do a minimum of four weeks (twenty workdays) summer practice in a suitable factory, a power station, or an engineering design and consultancy office. They are expected to get acquainted with a real engineering and business environment by studying various engineering practices through active participation. A report is to be submitted to reflect the contributions of the students. Students should follow the instructions stated in ALKU Internship Guide to successfully complete their internships.
MCE 303	FLUID MECHANICS II	3	0	0	4	Differential analysis of fluid flow. Navier-Stokes equation and its solutions. External flow, drag, lift, and airfoil theory. Compressible fluid flow, isentropic flow, supersonic nozzles, shock waves and expansion waves. Pumps, turbines, and scaling laws. Introduction to CFD.
MCE 305	MACHINE ELEMENTS I	3	0	0	5	Load, stress, strain, and deformation analysis of solid elements. Design to prevent static and fatigue failures. Design of mechanical elements including power screws, threaded fasteners, bolted and welded joints, riveted joints, shafts, axles, shaft-hub-connections, power screw mechanisms, pins, knuckles, and springs.
MCE 307	MANUFACTURING PROCESSES I	3	0	0	4	Classifications of processes in manufacturing. Basics of material processing and manufacturing techniques. Machine tool elements and mechanics of machine tools. Metal cutting tools. Manufacturing methods of turning, milling, drilling, shaping, grinding, and sawing. Gear and thread cutting. Forming, machining, and powder metallurgy. Manufacturing of polymer and composites. Metrology and quality control principles.
MCE 309	THEORY OF MACHINES I	3	0	0	4	In the first part of the machine theory course, basic concepts of mechanisms are introduced. Kinematic chains, mechanisms, and machines. Degrees of freedom of mechanisms. Position, velocity, and acceleration analysis of mechanisms. Instant center of rotation method. Mobility analysis. Static force analysis of mechanisms. Graphical and analytical methods for dynamic analysis of planar linkages. Four-bar linkage.
MCE 311	RENEWABLE ENERGY	3	0	0	4	Introduction to renewable energy. Fundamentals of solar energy, solar energy applications, solar collectors, and photovoltaic systems. Wind power and hydropower. Geothermal, biomass, wave, and tidal energies. Hydrogen and fuel cells. Economic and environmental considerations.
SEC 313	TECHNICAL ELECTIVE II	2	2	0	6	
MCE 313.1	*COMPUTER AIDED STRUCTURAL ANALYSIS*	2	2	0	6	Computer-aided structural analysis using commercial finite-element analysis software. Finite element modeling techniques of engineering problems in the design of a machine or its components. Linear static analysis for shell and solids structures, non-linear static analysis, plasticity, contact problems, and large deformations and buckling. Dynamic loading conditions, frequency response analysis, natural frequency extraction, and impact problems.
MCE 313.2	*COMPUTATIONAL FLUID DYNAMICS*	2	2	0	6	Discretization techniques and solution algorithms. Finite-difference solutions to classical model equations pertinent to wave phenomena, diffusion phenomena, or equilibrium, boundary and initial conditions and stability considerations. Application on fluid mechanics and heat transfer problems. Using appropriate software in solving CFD problems.
YEAR III – SEMESTER VI						
COURSE CODE	**COURSE NAME**	**COURSE HOUR**			**ECTS**	**CONTENT**
		T	**P**	**L**		
MCE 302	HEAT TRANSFER	4	0	0	5	Mechanisms of heat transfer. Heat conduction equation and solutions of steady one-dimensional problems. Steady heat conduction, thermal resistance network, and fins. Transient heat conduction and approximate analytical solutions. Numerical methods in heat conduction. Internal and external forced convection. Natural convection. Boiling and condensation. Radiation heat transfer. Heat exchangers.
MCE 304	MACHINE ELEMENTS II	3	0	0	5	Analysis and design of machine elements. Power transmission equipment (shafts, axles and spindles). Prime mover types and characteristics. Design of gear drives (spur, helical, bevel, and worm). Design of couplings, clutches, and brakes. Design of belt drives, flat belts, and v-belts. Design of chain drives and rope drives. Friction and wear, and lubrication. Rolling and journal bearings. Utilization of commercial computer-aided design software.
MCE 306	MANUFACTURING PROCESSES II	3	0	0	5	Metal working, hot working and cold working processes. Principles of metal casting. Welding and joining processes. Bulk deformation processes. Sheet-metal working processes. Forging, extrusion, drawing, and rolling. Chip removal processes. Non-traditional machining processes. Manufacturing systems and automation. Machine shop practices.
