



KFU
جامعة الملك فيصل
KING FAISAL UNIVERSITY
جامعة ووطن.. نماء.. واستدامة..

Mechanical Engineering Department

at

College of Engineering
King Faisal University
Al Ahsa-Kingdom of Saudi Arabia

June 2022

Mechanical Engineering – Welcome Note

Mechanical Engineering is one of the principal branches in Engineering and it is very broad based. Mechanical Engineering deals with the design, manufacture, production, operation and maintenance of mechanical equipment and systems. A degree in mechanical engineering will open opportunities in any type of industry.

Saudi Arabia, being an oil rich country has several oil and gas industries and power plants. Such plants certainly require the expertise of mechanical engineers to design, operate, and maintain a wide range of mechanical equipment and its associated systems. A thorough knowledge of design aspects, thermal characteristics, manufacturability, material aspects, and more importantly safety is certainly essential while designing, operating and maintaining mechanical equipment or systems. Such knowledge is imparted through interactive lectures, hands on experience in our well-equipped labs and through internships.

The Mechanical Engineering curriculum is meticulously developed and revised periodically. Eminent personnel from the industry & academics and our alumni are periodically invited to review our curriculum. Based on their inputs and the local industry requirements, various special topics are offered to our senior students. The mechanical engineering program is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.

Our faculty members have wide range of exposure in the academic and in the industry sectors. They stay active in research and periodically publish papers in reputed international academic conferences and in archival journals. Our staffs are very friendly and guide students during the academic program and during job search. We provide high quality education for our students, provide good interaction with the industry by conducting field trips and making internship as a part of our curriculum, encourage student's research and projects, support student's participation in technical conferences, enhance faculty skills through workshops, etc. More importantly, we assess our performance each semester and we constantly strive hard to improve our standards.

Welcome to the Department of Mechanical Engineering!

Mechanical Engineering Department Mission

The Mechanical Engineering program strives for providing quality services through close partnership with the community by demonstrating commitment to quality education that prepares graduates through a project-based learning with broad basic engineering knowledge to be professionals and to pursue postgraduate studies and research.

The department is also committed to quality research that leads to better solutions to mechanical engineering related problems with emphasis on issues of national significance by working closely with industry and research centres.

Program Educational Objectives (PEOs)

Within a few years of graduation, the Mechanical Engineering graduates are expected to attain the following program educational objectives:

- PEO 1:** Become technically competent engineers for a successful and productive career in the mechanical engineering profession.
- PEO 2:** Pursue graduate studies, research and design in mechanical engineering.
- PEO 3:** Demonstrate effective communication and teamwork skills in a diverse environment with an integrative perspective to solving mechanical engineering problems.
- PEO 4:** Engage in life-long learning for the purpose of continuous improvement.

Student Outcomes (SOs)

The graduates of the Mechanical Engineering Department, College of Engineering at King Faisal University are expected to demonstrate:

- (1) Ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
- (2) Ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
- (3) Ability to communicate effectively with a range of audiences
- (4) Ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
- (5) Ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
- (6) Ability to develop and conduct appropriate experimentation, analyse, and interpret data, and use engineering judgment to draw conclusions
- (7) Ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Labs

Thermodynamics Lab

In this laboratory, concepts related to first law of thermodynamics, processes, cycles, and efficiencies are studied experimentally. The objective of this laboratory is to enhance the student's knowledge in the area of thermodynamics principles and concepts that include thermal engineering applications, cycles and energy conversion.

Mechanical Systems Lab

In this laboratory, concepts related to heat transfer, solar energy, refrigeration and air conditioning systems and internal combustion engines are studied experimentally. The objective of this laboratory is to enhance the student's skills in thermo fluid applications.

Fluid Mechanics Lab

In this laboratory, concepts related to fluid properties, fluid statics and fluid dynamics are studied experimentally. In addition, energy principle, momentum principle, hydraulics and aerodynamics are investigated.

The objective of this laboratory is to enhance the student's knowledge in the area fluid mechanics.

Strength of Materials Lab

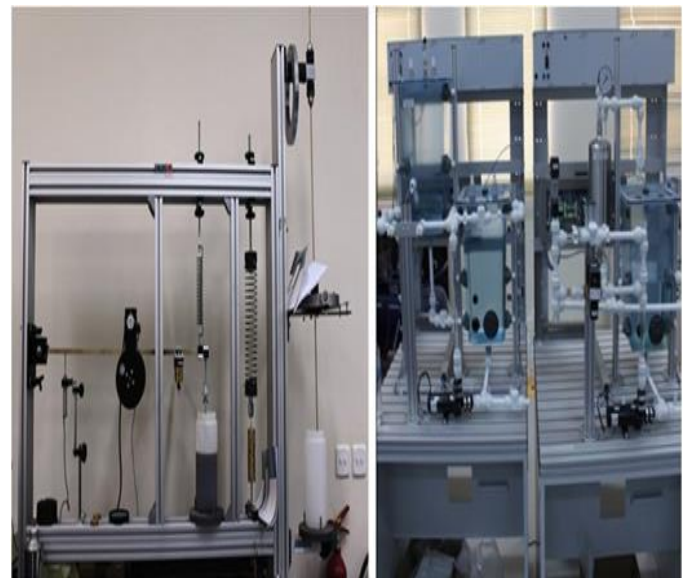
The fundamental principles of mechanics of materials and strength of structural components are studied through a series of experiments. This lab provides students with basic information in design of structural components and analysis of structural failures.

Control and Vibrations Lab

The lab covers topics related to process control systems, hydraulic concepts, vibration systems, DC motor control, and stepper motor control.

Measurements and Instrumentation Lab

The primary purpose of this lab is to provide fundamental knowledge in theory and practical experience in mechanical engineering measurements.



نموذج الخطة الدراسية لنظام ٣ فصول دراسية

اسم الكلية:	الهندسة	اسم القسم:	الهندسة الميكانيكية
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السنة الأولى

الفصل الدراسي: الثالث الأول

رقم المقرر	اسم المقرر باللغة العربية	اسم المقرر باللغة الإنجليزية	عدد الوحدات				قيد التخصص
			المعتمد	نظري	عملي	أخرى	
0814-140	فيزياء عامة ١	General Physics I	3	3	0	0	2201, 2202, 2203, 2204, 2206
0814-144	مختبر فيزياء عامة ١	General Physics I Lab	1	0	3	0	2201, 2202, 2203, 2204, 2206
0817-144	تفاضل و تكامل ١	Calculus I	4	4	0	0	2201, 2202, 2203, 2204, 2206
1722-133	تعبير انجليزي ١	English Composition I	2	2	0	0	2201, 2202, 2203, 2204, 2206
2200-100	مدخل الى الهندسة	Introduction to Engineering	1	1	0	0	2201, 2202, 2203, 2204, 2206

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الفصل الدراسي: الثالث الثاني

رقم المقرر	اسم المقرر باللغة العربية	اسم المقرر باللغة الإنجليزية	عدد الوحدات				قيد التخصص
			المعتمد	نظري	عملي	أخرى	
0815-140	كيمياء عامة ١	General Chemistry I	3	3	0	0	2201, 2202, 2203, 2204, 2206
0817-145	تفاضل و تكامل ٢	Calculus II	4	4	0	0	2201, 2202, 2203, 2204, 2206
1722-134	تعبير انجليزي ٢	English Composition II	2	2	0	0	2201, 2202, 2203, 2204, 2206
1722-138	أساسيات التواصل الخطابي	Fundamentals of Speech Communication	2	2	0	0	2201, 2202, 2203, 2204, 2206
2200-105	مهارات حاسوبية هندسية	Engineering Computing & Skills	2	0	2	0	2201, 2202, 2203, 2204, 2206

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الفصل الدراسي: الثالث الثالث

