

Fall 2024-25 - MECT410 & MENG410 CAPSTONE TEAM PROJECT GROUPS			
Gr. N	Supervisor	Project Title	Pre-Requisites
1	Assoc. Prof. Dr. Murat Özdenefe	Solar Powered Stirling Engine : This project aims to design and fabricate Stirling engine using solar energy as a heating source. The objective is to implement the utilization of renewable energy to provide the heating source for the engine by designing a concentrated solar collector to produce a very high temperature similar to that of a small gas burner. Furthermore, this project will demonstrate the Stirling engine capacity to produce power that is eco friendly and very practical for many applications.	MECT361, MECT444, EENG410, MENG442. Two students must be from Mechatronics Program.
2	Assoc. Prof. Dr. Murat Özdenefe	Smart Window Shade: The objective of this project is: To design and manufacture an external shading element for windows that is movable and preferably modular. The objective of the system is to block the direct radiation incident on the window for minimizing the heat gains during cooling season and to allow it to fall on the window for maximizing the heat gains during heating season. The external shading element will continuously adjust itself accordingly relative to the sun during a day by means of motors. The system will also be designed to adjust itself seasonally.	MECT361, MECT444, EENG410, MENG442. Two students must be from Mechatronics Program.
3	Assoc. Prof. Dr. Devrim Aydin	Indirect Evaporative Cooling assisted vapor compression cooler : Students are expected to design, develop and test a sustainable cooling system by integration of an existing evaporative coolings system with vapor compression unit. Within the project design, development and testing of the cooling system will be performed.	MENG244 OR MENG246, MENG303
4	Assoc. Prof. Dr. Devrim Aydin	Solar vegetable dryer: Students are expected to develop a drying system driven by solar collectors and heat recovery system to dry different types of vegetables. Within the project design, development and testing of the solar dryer will be performed.	MENG244 OR MENG246, MENG303
5	Assoc. Prof. Dr. Devrim Aydin	Solar driven thermal energy storage: Students are expected to develop an air cycle for storing thermal energy. System will be integrated with heat recovery for improved efficiency. Within the project design, development and testing of thermal energy storage system will be performed.	MENG244 OR MENG246, MENG303
6	Assoc. Prof. Dr. Devrim Aydin	Direct evaporative cooler using natural local materials: Students are expected to design, develop and test a direct evaporative cooling system using locally sourced natural materials as the evaporative cooling pad. Within the project design, development and testing of the cooling system will be performed.	MENG244 OR MENG246, MENG303
7	Prof. Dr. Uğur Atikol	Solar Air Conditioner – It is required to convert an old air conditioner into a solar PV-operated air conditioner that will run from a battery directly. The battery will store the energy from the solar panels and will be able to run the air conditioner for 3 to 4 hours until it is charged again. It is required to have a multi-disciplinary team with a partner from the EE department.	MENG345, MECT361, MENG364, EENG350, MENG443
8	Prof. Dr. Uğur Atikol	Wind Energy Storage System – It is required to design an energy storage system for a wind turbine having the capacity for storing energy that can provide electricity to the internet, tv, a few bulbs and charging for the cell phone for at least 2 hours. The team should be a multi-disciplinary team formed by mechatronics and electrical engineers.	MECT361, EENG350, MENG364, EENG342
9	Prof. Dr. Hasan Hacisevki	Drag Measuring System: A drag for measuring device will be designed and manufactured for wind tunnel test equipment. The device will measure the drag force during wind tunnel test and display the result on a digital display.	MENG201, MENG203, MENG375
10	Prof. Dr. Hasan Hacisevki	3 D carving machine: A 3 D three axis wood carving machine will be designed and manufactured. The plane dimensions will be 40 cm by 40 cm and height 30 cm. The system will be controlled through an open source software and must allow to upload drawings from Solidwork software.	MENG286, MENG303, MENG375, MECT444
11	Prof. Dr. Hasan Hacisevki	An automotive electric system work bench will be designed and manufactured for Automotive Systems course (MENG423) laboratory studies. Students will design the electric systems (wiring harness) and manufacture the test equipment.	MENG423, EENG225
12	Prof. Dr. Hasan Hacisevki	Pneumatic paper shear machine: A pneumatically controlled paper shearing machine will be designed and manufactured. The plate dimension will allow A4 size paper up to 100 mm stroke distance. Must include all safety functions and accessories.	MENG201, MENG353, MENG375, MENG376
13	Assoc. Prof. Dr. Babak Safaei	Development and implementation of solid-state batteries Solid-state batteries replace the liquid or gel electrolytes found in traditional lithium-ion batteries with a solid electrolyte, which is safer, more stable, and potentially offers higher energy density. Solid-state batteries have the potential to offer faster charging times, longer lifetimes, and increased safety, making them attractive for use in electric vehicles, consumer electronics, and grid-scale energy storage.	MENG303, MENG331, MENG364, MENG375, MECT375, MECT361, MECT444 SPECIAL REQUIREMENT: At least 2 team members should be from the Mechatronics Program. Software: Solidworks, ANSYS, Abaqus