MCE 308	THEORY OF MACHINES II	3	0	0	5	In the second part of the machine theory course, basic vibration theory, analytical dynamics concept, flywheels, brakes, and dynamometers are introduced. Free and forced vibration of single degree of freedom systems. Balancing of rotating machinery and linkages. Vibration control. 3D kinetics of a rigid body. Gyroscopic motion. Torque-free motion. Introduction to spatial kinematics.
SEC 310	*TECHNICAL ELECTIVE III*	3	0	0	5	
MCE 310.1	*COMPOSITE MATERIALS*	3	0	0	5	Introduction to composite materials. Classification of composite materials and their applications. Production and characterization methods. Structure-mechanical property relationship. Composite

						applications including fiber and matrix materials, processing, and manufacturing. Laminated plate theory, failure criterion, micromechanics, and damage. Design of symmetric, cross-ply, angle-ply, balanced, and quasi-isotropic laminates.
MCE 310.2	*REFRIGERATION*	3	0	0	5	Vapor compression refrigeration cycle. Compressors, evaporators, condensers, and expansion devices. Refrigerants. Cooling load calculations. Refrigeration and freezing of foods. Gas refrigeration and absorption refrigeration systems. Alternative refrigeration systems. Refrigeration applications and cryogenics.
SEC 312	*TECHNICAL ELECTIVE IV*	3	0	0	5	
MCE 312.1	*INTERMEDIATE STRENGTH OF MATERIALS*	3	0	0	5	Stress and strain analysis at a point. Plane stress and strain problems. Principal stress and strains. Octahedral and deviatoric stress. Airy stress function. Unbalanced bending and shear center in beams. Torsion in non-circular sections. Energy methods. Plastic behavior and residual stresses in basic structural elements.
MCE 312.2	*PIPELINE ENGINEERING*	3	0	0	5	Fundamentals of piping systems. Hydraulic and mechanical design considerations. Pipe sizing and selection, and wall thickness. Pipe network design and analysis. Pipeline economics. Transient pipe flow. Pump performance and analysis, and affinity laws. Cavitation and net positive suction head. Natural gas transmission.
YEAR IV – SEMESTER VII						
COURSE CODE	**COURSE NAME**	**COURSE HOUR**			**ECTS**	**CONTENT**
		T	**P**	**L**		
MCE 401	GRADUATION PROJECT I	0	3	0	3	Design methodology in mechanical engineering through an open-ended, in-depth design project. Design, manufacturing, and testing of a complete engineering system or application considering relevant professional standards, safety, cost, and sustainability. Students prepare a report and present their project to a panel of instructors at the end of the semester.
MCE 403	MECHANICAL ENGINEERING LABORATORY I	1	0	2	3	Health and safety procedures in the laboratory. Experimental procedure. Measurement systems. Error analysis and uncertainty. Analysis of experimental data, plotting, curve fitting, and presentation of results in written reports. Experiments on basic fields of mechanical engineering including solid mechanics, material characteristics, fuel characteristics, design and manufacturing, energy, heating and cooling systems, heat transfer, automotive, machine tools, machine theory, machine dynamics, and control.
MCE 405	CONTROL SYSTEMS	3	0	0	4	This course introduces the basic concepts of control theory. Review of Laplace transforms. Dynamic models. System response. Feedback control. Root-locus design. Frequency response design. Introduction to state-space control theory.
MCE 407	INTERNSHIP II	0	0	0	3	This is the second of the two internships. Students are required to do a minimum of four weeks (twenty workdays) summer practice in a suitable factory, a power station, or an engineering design and consultancy office. They are expected to get acquainted with a real engineering and business environment by studying various engineering practices through active participation. A report is to be submitted to reflect the contributions of the students. Students should follow the instructions stated in ALKU Internship Guide to successfully complete their internships.
ISG 401	OCCUPATIONAL HEALTH AND SAFETY I	2	0	0	2	Safe work practices as well as how to identify, prevent and correct problems associated with safety and health in the work environment. Occupational health and safety management system. Industrial hygiene. Risk management. Root-cause analysis of accidents and cost of accidents. Occupational diseases and work-related diseases. Case studies.
SEC 409	*TECHNICAL ELECTIVE V*	3	0	0	5	
MCE 409.1	*INTRODUCTION TO FRACTURE MECHANICS*	3	0	0	5	Basic concepts. Failure criteria. Mechanisms of fracture. Stress intensity factor. Energy balance and stress intensity factor approach to fracture. Plane strain and plane stress fracture toughness of materials. Fatigue crack growth. Elastic-plastic fracture. Plastic zone models. J-integral. Fail-safe and safe-life design concepts. Damage tolerances. Applications on practical problems.