رقم المقرر	اسم المقرر باللغة العربية	اسم المقرر باللغة الإنجليزية	عدد الوحدات				قيد التخصص
			المعتمد	نظري	عملي	أخرى	
0814-141	فيزياء عامة ٢	General Physics II	3	3	0	0	2201, 2202, 2203, 2204, 2206
0814-145	مختبر فيزياء عامة ٢	General Physics II Lab	1	0	3	0	2201, 2202, 2203, 2204, 2206
0815-142	كيمياء عامة ٢	General Chemistry II	3	3	0	0	2201, 2202, 2203, 2204, 2206
0815-143	مختبر كيمياء عامة	General Chemistry Lab	1	0	3	0	2201, 2202, 2203, 2204, 2206
2200-106	الرسم الهندسي	Engineering Graphics	2	0	2	0	2201, 2202, 2203, 2204, 2206
1900-101	العقيدة والمذاهب	Creed and doctrines	2	3	0	0	2201, 2202, 2203, 2204, 2206

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نموذج الخطة الدراسية لنظام ٣ فصول دراسية

الهندسة الميكانيكية	اسم القسم:	الهندسة	اسم الكلية:
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السنة الثانية

الفصل الدراسي: الثالث الأول

رقم المقرر	اسم المقرر باللغة العربية	اسم المقرر باللغة الإنجليزية	عدد الوحدات				قيد التخصص
			المعتمد	نظري	علمي	أخرى	
0817-244	رياضيات متعددة المتغيرات	Multivariate Calculus	3	3	0	0	2201, 2202, 2203, 2204, 2206
2200-201	ستاتيكا	Statics	3	3	0	0	2201, 2203
2201-102	رسم هندسي ميكانيكي	Mechanical Drawing	1	0	3	0	2201
0901-204	البرمجة الحاسوبية لطلبة الهندسة	Engineering Programming	3	3	0	0	2201, 2202, 2203, 2204, 2206
1722-137	الكتابة التقنية	Technical Writing	2	2	0	0	2201, 2202, 2203, 2204, 2206

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الفصل الدراسي: الثالث الثاني

رقم المقرر	اسم المقرر باللغة العربية	اسم المقرر باللغة الإنجليزية	عدد الوحدات				قيد التخصص
			المعتمد	نظري	علمي	أخرى	
0817-240	المعادلات التفاضلية	Differential Equations	3	3	0	0	2201, 2202, 2203, 2204, 2206
2200-203	ديناميكا	Dynamics	3	3	0	0	2201, 2203
2201-202	ديناميكا حرارية ١	Thermodynamics I	3	3	0	0	2201, 2203
2200-206	الدوائر الكهربائية	Electric Circuits	3	3	0	0	2201, 2203, 2204, 2206

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الفصل الدراسي: الثالث الثالث

رقم المقرر	اسم المقرر باللغة العربية	اسم المقرر باللغة الإنجليزية	عدد الوحدات				قيد التخصص
			المعتمد	نظري	علمي	أخرى	
0817-246	الجبر الخطي	Linear Algebra	3	3	0	0	2201, 2203
2200-202	مقاومة المواد	Strength of Materials	3	3	0	0	2201, 2203
2201-206	القياسات والأجهزة	Measurements & Instrumentations	2	1	2	0	2201
2201-203	ديناميكا حرارية ٢	Thermodynamics II	3	3	0	0	2201

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نموذج الخطة الدراسية لنظام ٣ فصول دراسية

اسم الكلية:	الهندسة	اسم القسم:	الهندسة الميكانيكية
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السنة الثالثة

الفصل الدراسي: الثلث الأول

رقم المقرر	اسم المقرر باللغة العربية	اسم المقرر باللغة الإنجليزية	عدد الوحدات				قيد التخصص
			المعتمد	نظري	عملي	أخرى	
2200-310	طرق الحل العددية	Numerical Methods	3	3	0	0	P: 0817-240 & P: 0901-204 & P: 2200-105
2200-205	علم المواد	Materials Science	3	3	0	0	P: 0815-142
2201-331	نظرية الآلات	Theory of Machines	3	3	0	0	P: 2200-203 & P: 0817-240
2200-209	مختبر مقاومة المواد	Strength of Materials Lab	1	0	3	0	P: 2200-202
2201-204	مختبر الديناميكا الحرارية	Thermodynamics Lab	1	0	3	0	P:2201-203 & P: 2201-206

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الفصل الدراسي: الثلث الثاني

رقم المقرر	اسم المقرر باللغة العربية	اسم المقرر باللغة الإنجليزية	عدد الوحدات				قيد التخصص
			المعتمد	نظري	عملي	أخرى	
2200-309	ميكانيكا الموائع	Fluid Mechanics	3	3	0	0	P: 2200-203 & P: 0817-240
1900-102	الثقافة الإسلامية	Islamic culture	2	3	0	0	None
2200-307	الاقتصاد الهندسي	Engineering Economics	3	3	0	0	P: 2200-100
2201-312	اهتزازات ميكانيكية	Mechanical Vibrations	3	3	0	0	P: 2200-203 & P: 0817-240 & P: 0817-246

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الفصل الدراسي: الثلث الثالث

رقم المقرر	اسم المقرر باللغة العربية	اسم المقرر باللغة الإنجليزية	عدد الوحدات				قيد التخصص
			المعتمد	نظري	عملي	أخرى	
0622-292	مبادئ الإدارة ومهاراتها	Management Fundamentals & Skills	3	3	0	0	None
2200-312	مختبر ميكانيكا الموائع	Fluid Mechanics Lab	1	0	3	0	P: 2200-309
2201-333	ديناميكا النظم	System Dynamics	3	3	0	0	P: 2201-312
2201-325	انتقال الحرارة	Heat Transfer	3	3	0	0	P: 2200-309 & 2200-310 & P: 0817-244

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الفصل الدراسي: الفصل الصيفي

رقم المقرر	اسم المقرر باللغة العربية	اسم المقرر باللغة الإنجليزية	عدد الوحدات				قيد التخصص
			المعتمد	نظري	عملي	أخرى	
2200-399	التدريب الهندسي	Engineering Training	0	0	0	ميداني	P: 1722-137

نموذج الخطة الدراسية لنظام ٣ فصول دراسية

الهندسة الميكانيكية	اسم القسم:	الهندسة	اسم الكلية:
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السنة الرابعة

الفصل الدراسي: الثالث الأول

رقم المقرر	اسم المقرر باللغة العربية	اسم المقرر باللغة الإنجليزية	عدد الوحدات				قيود التخصص
			المعمد	نظري	عملي	أخرى	
2201-332	تصميم عناصر الآلة	Design of Machine Elements	3	3	0	0	P: 2200-205 & P: 2200-202 & P: 2201-331 & P: 2201-102
2201-441	نظم التحكم	Control Systems	3	3	0	0	P: 2201-333
2201-442	ميكاترونكس	Mechatronics	3	3	0	0	P: 2201-206
2201-425	مختبر النظم الميكانيكية	Mechanical Systems Lab	1	0	3	0	P: 2201-325 & P: 2201-312

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الفصل الدراسي: الثالث الثاني

رقم المقرر	اسم المقرر باللغة العربية	اسم المقرر باللغة الإنجليزية	عدد الوحدات				قيود التخصص
			المعمد	نظري	عملي	أخرى	
2201-422	نظم التكييف والتبريد	Air Conditioning & Refrigeration Systems	3	3	0	0	P: 2201-203 & 2201-325
2201-460	عمليات التصنيع	Manufacturing Processes	3	3	0	0	P: 2200-205
2201-4xx	اختياري قسم	Technical Elective I	3	3	0	0	
2201-495	مشروع تخرج ١	Senior Design I	2	2	0	0	P: 2201-332, P: 2201-325 & P: 2200-307 & C:2201-460

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الفصل الدراسي: الثالث الثالث

