Spring 2024-25 - MECT410 & MENG410 CAPSTONE TEAM PROJECT GROUPS

Gr. No	Supervisor	Project Title	Pre-Requisites
1	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 mimimising 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 continiously 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.**
2	Assoc. Prof. Dr. Devrim Aydin	**Solar Sourced Thermal Battery** Students are expected to develop a compact heat storage unit for storage of solar energy. Developed unit will be integrated to an existing solar water heating system and experimented in real life conditions.	MENG246, MENG345
3	Assoc. Prof. Dr. Devrim Aydin	**Polymer Fibre Heat Exchanger for Thermal Energy Storage Applications** A heat exchanger using polymer fibre materials will be developed and tested in a thermal energy storage system.	MENG246, MENG345
4	Assoc. Prof. Dr. Devrim Aydin	**Solar Driven Air Dryer:** System will be designed as moving bed unit to for continuous operation to remove moisture from the air, Developed system could be used in buidings to meet the latent cooling loads therefore to reduce the energy comsumption of air conditioners.	MENG246, MENG345
5	Prof. Dr. Uğur Atikol	**Solar Air Conditioner** It is required to convert an old airconditioner 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**
6	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**
7	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,MENG353**
8	Prof. Dr. Hasan Hacisevki	**Tree branch grinding machine** Design and manufacture a tree branch grinding machine. Students will select material and perform related calculations and after completing design and drawings parts will be produced and finally assembly will be completed and tested.	**MENG286, MENG303, MENG375, MECT444**
9	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
10	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
11	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
12	Prof. Dr. Qasim Zeeshan	**Refurbishment of a Mini Cricular 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

NOTE: MENG303 is a mandatory pre-requisite. The other pre-requisites must be taken by atleast one member of the team in the previous or current semester. The group must fullfil the pre-requisite requirements as a team.