

List of ME411 and ME415 Senior Design Project Proposals (041)

Serial	Advisor(s)	Project Titles and Brief Descriptions	Pre-requisites	No. of Students
1	Dr. Zaki Ahmad B.J. Abdul Aleem	<p><u>Innovative Coating Using Nano-Particles</u></p> <p>A dramatic improvement in the quality of coatings in terms of opacity, gloss, color retention, water repellency and environmental pollution can be brought about by using nano-pigments. The objective would be to observe the effect of nano-particles on the quality of coating.</p>	Registering ME 427	4
2	Drs. E. Mokheimer A. Shuaib Rached Ben Mansour	<p><u>Evaluation of the Effectiveness of Evaporative Cooling of Large Spaces in Dhahran</u></p> <p>Evaporative cooling of large spaces (e.g. green houses) will be investigated. A set of experiments, measuring tools, data loggers and analyzer would be either designed or utilized to assess this cooling method.</p>	Senior Standing	4
3	Dr. Saif A. Al-Kaabi	<p><u>Design of a Flexible Testing device for Pipes</u></p> <p>A flexible mechanism (device) is needed to test tubes and pipes using vibration or/and ultrasonic sensors. The device must be able to position the sensors around the pipe outer surface for both exciters and receivers.</p>	ME 308	2-3

4	Drs. H. M. Badr N. Merah	<p><u>Design of a Radial-Type Centrifugal Pump</u></p> <p>The project aims to design, a radial-type pump centrifugal pump that is required to operate at a certain specific condition (speed of rotation, head and flow rate). The work involves the design of the pump impeller and casing in addition to the design of the driving shaft, bearings and the sealing system. The performance characteristics are to be predicted at different speeds.</p>	ME 438 or consent of the instructors	2-3
5	Drs. Habib Abualhamayel P. Gandhidasan	<p><u>Testing of a dew recovery system</u></p> <p>The formation of dew is a very natural phenomenon. This type of water collection is possible whenever humid air and clear nighttime skies exist simultaneously. A suitable system for dew recovery is designed. This will be tested in Dhahran and close by area.</p>	ME 315	2
6	Drs. Habib Abualhamayel P. Gandhidasan	<p><u>Testing of a fog collector</u></p> <p>The problem of obtaining additional water from fog is received serious attention. The most suitable location for collection of fog water in the Kingdom is identified as Abha area (southwest region of the Kingdom). Testing will be conducted in this area.</p>	ME 315	1-2

7	Dr. M. A. Habib	<p><u>Design of a compressor, turbine and a combustion chamber of a small power gas turbine unit</u></p> <p>Objectives: design a compressor, a turbine and a combustion chamber of a small power gas turbine unit.</p> <p>Procedure:</p> <ol style="list-style-type: none"> 1. Calculate the required mass flow rate and the pressure ratio of the compressor and turbine. 2. Calculate the number of stages of the compressor and turbine 3. Calculate the dimensions of the annulus for the compressor and turbine. 4. Calculate the blade angles for each of the compressor and turbine blades and plot the velocity diagrams. 5. Calculate the number of burners, fuel flow rates and size of the combustion chamber. 6. Provide the necessary construction diagrams. 	ME 427	2
8	Drs. Habib Abualhamayel P. Gandhidasan	<p><u>CONCENTRATION OF LIQUID FOODS USING DESICCANT TECHNOLOGY – REDESIGN AND TESTING</u></p> <p>CONCENTRATION OF LIQUID FOODS, SUCH AS FRUIT JUICES, REDUCES PACKAGING, TRANSPORT AND STORAGE COSTS, WHILST THE REDUCED WATER ACTIVITY ENHANCES STORAGE STABILITY. A FALLING-FILM, VERTICAL, LONG-TUBE EVAPORATOR WILL BE REDESIGNED AND FABRICATED. TESTS WILL BE CONDUCTED USING CALCIUM CHLORIDE SOLUTION AS THE DESICCANT.</p>	ME 315	2

9	Drs. Habib Abualhamayel P. Gandhidasan	<u>Testing of a water recovery system using calcium chloride solution</u> This project proposes to use calcium chloride solution to extract fresh water from the atmosphere. The nighttime moisture absorption and daytime moisture desorption take place in the same unit. The unit consists of a flat, blackened, tilted surface and is covered with a single glazing. A suitable system is ready for operation and it will be tested both in the night as well as in the daytime.	ME 315	2
10	Dr. Abdel-Salam Eleiche	<u>Adapting Bicycle Technology For Under-Developed Countries</u> The objective of the project is to design mechanical devices that use standard bicycle parts, in order to service various needs (e.g. transportation, farming, machineries, etc.) of many under-developed countries. The team will select particular useful applications for their project. Suitable designs will be selected and documented. Some of these designs will also be implemented. Special criteria will be set for the designs selected, e.g. inexpensive construction, sufficient strength, ease of use, maintainability, safety, etc.	Senior standing	3 (ME 415) 2 (ME 411)