رقم المقرر	اسم المقرر باللغة العربية	اسم المقرر باللغة الإنجليزية	عدد الوحدات				قيود التخصص
			المعمد	نظري	عملي	أخرى	
2201-496	مشروع تخرج ٢	Senior Design II	2	2	0	0	P: 2201-495
2201-4xx	اختياري قسم	Technical Elective II	3	3	0	0	
2201-4xx	اختياري قسم	Technical Elective III	3	3	0	0	
1900-xxx	اختياري جامعة	University Elective	2	3	0	0	
1900-xxx	اختياري جامعة	University Elective	2	3	0	0	

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Total

Department Technical Electives				مواد القسم الاختيارية			
رمز المقرر	اسم المقرر	Pre- & Co-requisite	Type	Units Credits	Course Title	Course Code	Course Number
مك ٤٢٠	تصميم النظم الحرارية	P: 2201-203 & 2201-325	اختياري قسم	3	Design of Thermal Systems	ME 420	2201-420
مك ٤٢١	محركات الاحتراق الداخلي	P: 2201-203 & 2201-325	اختياري قسم	3	Internal Combustion Engines	ME 421	2201-421
مك ٤٢٣	الطاقة المتجددة والشمسية	P: 2201-203 & 2201-325	اختياري قسم	3	Renewable & Solar Energy	ME 423	2201-423
مك ٤٢٦	تحويل الطاقة	P: 2201-203 & 2201-325	اختياري قسم	3	Energy Conversion	ME 426	2201-426
مك ٤٢٧	الآلات التوربينية	P: 2201-325	اختياري قسم	3	Turbomachinery	ME 427	2201-427
مك ٤٣٠	التصميم بالحاسوب	P: 2201-332	اختياري قسم	3	Computer Aided Design	ME 430	2201-430
مك ٤٤٥	الروبوتات	P: 2200-203 & 2200-310	اختياري قسم	3	Robotics	ME 445	2201-445
مك ٤٦٧	تقنية النانو	P: 2200-205 & P: مستوى سابع (level seven or above)	اختياري قسم	3	Nanotechnology	ME 467	2201-467
مك ٤٣١	طريقة الأجزاء المحدودة	P: 2201-332 & P: 2201-325	اختياري قسم	3	Finite Element Method	ME 431	2201-431
مك ٤٨١	البحث العلمي لطلبة البكالوريوس ١	P: مستوى سابع فما فوق (level seven or above)	اختياري قسم	3	Undergraduate Research I	ME 481	2201-481
مك ٤٨٢	البحث العلمي لطلبة البكالوريوس ٢	P: مستوى سابع فما فوق (level seven or above)	اختياري قسم	3	Undergraduate Research II	ME 482	2201-482
مك ٤٨٤	موضوعات خاصة ١	P: مستوى سابع فما فوق (level seven or above)	اختياري قسم	3	Special Topics I	ME 484	2201-484
مك ٤٨٥	موضوعات خاصة ٢	P: مستوى سابع فما فوق (level seven or above)	اختياري قسم	3	Special Topics II	ME 485	2201-485
ك ٤٢٩	ميكاترونكس	P: 2202-330	اختياري قسم	3	Mechatronics	EE 429	2202-429

Compulsory

Compulsory

Elective

Elective

Elective

Elective

Elective

Elective

Elective

Elective

Elective

Elective

Elective

Elective

ME Dept: University Electives (For Batch 2018 & above): From Supporting Studies Center				
Pre-& Co-requisite	Units	Course Title	Course	Course
	Credits		Code	Number
None	2	Creed and doctrines	SSC101	1900-101
None	2	Islamic culture	SSC102	1900-102
None	2	Islamic Morals and Ethics	SSC103	1900-103
None	2	Studies in the Biography of the Prophet	SSC104	1900-104
None	2	Medical jurisprudence	SSC105	1900-105
None	2	Economics & Politics in Islam	SSC106	1900-106
None	2	Islamic Social & Family Behavior	SSC107	1900-107
None	2	Management & Entrepreneurship	SSC108	1900-108
None	2	Health & Fitness	SSC109	1900-109
None	2	Research skills	SSC110	1900-110
None	2	Volunteer work	SSC111	1900-111
None	2	Medicine: Type and use	SSC112	1900-112
None	2	Human Rights in Islam	SSC113	1900-113
None	2	Food and Nutrition	SSC114	1900-114

Course Descriptions (Catalogue)

Math 144–Calculus I 4(4-0-0): This is an introductory course of mathematics for college of engineering students. The course covers the basic concepts and methods of calculus. At the beginning of the course the instructor will provide students the knowledge of the number systems, algebraic operations and functions of single variable with domain and range so that students can learn differentiation of the functions. The main topics to be covered in this course include: Limits, Continuity, Differentiation of functions of a single variable, Exponential, Logarithmic, Trigonometric, Inverse trigonometric functions, Applications of derivatives, Differentials, Curve Sketching, L'Hospital Rule, Mean value theorems, Area and estimating with finite sums, Introduction to integrals and definite integrals. **Four 1-hour lectures per week. Co-requisite: None.**

Phys 140–General Physics I 3(3-0-0): The course is an introduction to units, measurements, motion in one and two dimensions, kinematics and dynamics, Newton's laws, work and energy, rotational dynamics, linear and angular momentum, torque, and collisions. Basic calculus and multi-variable algebra will be used. **Three 1-hour lectures per week. Co-requisite: Math 144 & Phys 144.**

Phys 144–General Physics I Lab. 1(0-0-3): Measure basic constants such as length, weight and time, value of acceleration due to gravity. Design and conduct experiments in mechanics. Analyze and interpret experiment data. Write a scientific report. Draw and interpret a graph. Apply experimental principles and error calculations to mechanics. **Three hours Lab. per week. Co-requisite: Phys 140.**

Chem 140-General Chemistry I 3(3-0-0): Matter properties and measurement, Atoms and the Atomic Theory, Chemical Compounds, Chemical Reactions, Reactions in Aqueous Solutions, Liquids Solids and Intermolecular Forces, Electrons in Atoms, Periodic Table and Atomic Properties, Chemical Bonding, Valence-Bond, Hybridization of Atomic Orbital, Multiple Covalent Bonds, Molecular Orbital Theory, Liquids and Solids. **Three 1-hour lectures per week. Co-requisite: None.**

Engr 100-Introduction to Engineering 1(1-0-0): This course introduces engineering to students, particularly those who are interested in an engineering profession. It covers engineering ethics, teamwork, communication skills, engineering topics, and engineering problem solving skills and design methodology. **One 1-hour lecture per week. Co-requisite: None.**

Engr 106–Engineering Graphics 2(1-0-3): An introductory course in engineering graphics focuses on graphical communication. Topics include descriptive geometry elements, visualization, engineering drawing techniques, orthographic projection, pictorial representation, section views, and basic dimensioning. The course incorporates computer aided drafting (CAD) with engineering applications using 2-D drawing. This course is divided in to two sections:

sketching and AutoCAD. The course begins by teaching the basics of engineering graphics using sketching. Freehand sketching using only a pencil and paper is an important skill for any engineer. It is a means of quickly conveying technical information to others. Through sketching the concepts of pictorial projections, section views, auxiliary views and dimensioning are taught. Once the foundation of engineering graphics is known, these concepts can be applied using computer aided design (CAD) software. AutoCAD is taught first. AutoCAD is a drawing software package used to create two dimensional engineering drawings. **One 2-hours lecture per week. Co-requisite: None.**

Eng 133–English Composition I 2(2-0-0): This is an intermediate level writing class. Students are guided through the stages of the writing process to write paragraphs that are both meaningful and organized and include a topic sentence with a controlling idea and conclusion. Students write multi-draft compositions from a variety of practical and academic purposes. They improve their writing by studying model sentences and paragraphs, basic sentence patterns, mechanics, coordinating conjunctions, transitions and vocabulary. **Two 1-hour lectures per week. Co-requisite: None.**