MCE 409.2	*MECHANICS OF COMPOSITE STRUCTURES*	3	0	0	5	Definition of composite materials, structural applications of composites, constituent filler, and matrix materials. Review of stress transformations, stress-strain relations, and generalized Hooke's law. Micromechanics and ply mechanics. Failure criteria of composite materials. Concepts of macromechanics and micromechanics of lamina and laminate and failure analysis of laminates. Modeling and calculation of laminated composites.
MCE 409.3	*HVAC SYSTEMS*	3	0	0	5	Heating, ventilating and air conditioning (HVAC) principles. Classification and selection of heating, air conditioning and heat pump systems. Applied psychrometrics and air-conditioning processes. Human thermal comfort and indoor air quality. Heating and cooling loads calculations. HVAC equipment and system design. Air distribution systems and duct design.
MCE 409.4	*ROBOTICS*	3	0	0	5	Industrial robots. Robot geometry and components, degrees of freedom, joints, robot coordinates. Robot programming. Frames, rigid body rotations, and rotation matrices. Spatial velocity, twists, screws, and wrenches. Velocity kinematics, body and space Jacobians. Non-weld unsolvable joining methods (rivet, bonding, soldering) and welded joining. Robotic applications.
MCE 409.5	*COMBUSTION AND ENGINES*	3	0	0	5	Engine types. Four-stroke and two-stroke reciprocating engine operation. Engine design and operating characteristics. Ideal and actual engine cycles. Thermochemistry and engine fuels. Air and fuel induction systems. Combustion in spark-ignition and compression-ignition engines. Exhaust

						flow and turbochargers. Heat transfer in engines. Engine emissions and control. Hybrid engine systems and electric vehicles.
MCE 409.6	*COMPUTER AIDED MANUFACTURING*	3	0	0	5	Computer-aided design (CAD) and computer-aided manufacturing (CAM) technologies. Computer-aided process planning (CAPP), production planning and control, programming principles of numerical controlled and computer numerical controlled systems, manufacturing systems design, manufacturing cells and flexible manufacturing systems. CAD/geometric modeling. Parametric representation of curves and surfaces. Viewing transformations. Computer numerical control (CNC) machines. Part programming. Introduction to rapid prototyping.
MCE 409.7	*AUTOMOTIVE TECHNOLOGY*	3	0	0	5	Engine characteristics. Vehicle performance. Resistances to motion. Maximum speed and acceleration performance. Calculation of fuel consumption. Power train: clutch, gearbox, gear ratios, propeller shaft, universal and constant velocity joints, differential, differential ratio, drive shafts. Brakes: basic requirements, directional stability, weight transfer, brake force distribution. Modern trends in automotive engineering. Hybrid and electric vehicles.
YEAR IV – SEMESTER VIII						
COURSE CODE	**COURSE NAME**	**COURSE HOUR**			**ECTS**	**CONTENT**
		T	**P**	**L**		
MCE 402	GRADUATION PROJECT II	0	3	0	4	This course continues from MCE 401 Graduation Project I. Design methodology in mechanical engineering through an open-ended, in-depth design project. Design, manufacturing, and testing of a complete engineering system or application considering relevant professional standards, safety, cost, and sustainability. Students prepare a report and present their project to a panel of instructors at the end of the semester.
MCE 404	MECHANICAL ENGINEERING LABORATORY II	1	0	2	4	This course continues from MCE 403. Experiments on basic fields of mechanical engineering including solid mechanics, material characteristics, fuel characteristics, design and manufacturing, energy, heating and cooling systems, heat transfer, automotive, machine tools, machine theory, machine dynamics, and control. Analysis of experimental data, plotting, curve fitting, and presentation of results in written reports.
ISG 402	OCCUPATIONAL HEALTH AND SAFETY II	1	0	0	1	Establishing workplace, regulations of the workplace and its attachments. Fire, electricity, first aid, and rescue measures. Personal protective equipment. Safety and health symbols. Emergency plan. Work safety and health at design stage. Usage of working equipment. Health and safety standards. Heavy and high-risk industries. Regulations dealing with occupational work safety.
SEC 406	*TECHNICAL ELECTIVE VI*	3	0	0	6	
MCE 406.1	*ENERGY EFFICIENCY AND MANAGEMENT*	3	0	0	6	Introduction to energy efficiency. Energy management and audit. Billing rate structures. Cogeneration. Boilers and steam systems. Heat recovery systems. Thermal insulation. Energy consumption in buildings. Electric motors. Compressors and compressed air lines. Lighting systems and home appliances. Economic and environmental considerations.