11	Dr. M. Hawwa	<p><u>Design of a MEMS Micro Motor</u></p> <p>Background: Microelectromechanical systems (MEMS) are a class of devices which encompass components much less than a millimeter in any dimension. These devices are being used to perform as sensors or actuators, micro turbines, micro accelerometers, printer heads, and even power generators.</p> <p>Project: Design an electrostatic linear micro motor to produce a displacement as a result to the application of electrical voltage. Demonstrate the device performance analytically and use a CAD package to refine the design and achieve an effective functioning.</p>	Senior standing	1
12	Dr. M. Hawwa	<p><u>Optimization of a Laminated Composite Beam</u></p> <p>Background: Composite materials have been increasingly used in many engineering applications. The popularity of composites is due to their amenability to tailoring of their mechanical properties. It would be ideal to design properly optimized light weight laminated composite structural elements with no reduction in strength.</p> <p>Project: Deflection, stress-strain, and buckling behaviors are all equally important for a composite beam to be mechanically sound. Design a composite layered beam, where the use of laminates in the design should offer the possibility to combine the desirable properties of different materials to realize optimized mechanical characteristics.</p>	Senior standing	1

13	Dr. M. Anatr	<p><u>Design of a Heat Exchanger</u></p> <p>1. Modification to a manufactured shell and tube heat exchanger. (Actually the outer shell is better changes)</p> <p>2. Design and fabrication of a base to put the exchanger on.</p> <p>3. Making arrangement for hot and cold fluids supplied with necessary measuring devices.</p> <p>4. Running a set of experiments for rating the exchanger along with a parametric study.</p>	ME 315	3
14	Dr. Zaki Ahmad B.J. Abdul Aleem	<p><u>Resistance of Aluminum Metal Matrix Composites to Impingement Corrosion</u></p> <p>Modification of impingement testing equipment and evaluation of the effect of impingent on metal matrix composite.</p>	Registering ME 427	1
15	Drs. Iyad Al-Zaharnah and Naser Merah	<p><u>Design of an industrial automatic jack for lifting weights</u></p> <p>It is required to design an industrial automatic jack for lifting heavy weights. The students need to investigate two possible mechanisms for lifting the weights. One mechanism is by using a pneumatic system (using a pneumatic cylinder, an air pump and an electrical motor) and the other mechanism is using a worm gear assembly and an electrical motor. The investigation includes the factors of safety, cost, speed of operation, weight, robustness of use, etc. Once the students decide to use a certain mechanism, they will continue the project with detailed analysis (dynamic, force, stress-strain, etc.) in addition to materials selection and manufacturing details. Detailed and assembly drawings are needed with the final design.</p>	ME 307 & ME 308	3

16	Drs. Y. Al-Nassar and Abdulkader Aksoy	<u>Design of Prototype Mechanisms for Bi-Axial Rotation of Cylindrical Solid Samples</u>	Senior Standing	3
17	Drs. Faleh Al-Sulaiman and Yehia Khulief	<u>Vibration analysis of the human body</u> Description: The human body can be modeled by an interconnected elastic multi-body system, with different joints and force elements. Such force elements are basically spring-damper elements. The determination of the damping and stiffness characteristics is essential to setting vibration tolerances during work involving vibrating equipment; e.g. jack hammer operation. In this project a test setup will be designed. Several volunteers will be tested. The input and output vibration will be reduced, analyzed and used to produce estimates of the model parameters.	Consent of instructor	2 - 3
18	Drs. Zuhair M. Gasem and Luai Al-hadrami	<u>Design of Heat Exchanger</u> Heat exchanger tubes are subject to high velocity and high temperature fluid flow which promote erosion and corrosion damage. The extent of damage depends on many variables including: tubes materials, velocity and temperature of the flowing fluid, and the geometry of impingement. A previous senior project team has built an erosion-corrosion testing loop. The objectives of the proposed project is (1) to modify the loop design to test tubular specimens and (2) to generate experimental data that describe the extent of erosion-corrosion damage as a function of pre selected parameters.	Senior Standing	2 - 3

19	Dr. Zuhair M. Gasem	<u>Brief Description:</u> Scandium is being investigated for its strengthening effect on aluminum alloys. The increased strengthening effect could increase the susceptibility to stress corrosion cracking. The objectives of this project are: (1) to generate the precipitation kinetics of different amounts of Sc added to aluminum and (2) to test the alloys for stress corrosion cracking susceptibility.	Senior Standing	2 ME 415 students
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