Math 145–Calculus II 4(4-0-0): This is an intermediate level calculus course designed for undergraduate Engineering students. This course covers mainly the integration and basic principles of Vectors and their applications. At the beginning of this course, the instructor will give the review of differentiation and integration. In depth, the students will learn the methods of integration and vectors. The topic covered include, Techniques of Integration, Improper Integration, Applications of Integration, Infinite Sequences and Series, (Power series and Taylor series), Polar coordinates, Transcendental Functions, Vectors, Vector Valued Functions. **Four 1-hour lectures per week. Pre-requisite: Math 144.**

Phys 141–General Physics II 3(3-0-0): This course introduces students to the physics of electricity and magnetism and the connections between them. The concepts of electric charge, electric field, electric potential, Kirchhoff Law, Gauss Law, electric and magnetic fluxes, capacitance, resistivity and resistance, connections in series and in parallel, RC-circuit, magnetic field, magnetic force, magnetic and electric torques, Ampere Law, electromagnetic induction, and Faraday Law and Lenz Law will be taught. **Three 1-hour lectures per week. Pre-requisite: Phys 140. Co-requisite: Phys 145.**

Phys 145–General Physics II Lab. 1(0-0-3): This course introduces students to the basic electrical measurements' techniques and to the physics of electricity and magnetism. The concepts of basic measurements, Resistors in series and in parallel, Verifying Ohm's law, Wheatstone Bridge, Verifying Kirchhoff's Laws, Resistivity, Capacitors in series and in parallel, RC circuit, Introduction to Oscilloscope, the Mechanical Equivalent of Heat, the Negative Temperature Coefficient of Resistance (Thermistor), Galvanometer, and the Magnetic Moment will be

taught. **Three hours Lab. per week.** Co-requisite: Phys 141.

Chem 142-General Chemistry II 3(3-0-0): Properties of Gases: Kinetic-molecular theory of gases, Ideal gas law, Mixtures of gases, Thermochemistry, Principles of Chemical Equilibrium, Acids and Bases, Buffer Solutions, Neutralization Reactions and Titration Curves, Solubility and Complex-Ion Equilibria, Spontaneous Change: Entropy and Free Energy, Thermodynamic, Solutions and Their Physical Properties, Chemical Kinetics and Electrochemistry. **Three 1-hour lectures per week.** Pre-requisite: Chem 140. Co-requisite: Chem 143.

Chem 143-General Chemistry Lab. 1(0-0-3): Laboratory safety rules and Evaluation of analytical data, Definition and determination of density, explanation and determination of specific heat, concept of Acids, bases and Heat of Neutralization Reaction and its determination, reversible reactions, concept of equilibrium constant and its determination, LeChatelier principle and its verification, principle involved in Acid base titrations, indicators, Ionization of electrolytes, determination of dissociation constant of weak acid(K_a), principle involved in complex metric titrations, hardness of water and its determination. **Three hours Lab. per week.** Co-requisite: Chem 142.

Engr 105-Engineering Computing & Skills 2(2-0-0): Problem solving skills and computing using MATLAB. **Two 1-hour lectures per week.** Pre-requisite: Engr 100. Co-requisite: Math 145.

Eng 134-English Composition II 2(2,0,0): This English course is designed to take learners from the paragraph level of writing in English to the Essay level. It concentrates of the essential form and function of the essay and prepares the ground for the academic essay. Particular importance is given to tasks of description and argumentation, including work on comparison, definition, cause-effect and expression of opinion in essay writing. Thus, students are taken through the major stages of the essay composition process. **Two 1-hour lectures per week.** Pre-requisite: Eng 133.

Eng 138-Fundamentals of Speech Communication 2(2-0-0): A study of communication theories as applied to speech: practical communicative experiences ranging from interpersonal communication and small-group process through problem identification and solution in discussion, to informative and persuasive speaking in standard speaker-audience situations. **One 2-hour lecture per week.** Co-requisite: Eng 134.

Math 244-Multivariate Calculus 3(3-0-0): This course is an advanced course in calculus, designed for undergraduate students of engineering. The course covers the basic principles and methods of differentiation and integration of two or more variables. At the beginning of the course, the Instructor will give a review of functions of one variable and its differentiation and integration. Then, the functions of two or more variables with domain and range will be

discussed. Throughout the course, the following main topics will be covered: solid analytic geometry; vector calculus; partial derivative; and multiple integrals. The coverage will also include relevant and important applications in the sciences and engineering. **Three 1-hour lectures per week.** Pre-requisite: Math 145.

Math 246-Linear Algebra 3(3-0-0): Linear transformations, finite dimensional vector spaces, matrices, determinants, systems of linear equations, and applications to areas such as linear programming. Markov chains and differential equations. **Three 1-hour lectures per week.** Pre-requisite: Math: 145.

Engr. 206-Electric Circuits 3(3-0-0): Resistors, capacitors, inductors, currents; voltages; power and energy; circuit analysis techniques; DC and AC analysis; magnetic circuits and transformers; Introduction to DC and AC machines. **Three 1-hour lectures per week.** Pre-requisite(s): Phys. 141.

Engr. 201-Statics 3(3-0-0): The subject of Statics deals with forces acting on rigid bodies at rest covering coplanar and non-coplanar forces, concurrent and non-concurrent forces, friction forces, hydrostatic forces, centroid and moments of inertia. Much time will be spent finding resultant forces for a variety of force systems, as well as analyzing forces acting on bodies to find the reacting forces supporting those bodies. This course also shows how to find the internal forces in structural elements and how to get the centroid and inertia for areas. Students will develop critical thinking skills necessary to formulate appropriate approaches to problem solutions. **Three 1-hour lectures per week.** Pre-requisite(s): Phys. 140.

ME 102-Mechanical Drawing 1(0-0-3): Computer-aided solid modeling concepts, Modeling 3D geometries using solid modeling techniques, Combination of solid modeling techniques to create complex parts, Assembly of 3D parts to form a machine or complete mechanical system, Generating multi-view engineering drawings for 3D parts or assemblies. **1-three hour drafting session per week.** Pre-requisite(s): Engr. 106.

SSC 101-Islamic Creed and Contemporary Doctrines 2(2-0-0): Creed: definition, importance, sources, characteristics, study methodology, pillars of faith, influence of creed on individuals and society, belief nullifiers, thought constraints, study of some contemporary doctrines: secularism, Satan worshipers, Baha'ism, Zionism, Misoneism, Christian fundamentalism. Student is required to memorize part of the holy Quran. **One 2-hour lecture per week.** Pre-requisite(s): None.

Math 240-Differential Equations 3(3-0-0): This course is an introductory course of differential equations for college of engineering students. The course covers different methods and concepts to solve first and second order differential equations. At the beginning of the course we discuss some definitions and terminology about differential equations. Then we move to solving first and second order differential equations. The topics in this course include, linear differential equations, solving first order differential

equations, solving second order differential equations, series solutions of second order linear differential equations, solving systems of linear differential equations, Laplace transform and its applications in solving differential equations. **Three 1-hour lectures per week.** Pre-requisite: Math 145.

Engr. 202–Strength of Materials 3(3-0-0): The course covers strength of materials in depth including the followings: Basic Concepts in Strength of Materials, Direct Stress, Strain, Axial Deformation and Thermal Stress, Torsion, Transverse Shearing Forces, Bending Moments in Beams and Stress Due to Bending, Shearing Stresses in Beams, Combined Stresses and Pressure Vessels, Stress Transformations, Deflection of Beams, Columns. **Three 1-hour lectures per week.** Pre-requisite(s): Engr. 201.

Engr. 203-Dynamics 3(3-0-0): Fundamentals of particle and rigid body dynamics. Kinematics and kinetics of a single particle and system of particles. Application of Newton's laws and energy and moment principles in solving problems involving particles or rigid bodies in planar motion. Introduction to kinetics of rigid bodies in three dimensions, angular acceleration, angular momentum, instantaneous centre, mechanical vibrations of simple spring-mass systems. **Three 1-hour lectures per week.** Pre-requisite(s): Engr. 201.