14	Assoc. Prof. Dr. Babak Safaei	Multi-functional sandwich structures The development of multi-functional sandwich structures that can perform multiple functions, such as providing structural support, thermal insulation, and acoustic absorption, is another current hot topic in the field. Research is being conducted to develop new core materials and face sheet materials that can provide multiple functions and to optimize the design of sandwich structures for multi-functionality.	MENG303, MENG331, MENG364, MENG375, MECT375, MECT361, MECT444 SPECIAL REQUIREMENT: At least 2 team members should be from the Mechatronics Program. Software: Solidworks, ANSYS, Abaqus
15	Assoc. Prof. Dr. Babak Safaei	Development of Lattice Models	MENG303, MENG331, MENG364, MENG375, MECT375, MECT361, MECT444 SPECIAL REQUIREMENT: At least 2 team members should be from the Mechatronics Program. Software: Solidworks, ANSYS, Abaqus
16	Assoc. Prof. Dr. Babak Safaei	Adaptive Manufacturing of Auxetic Structures	MENG303, MENG331, MENG364, MENG375, MECT375, MECT361, MECT444 SPECIAL REQUIREMENT: At least 2 team members should be from the Mechatronics Program. Software: Solidworks, ANSYS, Abaqus
17	Prof. Dr. Qasim Zeeshan	Refurbishment of the Mini CNC Milling Machine	MENG303, MENG331, MENG364, MENG375, MECT361, MECT444, EENG320, EENG410, EENG428 SPECIAL REQUIREMENT: At least 2 team members should be from the Mechatronics Program. Software: Solidworks, MATLAB, Simulink, ANSYS, ARDUINO, PLC, ROS
18	Prof. Dr. Qasim Zeeshan	Refurbishment of the Mini CNC Turning Machine	MENG303, MENG331, MENG364, MENG375, MECT361, MECT444, EENG320, EENG410, EENG428 SPECIAL REQUIREMENT: At least 2 team members should be from the Mechatronics Program. Software: Solidworks, MATLAB, Simulink, ANSYS, ARDUINO, PLC, ROS
19	Prof. Dr. Qasim Zeeshan	Snake Robot - 2.0: This project focuses on the redesign, development and testing of the snake robot 1.0 which was inspired from real snakes. It consists of compact links (brackets) which allow to maintain smooth movements. The most effective movement pattern such as: crawling and jittering must be implemented. Servo motors, wireless cam, Arduino Nano and remote control are some of the components that must be used to develop this prototype. To make the snake robot function like a real snake, it is constructed using many brackets. To cut down the cost, these brackets must be designed and 3D printed. Each bracket can have a servo motor that enables the robot to have various degrees of freedom for different gaits. Modular design must give the robot flexibility to reach different terrains and ability to move around in complex environments. The work will cover several key areas of mechanical and mechatronics engineering.	MENG303, MENG331, MENG364, MENG375, MENG353, MECT361, MECT444, EENG320, EENG410, EENG428 SPECIAL REQUIREMENT: At least 2 team members should be from the Mechatronics Program. Software: Solidworks, MATLAB, Simulink, ANSYS, ARDUINO, ROS
20	Prof. Dr. Qasim Zeeshan	Digitization of Universal Vibration Apparatus – TM16 - TM16 series is a range of products that teach different aspects of vibrations and oscillations in mechanical systems. These include pendulums, mass-springs systems and shafts and beams. The TM16 series is a modular system, based around a Frame and Cupboard. The aim of the project is to digitize the apparatus by integrating it with digital sensors and a digital display unit with data transmission to a PC. The work will cover several key areas of mechanical and mechatronics engineering.	MENG303, MENG331, MENG364, MENG375, MECT361, MECT444, EENG320, EENG410, EENG428 SPECIAL REQUIREMENT: At least 2 team members should be from the Mechatronics Program. Software: Solidworks, MATLAB, Simulink, ANSYS, ARDUINO, PLC
21	Prof. Dr. Qasim Zeeshan	Design and Development of Micro Vertical Axis Wind Turbine (VAWT) - The objective of this project is to design and develop a Bio-inspired Wind Turbine. The sub systems: rotor blades, transmission (gear box), braking and control system, inverter and storage system (battery) must be configured to achieve the performance requirements. The data acquisition system must be an integral part of the design. The static & dynamic balancing is mandatory. The work will cover several key areas of mechanical and mechatronics engineering.	MENG303, MENG331, MENG364, MENG375, MECT361, MECT444, EENG320, EENG410, EENG428 SPECIAL REQUIREMENT: At least 2 team members should be from the Mechatronics Program. Software: Solidworks, MATLAB, Simulink, ANSYS, ARDUINO, PLC
22	Prof. Dr. Qasim Zeeshan	Refurbishment of a Mini Circular Automated Storage and Retrieval System (ASRS) - Automated Storage and Retrieval Systems (AS/RS) are used as warehouses, specifically designed for material handling in advanced manufacturing systems and are broadly utilized in distribution centers as subsystem for production area. The aim of the project is to refurbish the mini Circular AS/RS Configuration. The configuration is based on a single aisle; single S/R (Storage/Retrieval) machine. Randomly storage assignment policy is applied for the system.	MENG303, MENG331, MENG364, MENG375, MECT361, MECT444, EENG320, EENG410, EENG428 SPECIAL REQUIREMENT: At least 2 team members should be from the Mechatronics Program. Software: Solidworks, MATLAB, Simulink, ANSYS, ARDUINO, PLC