MCE 406.2	*APPLIED MECHANICS*	3	0	0	6	Mechanical behavior of materials, spring stiffness test, tension test, torsion test, measurement of stress due to bending using a strain gage. Deflection of beams. Introduction to photoelasticity, virtual polariscope. Brittle coating technique. Fatigue test. Creep test.
MCE 406.3	*ENERGY TECHNOLOGY*	3	0	0	6	Fossil fuels and renewable energy applications. Power plants, refrigeration, and heat pump systems. Energy and exergy analysis of power plants and refrigeration systems. Cogeneration and hybrid systems. Fuel cells. Nuclear power systems. Energy storage. Energy efficiency applications. Optimization of boiler operation. Design, analysis, and performance improvements of energy systems. Heating and cooling systems. Energy systems and the environment. Engineering economics of energy systems.
MCE 406.4	*MECHANICAL VIBRATIONS*	3	0	0	6	This is an introductory course in the basic theory and applications of vibration engineering. Free and forced vibration of single degree of freedom and multi degrees of freedom systems. Response to harmonic excitations. Vibration under general forcing. Vibration of continuous systems. Vibration measurement and passive vibration control. Analytical and experimental modal analysis.
MCE 406.5	*INTERMEDIATE MANUFACTURING PROCESSES*	3	0	0	6	Fundamentals and principles associated with the manufacturing process. Computer-aided process planning (CAPP). Production planning and control. Programming principles of numerical controlled and computer numerical controlled systems. Manufacturing systems design. Manufacturing cells and flexible manufacturing systems. Cost analysis in manufacturing.
MCE 406.6	*MATERIALS CHARACTERIZATION*	3	0	0	6	Introduction to material characterization methods and applications. Theory, basic operations, and applications of most common material characterization techniques including X-ray diffraction (XRD), scanning electron microscopy (SEM), transmission electron microscopy (TEM), spectroscopy, Differential Scanning Calorimetry (DSC), Thermogravimetric Analysis (TGA), and Dynamic Mechanical Analysis (DMA). Theoretical principles and practical applications in material science. Characterization of composition, morphology, and performance of materials.
SEC 408	*NONTECHNICAL ELECTIVE III*	2	0	0	3	
MCE 408.1	*ENGINEERING ETHICS*	2	0	0	3	Sources of ethics. Ethical theories. Moral, law and ethics. Personal and professional ethics. Understanding ethical problems. Ethical safety, risks, and accidents. Rights and responsibilities of

						engineers. Conflict of interest. Research misconduct and plagiarism. Code of ethics in engineering. Ethical issues in engineering practice. Case studies.
MCE 408.2	*TOTAL PRODUCTIVE MANAGEMENT*	2	0	0	3	Overview and methodology. Types of maintenance. Overall equipment effectiveness. Four-phase approach, implementation, introducing, and institutionalizing total productive management (TPM). Preparatory stage, introduction stage, implementation, and institutionalizing stage. TPM pillars. Economics of production: cost estimating and break-even analysis. Selection of machinery. Ergonomics, time and motion study. Process operation analyses and flow charts. Specification and standardization for production.
MCE 408.3	*TOTAL QUALITY MANAGEMENT*	2	0	0	3	Aspects of total quality management (TQM). Quality concepts. Deming's principles. Design quality into the system. Quality management. Control and improvement. Quality circles. Emerging topics.
MCE 408.4	*ENTREPRENEURSHIP*	2	0	0	3	Concepts of entrepreneurs and entrepreneurship. Entrepreneurship in economic theory. Importance of small business. Entrepreneurship and economic development. Type of entrepreneurship. Features and types of businesses and entrepreneurs. Sources of business ideas. Conversion of ideas into project plan. Financial support mechanisms. Intellectual property.
MCE 408.5	*ECONOMICS*	2	0	0	3	Introduction to economy studies. Cost concepts. Time value of money. Life cycle costing. Payback period analysis. Depreciation and after-tax analysis. Comparison of investment alternatives and replacement analysis. Sensitivity analysis. Evaluation of public projects. Linear programming and large-scale project planning.
MCE 408.6	*PROJECT MANAGEMENT*	2	0	0	3	Project management principles. Practices and scheduling. Project risk management. Project procurement and contract management. Project quality management. People side of project management. Legal aspects for project management. Financial principles and project cost management. Project management in the business context.