ME 202-Thermodynamics I 3(3-0-0): Thermodynamics concepts and definitions, states, properties, systems, control volume, processes, cycles, units, tables of properties, work and heat, first law, internal energy and enthalpy, conservation of mass, steady-state and uniform state processes, second law, reversible processes, entropy, Clausius inequality, principle of the increase of entropy, efficiencies, irreversibility and availability, power and refrigeration cycles. **Three 1-hour lectures per week.** Pre-requisite(s): Math 145 & Phys. 141 & Chem. 140.

ME 206-Measurements and Instrumentations 2(1-0-3): Introduction to measurement systems and experimental methods, basic concepts, calibration, dynamic response, analysis of experimental data, basic electrical measurements and sensing devices, displacement measurements, pressure measurement, flow measurement, temperature measurement, force, torque and strain measurements. Also, some experiments will be conducted. **Three 1-hour lectures per week.** Pre-requisite: Engr. 206. Co-requisite: Eng. 137.

CS 204–Engineering Programming 3(3-0-0): Introduction to computer systems; problem solving methodology; testing and debugging of programs; variables, declarations, and assignments; input and output; data types; control flow and looping; functions and overloading; streams and input/output; one-dimensional arrays; two-dimensional arrays; pointers and dynamic arrays; structures; abstract data types and classes; inheritance; friends, overloaded operators, and arrays in classes; recursive functions.. Projects that will require lab work will be assigned weekly. **Three 1-hour lectures per week.** Prerequisite: Math 144.

Eng. 137-Technical Writing 2(2-0-0): This course introduces students to the fundamentals of writing, designing and conveying technical information to different audiences. Students will learn about technical writing conventions, such as organization, style and tone and illustration and layout as they work through the writing process to produce a variety of common technical documents that they will encounter in their academic work. Two 1-hour lectures per week. **Two 1-hour lectures per week.** Pre-requisite(s): Eng. 134 & Eng. 138.

Engr. 205-Material Science 3(3-0-0): Mechanical, electrical and chemical properties of engineering materials, fundamentals of crystallography, crystal defects, Impurities and imperfections in solids. Atomic diffusion. Single phase metals and alloys; elastic and plastic deformation, recrystallization and grain growth. Multi-phase materials; phase diagrams and equilibrium microstructural development, Heat treatment process, Studies of the widely-used engineering metals, alloys, polymers, composites & ceramics. **Three 1-hour lectures per week.** Pre-requisite(s): Chem. 142.

Engr. 209-Strength of Materials Lab 1(0-0-3): Strength of materials lab contains several equipment that can be utilized to introduce the most important concepts of materials and its ability to withstand external loads without failure which is the base of machine and components design. On the other hand, strength of material lab will support student information in materials and its properties and strength of materials and types of loadings and types of stresses induced in members due to this loading. The most important experiments in the field of strength of materials like tensile test, compression test, torsion test, Fatigue test, Hardness test, impact test, and creep test will be discussed. **1-three hour lab per week.** Pre-requisite(s): Engr. 202.

Engr. 309-Fluid Mechanics 3(3-0-0): The course addresses flow classification, fluid properties, fluid in statics, pressure measurements, buoyancy, fluids in motion, continuity equation, pressure gradient in fluid flow, Bernoulli's, Reynold's transport theorem, momentum and energy equations, dimensional analysis and similitude, and an introduction to the hydrodynamic boundary layer. **Three 1-hour lectures per week.** Pre-requisite(s): Engr. 203 & Math 240.

Engr 310-Numerical Methods 3(3-0-0): Introduction to Numerical Methods, Solution of Nonlinear Equations, Solution of Simultaneous Linear Algebraic Equations, Solution of Matrix Eigenvalue Problem, Curve Fitting and Interpolation, Numerical Differentiation, Numerical Integration, Ordinary Differential Equations: Initial-Value Problems, Ordinary Differential Equations: Boundary-Value Problems. **Three 1-hour lectures per week.** Prerequisite: Math 240, CS 204 & Engr 105.

ME 203–Thermodynamics II 3(3-0-0): Basic laws and principles applications to gas power and refrigeration cycles, vapor and combined power cycles, mixtures of gases and vapors, psychrometry, chemical reactions, thermodynamic property relations,

and exergy analysis. **Three 1-hour lectures per week.** Pre-requisite: ME 202.

ME 331-Theory of Machines 3(3-0-0): Theory of Machines & Mechanisms is a study of linear & angular displacements, velocities, accelerations of points & bodies, and the static and dynamic forces required for the proper design of mechanical linkages, cams systems. The course covers both static force analysis of mechanisms and dynamic analysis of linkages. Mechanisms and applications, vector method of analysis of plane mechanisms, mobility and linkages, cams, position, velocity and acceleration analysis in mechanisms. Static and dynamic balancing and balancing machines, flywheels, & reciprocating engines.. **Three 1-hour lectures per week.** Pre-requisite(s): Engr. 203 & Math. 240.

Engr. 312-Fluid Mechanics Lab 1(0-0-3): Conduct experiments to understand the basic concepts of fluid mechanics such as Hydrostatic Bench, Orifice and Jet Flow Apparatus, Bernoulli's Theorem Apparatus, Impact of Jet Apparatus, Piping Loss Test Panel, Open Circuit Wind Tunnel, Pump Test Set, Turbine Service Unit, Series/ Parallel Pumps, Variable Slope Channel. **1-three hour lab per week.** Pre-requisite(s): Engr. 309.

ME 204-Thermodynamics Lab 1(0-0-3): The course covers a wide range of experiments related to thermodynamics concepts. First law of thermodynamics and some thermodynamic relations are investigated. Measure of some fuels properties like calorific value. Thermodynamics cycles will be investigated like Refrigeration, Rankine, Brayton, and Sterling cycle. Compression and expansion of air will be studied. The performance of the solar collector will be investigated. Many parameters will be measured in the internal combustion engines. **1-three hour lab per week.** Pre-requisite(s): ME 203 & ME 206.

ME 312-Mechanical Vibrations 3(3-0-0): This course covers fundamentals of theory and analysis of mechanical vibrations, simple harmonic oscillator, complex phasor representation of harmonic motion, elements of a vibrating system, review of model formulation using Newton's laws and work-energy method, equivalent inertia, spring and damper for lumped parameter and continuous systems, natural frequency and damping ratio, undamped and viscous and dry friction damped free vibrations of SDOF oscillators, Rayleigh-Ritz method, static and dynamic stability vibration of mechanical systems, logarithmic decrement, response of SDOF oscillators to direct harmonic, rotating unbalance, base motion, periodic, transient 1 and non-periodic loads, vibration instrumentation and isolation. Free and forced vibrations of Two DOF systems. Lagrange's equation. Normal modes and principal coordinates, tuned vibration absorber, introduction to vibration of continuous systems, wave equation and Euler-Bernoulli beam bending vibrations. **Three 1-hour lectures per week.** Pre-requisite(s): Engr. 203, Math 240 & Math. 246.

ME 325-Heat Transfer 3(3-0-0): The course addresses the mechanism of heat transfer modes, introduction to conduction, thermal conductivity of solids, diffusion equation, heat transfer in fins &

extended surfaces, multi-dimensional steady-state conduction, transient conduction, lumped capacitance method, introduction to convection, forced convection, natural convection, hydrodynamic & thermal boundary layers, forced convection external flow, heat exchangers, an introduction to basic radiation. **Three 1-hour lectures per week.** Pre-requisite(s): Engr. 309, Engr. 310 & Math. 244.

ME 332-Design of Machine Elements 3(3-0-0): Theory of Machines & Mechanisms is a study of linear & angular displacements, velocities, accelerations of points & bodies, and the static and dynamic forces required for the proper design of mechanical linkages, cams systems. The course covers both static force analysis of mechanisms and dynamic analysis of linkages. Mechanisms and applications, vector method of analysis of plane mechanisms, mobility and linkages, cams, position, velocity and acceleration analysis in mechanisms. Static and dynamic balancing and balancing machines, flywheels, & reciprocating engines. **Three 1-hour lectures per week.** Pre-requisite(s): Engr. 205, Engr. 202, ME 331, & ME 102.

Engr 307-Engineering Economics 3(3-0-0): The course covers the following topics: Engineering Economic Decisions; Understanding Financial Statements; Cost Concepts and Behaviors; Time is Money; Understanding Money and Its Management; Principles of Investing; Present Worth Analysis; Annual Equivalent Worth Analysis; Rate of Return Analysis; Depreciation; Taxes; Break-Even Analysis; Cost Estimation; Developing Project Cash Flows; Inflation; Replacement Decisions. **Three 1-hour lectures per week.** Pre-requisite(s): Engr 100.

Mgt 292-Management Fundamentals & Skill 3(3-0-0): The course covers Management fundamentals & Skill, such as, Global Management - Change and Innovation - Appendix: Managing Entrepreneurial Ventures - Decision Making - Strategic Management - Module Planning Tools and Techniques - In class discussion: Ethics Dilemma - Operations Management - Marketing Management - E Business - Marketing Plan - Human Resource Management - Team Building - Foundations of Individual Behaviour - Communication. **Three 1-hour lectures per week.** Pre-requisite(s): None.

Engr 399-Engineering Training 0(0-0-0): All engineering students are required to undergo a comprehensive "Engineering Training Program" with a reputable and specialized industrial firm. The firm can be in or outside Saudi Arabia relevant to his major area of interest in engineering analysis, design, or construction. The main purpose of this summer training is to enhance the students' practical experience and career abilities. Also, it deepens their engineering knowledge acquired during their academic years in the field of practical experience in real-life engineering projects. Additionally, such a program improves the relationship between the College of Engineering and the governmental and private industrial firms. Also, it can provide the industry with well-trained professionals in the near future. The qualifying student

should spend at least eight weeks in a governmental organization, a reputable industrial firm, or a research center that is involved with engineering activities. **Two months of full time training.** Pre-requisite: Eng. 137 & (Level 7 or above).

ME 333-System Dynamics 3(3-0-0): This course introduces students to basic theory and practices of formulation, simulation and analysis of approximate linear discrete mathematical models for mechanical, electrical, fluid, thermal and electromechanical systems, identification of elements of mechanical, electrical, fluid and thermal systems, elements constitutive relations and governing physical laws. Analytical solutions of first and second order systems, simulations using MATLAB and SIMULINK, Laplace Transforms applications, transfer function state space representations, and frequency response. **Three 1-hour lectures per week.** Pre-requisite(s): ME 312.

ME 425-Mechanical Systems Lab 1(0-0-3): The course covers experiments to understand some basic concepts of heat transfer, refrigeration systems, special humidity sensor and vibration module. and make students familiar as much as possible with the devices by getting readings, analyzing the results then comparing with the theoretical calculations for each experiment, and find the differences between the results of the experiments and the theoretical values, then trying to find the basic technical reasons of these differences. **1-three hour lab. per week.** Pre-requisite(s): ME 312 & ME 325.

ME 460-Manufacturing Processes 3(3-0-0): Metal casting, forming and chip removal processes, cutting tools, cutting fluids, forces and power. Consumption. Investigation of conventional and non-conventional manufacturing processes **Three 1-hour lectures per week.** Pre-requisite(s): Engr 205.

ME 495-Senior Design I 2(2-0-0): Planning, design, construction and/or management of an engineering project that handles contemporary engineering problems under the supervision of one or more faculty members. The course allows the student to apply the knowledge attained from the various courses of the undergraduate program to prepare the proper approach of solution to his project problem. **Two 1-hour lectures per week.** Pre-requisite(s): Senior Standing, ME 332, ME 325 & Engr. 307. Co-requisite(s): ME 460.

SSC 102-Islamic Culture 2(2-0-0): Moderation, Islam globalism and human ties, discrimination and nationalism, Arabic as the medium of education and culture, science and religion, interfaith dialogue, Orientalism and Christianization, Colonialism, Westernization, modernity in literature, Globalization, Terrorism, Development of Moslem nations. **One 2-hour lectures per week.** Pre-requisite(s): None.

ME 422-Refrigeration & Air conditioning Systems 3(3-0-0): Review of psychometry. Air conditioning processes. Thermal comfort, inside and outside design conditions. Ventilation and infiltration. Heating load calculations. Cooling load calculations. Water heating systems layout and design. Air systems design.

Refrigeration systems classification. Theoretical and actual vapor compression cycles. Description of different types of expansion valves. Refrigeration load calculations. Absorption chillers. **Three 1-hour lectures per week.** Pre-requisite(s): ME 203 & ME 325.

ME 441-Control Systems 3(3-0-0): This course introduces the basics of theory of analysis and design of linear feedback control systems, reviews of formulation of linear lumped parameters mathematical models of mechanical, electrical, fluid, thermal and combined systems, block diagrams and state space representations, poles and zeros of transfer function, Block diagram reduction, Mason's gain formula, solution of state equations and state transition matrix, 1st and 2nd order systems response specifications, time constants, overshoot, rise and settling times and steady state errors, Routh-Hurwitz stability criterion, system types and static error coefficients, PID control actions and lag-lead compensators frequency response function and Bode plots, Nyquist stability criterions, phase and gain margins, Root Locus design, simulation using MATLAB tool boxes. **Three 1-hour lectures per week.** Pre-requisite(s): ME 333.

ME 442-Mechatronics 3(3-0-0): The mechatronics course provides the student with a general overview of an integrated electro-mechanical system, which employs analog and/or digital electronics for sensing, actuation and control. Microprocessor based control systems are given special attention and are covered in detail. An important objective of the course is to demonstrate the integration of measurement systems, control, electronics, programming and mechanics in designing competitive systems. The practical assignments and the project work are designed to enhance planning and team skills. **Three 1-hour lectures per week.** Pre-requisite(s): ME 206.

ME 496- Senior Design II 2(2-0-0): Completion of Senior Design I in planning, design, construction and/or management of an engineering project that handles contemporary engineering problems under the supervision of one or more faculty members. Like ME 495 the course allows the student to apply the knowledge attained from the various courses of the undergraduate program to prepare the proper approach of solution and completion to his engineering project. **Two 1-hour lectures per week.** Pre-requisite(s): ME 495.

Deic 101- Islamic Creed & Contemporary Doctrines 2(2-0-0): Definition, importance, sources, characteristics, study methodology, pillars of faith, the influence of creed on individuals and society, belief nullifiers, thought constraints, Study of some contemporary doctrines: secularism, Satan worshipers, Baha'ism, Zionism, Misoneism, Christian fundamentalism. **One 2-hours lectures per week.** Pre-requisite(s): None.

Deic 102-Islamic Morals and Ethics 2(2-0-0): Moderation, Islam globalism and human ties, discrimination and nationalism, Arabic as the medium of education and culture, science and religion, interfaith dialogue, Orientalism and Christianization, Colonialism, Westernization, modernity in literature,

Globalization, Terrorism, Development of Moslem nations. **One 2-hours lectures per week.** Pre-requisite(s): None.

Deic 102-Fiqh Biography 2(2-0-0): Definition, importance, sources, characteristics, study methodology, pillars of faith, the influence of creed on individuals and society, belief nullifiers, thought constraints, Study of some contemporary doctrines: secularism, Satan worshipers, Baha'ism, Zionism, Misoneism, Christian fundamentalism. **One 2-hours lectures per week.** Pre-requisite(s): None.

Deic 302-Islam and Science and Technology Issues 2(2-0-0): Moderation, Islam globalism and human ties, discrimination and nationalism, Arabic as the medium of education and culture, science and religion, interfaith dialogue, Orientalism and Christianization, Colonialism, Westernization, modernity in literature, Globalization, Terrorism, Development of Moslem nations. **One 2-hours lectures per week.** Pre-requisite(s): None.

Deic 317-Islamic Morals and Ethics 2(2-0-0): Morals (Ethics: definition and foundations, characteristics, study of model samples of the Prophets' morals and ethics, tools of moral/ethical education in Islam. Concept of the profession and its importance in human life, constituents of professional morals/ethics and its constraints, model samples of professional morals/ethics in Islam. **One 2-hours lectures per week.** Pre-requisite(s): None.

Deic 318-Economic System in Islam 2(2-0-0): Islamic Economy: (its nature and principles, development, and characteristics), the economic problem and how to face it, contemporary economic systems (capitalism, socialism), economic globalism, World Bank and its goals, World Trade Organization and its goals, ownership in Islam: definition, types, constraints. Islam and economic freedom, Production, distribution, expenditure, economic policies in contracts and transactions. Student is required to memorize part of the holy Quran. **One 2-hours lectures per week.** Pre-requisite(s): None.

Deic 401- Islamic Social System 2(2-0-0): Society: definition, building blocks of society in Islam, Islamic society attributes, Family in Islam: definition, status, importance, building blocks, marriage and its purposes, spouses' rights, parents, siblings, and relatives' rights, women's status and rights in Islam, Family controversial issues about family system in Islam and responding to those issues (polygamy, inheritance, veil, divorce, etc.), Family problems and remedies (women's work, alimony, stewardship, etc.). Student is required to memorize part of the holy Quran. **One 2-hours lectures per week.** Pre-requisite(s): None.

Deic 418- Political System & Human Rights in Islam 2(2-0-0): Political system: definition, characteristics. Country building blocks: homeland, society, authority, goals, foundations, principles of ruling in Islam, ruler selection, ruler duties, state authority, rights of Moslems and non-Moslems in the Islamic state, Manifestations of implementing the

political system in KSA: Governance statute, Shura, judiciary system, security, Hisbah. Human rights in Islam: definition, significance, sources, constraints, Basic rights: (equality, freedom, life, justice, safety), Universal/International Declaration of Human Rights and position of KSA from it. Students are required to memorize part of the holy Quran. **One 2-hours lectures per week.** Pre-requisite(s): None.

SSC 103-Islamic Morals and Ethics 2(2-0-0): Ethics: its definition, importance, swearing, and stature in Islam. Characteristics of Islamic morals. Moral obligation, moral responsibility, and moral sanction. Pictures of the manners of the Prophet Mohammed, peace and blessings be upon him. Pictures of the morals of his companions. Ethics and ethics of the profession. The Kingdom of Saudi Arabia's efforts in the field of protecting integrity and combating professional corruption, while mentioning ethical applications from Saudi professional systems. Introduction to the National Anti-Corruption Commission "integrity". The role of the National Anti-Corruption Commission "integrity" in protecting the integrity and combating professional corruption. **One 2-hours lectures per week.** Pre-requisite(s): None.

SSC 104- Studies in the Biography of the Prophet 2(2-0-0): The importance of studying the Prophet Mohammed's biography. A glimpse into Arab life before Islam: religious, moral, social, and political life. The scientific method in the study of the Prophet's biography. Stages of the Prophet's Biography and the values learned from them. The Characteristics of the Prophet. Prophetic merits: the characteristics of the Prophet, both moral and ethical. The role of the Kingdom of Saudi Arabia in serving the prophetic biography. The personal efforts of some scholars of the Kingdom of Saudi Arabia to defend the Sunnah of the Prophet. **One 2-hours lectures per week.** Pre-requisite(s): None.

SSC 105-Medial Jurisprudence 2(2-0-0): Medical jurisprudence. Treatment in Islamic law. Prophetic Medicine: preventive commandments, and treatment models. Examples of the scientific miracle of prophetic medicine. Legitimate Ruqyah and its evidence. Provisions of acts of worship related to the patient and the medical practitioner. Authorization and medical responsibility. Responsibility for a medical error. Applications of legal rules and intentions on medical provisions. Examples of contemporary medical issues: plastic surgery, fertilization outside the body, birth control and its regulation, milk bank, sperm freezing, miscarriage, gender determination, HIV/AIDS, organ and cell transplantation, resuscitation devices, and weight loss. **One 2-hours lectures per week.** Pre-requisite(s): None.

SSC 106-Economics & Politics in Islam 2(2-0-0): Political system: definition, and characteristics. Characteristics of the Islamic political system. The pillars of the state: the nation, and society. Manifestations of application of the political system in the Kingdom of Saudi Arabia. The Islamic economic system: definition, origin and development, importance, basics, and the characteristics of the economic system in Islam. Contemporary economic systems. Economic globalization. Property in Islam.

Areas of intellectual property. Legitimate methods of ownership. Islam and economic freedom. Socioeconomic solidarity. **One 2-hours lectures per week. Pre-requisite(s): None.**

SSC 107-Islam Social & Family Behavior 2(2-0-0):

The social system in Islam. Social security and its role in preserving society. The importance of the family in Islam. Family protection factors in Islam. The role of the family in achieving community security. The response to the most prominent suspicions raised about the family. The most important social problems and ways to prevent. A study of some contemporary issues in the social system. Development and its impact on social renaissance. The relationship between the individual and society in Islam and positive systems. Study of contemporary issues related to women. The role of women towards their societies. The psychological characteristics of men and women, and their effect on family coexistence. **One 2-hours lectures per week. Pre-requisite(s): None.**

SSC 108-Management & Entrepreneurship 2(2-0-0):

In the first part of this course, students from various disciplines will get acquainted with the most important basic concepts related to management and administrative decision, in addition to the most important traditional administrative functions of planning, organizing, directing and controlling, as well as what the knowledge and capabilities required by modern and future management come in the forefront of, Likewise leadership, participatory management, posterior leadership, technology management.

In the other part of this course, students will have a solid foundation on the concept of entrepreneurship, its strategies, and its role in developing the national economy through small-scale projects. In this part, students will learn how to discover opportunities, understand, evaluate, and then transform them into sustainable business. Each student will also be able to learn the features and characteristics of entrepreneurs and the difficulties associated with entrepreneurship. **One 2-hours lectures per week. Pre-requisite(s): None.**

SSC 109-Health & Fitness 2(2-0-0):

What is health? Physical fitness. Textures. Healthy nutrition. Weight control. Infectious and non-infectious diseases. Smoking. Drug. First aid. Car Accidents. Psychological stress. **One 2-hours lectures per week. Pre-requisite(s): None.**

SSC 110-Research Skills 2(2-0-0):

Research: concept, goals, fields, types, and steps. Research Methods: Descriptive Approach, Experimental Approach, and Historical Approach. Elements of a scientific research plan: Introduction, its problem; Its goals, importance, assumptions, and questions. Review of previous studies: How to critically analyze previous studies. Research hypotheses: definition, types, and formulation. References: books, periodicals, scientific theses, bulletins, and manuscripts. How to obtain information from global databases, and the skills of using the library electronically. Methods for writing references and quotations. Samples: their types and methods of selection. Research tools: (questionnaire - interview -

observation - tests and measurements) and checking their suitability for the application. Scientific writing for research (abstract in Arabic and foreign languages - introduction - discussion - conclusion). Research ethics: Scientific honesty in quoting and avoiding scientific plagiarism. **One 2-hours lectures per week. Pre-requisite(s): None.**

SSC 111-Volunteer Work 2(2-0-0):

The concept of volunteering from a social perspective. The importance, fields, and sources of volunteer work. Voluntary work in Islam. Volunteering in international and Arabic legislations. Theoretical foundations for volunteer efforts. Obstacles to volunteer, with a statement of volunteering culture and the ethics of volunteering in Saudi society. Management and organizations of volunteer work (administrative organization of charitable societies and social institutions in the Kingdom of Saudi Arabia). Evaluating the reality of volunteer work in society, with an indication of the relationship between civil and governmental social bodies. Voluntary work and its relationship to community security. Examples of voluntary work organizations at the Arabic level in general and the Kingdom of Saudi Arabia in particular. Voluntary field exercise for four weeks. Reviewing and evaluating the student's voluntary experience. **One 2-hours lectures per week. Pre-requisite(s): None.**

SSC 112-Medicine: type & use 2(2-0-0):

The main objective of this course is to introduce students to medicine and its various types and forms. This course also aims to provide the student with some special skills for optimal interaction with some common types of drugs such as antibiotics and medications in some famous physiological situations such as pregnancy, lactation, and some chronic diseases. This approach deals with describing known drug interactions, especially when using medicines with some types of foods, herbs, and nutritional supplements. **One 2-hours lectures per week. Pre-requisite(s): None.**

SSC 113-Human Rights in Islam 2(2-0-0):

Human rights: definition and importance. The basic premises of human rights. Principles of human rights in Islam, philosophy, and thought. The history of human rights. The Universal Declaration of Human Rights: legal value and criticism. Islamic Declaration of Human Rights, the Kingdom of Saudi Arabia's concern for human rights. The legal framework for human rights in the Kingdom. Basic human rights: the right to life, the right to justice, the right to freedom, the right to religion, and the right to work. **One 2-hours lectures per week. Pre-requisite(s): None.**

SSC 114-Food & Nutrition: type & use 2(2-0-0):

Introduction to food science and nutrition. Food and nutritional terminologies. The global food security problem. Fields of the food industry in the Kingdom. Main food groups (dairy - meat - vegetables and fruits - grains). Nutrients (food ingredients): moisture, carbohydrates (starch) sugars, dietary fiber, proteins, oils and fats, vitamins, and minerals. Food additive. Food corruption, and the authorities concerned with food control in the Kingdom. Methods of food preservation: drying, packaging, cooling, and freezing. Nutrition and its importance for the human body. Food physiology. Daily needs of nutrients. Nutrition and

general health of the body. Nutritional status sections. An example of obese malnutrition diseases. Dietary energy, production, and use in the body - the body's energy needs. **One 2-hours lectures per week. Pre-requisite(s): None.**

ME 420-Design of Thermal Systems 3(3-0-0): Designing of a workable thermal system, modelling of thermal equipment, system simulation and optimization, thermodynamic properties and steady-state simulation of large systems. Thermal systems and other related topics in the Saudi Arabian industry. **Three 1-hour lectures per week. Pre-requisite(s): ME 203 & ME 325.**

ME 421-Internal Combustion Engines 3(3-0-0): Engine classifications and terminology. Engine operating characteristics and performance parameters. Air standard engine cycles including: Otto, Diesel, Dual and two-stroke cycles. Common fuels used in IC engines, combustion reactions and the associated thermochemical calculations. Engine emissions and their control technologies and strategies. Air and fuel induction methods and technologies, the physics of the combustion phenomena. Friction losses, lubricants and lubrication systems. **Three 1-hour lectures per week. Pre-requisite(s): ME 203 & ME 325.**

ME 423-Renewable & Solar energy 3(3-0-0): Introduction to energy use and renewable energy sources, Non-conventional energy sources such as nuclear, hydrogen, renewable: solar, wind, wave, fuel-cell and advanced energy systems. **Three 1-hour lectures per week. Pre-requisite(s): ME 203 & ME 325.**

ME 426-Energy Conversion 3(3-0-0): Energy classification, sources and utilization, energy growth and economics, fossil fuels, combustion, power plants and steam generators, boiler's performance, pollution, energy conversion systems and energy storage. **Three 1-hour lectures per week. Pre-requisite(s): ME 203 & ME 325.**

ME 427-Turbo machinery 3(3-0-0): Turbo machinery classifications and terminology. Implementation of dimensional analysis for predicting performance of turbo machines and designing engineering systems. Understand the fundamentals of energy transfer between rotating rotors and fluid flow. Demonstrate the ability to construct velocity diagrams for various turbo machines (axial-flow compressors and turbines, radial-flow compressors and turbines, pumps, fans, blowers, hydraulic turbines) and their relation to design. Perform elementary analysis for determining input/output work of various turbo devices. Turbo machinery emissions and their control technologies and strategies. Design and selection of turbo machines for various engineering applications. **Three 1-hour lectures per week. Pre-requisite(s): ME 325.**

ME 430- Computer Aided Design 3(3-0-0): This is a senior-level mechanical engineering course. It exploits the general experience that the students have accumulated throughout the course of their studies. It also introduces students to the analytical basis to CAD

software and the three main ways to represent an entity, namely wireframe, surface and solid modelling. The course can be broken down into three main stages. The first stage of the course aims at introducing the concept and importance of CAD as part of the design process. The second stage focuses on mathematical representation and manipulation of geometrical entities. The final stage discusses current applications of CAD in academic and industrial fields, especially ones related to the instructor's field of expertise. **Three 1-hour lectures per week. Pre-requisite(s): ME 332.**

ME 431-Finite Element Methods 3(3-0-0): Definitions and simple finite element formulation, truss, beam, quadrilateral elements, modelling principles and mesh specification, some computer applications in mechanical engineering. Familiarities with windows operating system are essential. Knowledge of numerical methods is strongly recommended. **Three 1-hour lectures per week. Pre-requisite(s): ME 332 & ME 325.**

ME 445-Robotics 3(3-0-0): Kinematics modelling and simulation of various robot manipulators, rotation matrix, direct/inverse kinematics and dynamics modelling of robotic systems. Introduction to motion control systems, different control schemes and comparison, stability analysis, joint/configuration spaces; interaction control, impedance/compliance/force control, trajectory planning and control, actuators and sensors for robotics applications. **Three 1-hour lectures per week. Pre-requisite(s): Engr. 203 & Engr. 310.**

ME 467-Nanotechnology 3(3-0-0): Nanotechnology is a course that deals with Nano-materials, which is an interdisciplinary introduction to processing, structure, and properties of materials at the Nano-meter length scale. The course will cover recent breakthroughs and assess the impact of this promising field. Specific nanofabrication topics include epitaxy, beam lithography, self-assembly, bio-catalytic synthesis, atom optics, and scanning probe lithography. The unique size-dependent properties (mechanical, thermal, chemical, optical, electronic, and magnetic) that result from nanoscale structure will be explored in the context of technological applications including computation, magnetic storage, sensors & actuators. **Three lectures per week. Pre-requisite(s): Senior Standing.**

ME 481-Undergraduate Research I 3(3-0-0): This course is designed to enhance an undergraduate curriculum in mechanical engineering by providing students with the opportunity to engage in research activities. Requires progress reports and a comprehensive written report. **Three 1-hour lectures per week. Pre-requisite(s): Senior Standing.**

ME 482-Undergraduate Research II 3(3-0-0): This course is designed to enhance an undergraduate curriculum in mechanical engineering by providing students with the opportunity to engage in research activities. Requires progress reports and a comprehensive written report. **Three 1-hour lectures per week. Pre-requisite(s): Senior Standing.**

ME 484-Special Topics I 3(3-0-0): The course covers special topics in an area of mechanical engineering. Given on demand. Three 1-hour lectures per week. Pre-requisite(s): Senior Standing.

ME 485-Special Topics II 3(3-0-0): The course covers special topics in an area of mechanical engineering. Given on demand. Three 1-hour lectures per week. Pre-requisite(s): Senior Standing.

Contact Information

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