Fall 2025-26 - MECT410 & MENG410 CAPSTONE TEAM PROJECT GROUPS

Gr. No	Supervisor	Project Title	Pre-Requisites
1	**Assoc. Prof. Dr. Murat Özdenefe**	**Solar Powered Seawater Desalination Unit** Students are expected to design and develop a compact Solar Powered Seawater Desalination Unit. This capstone project addresses the growing demand for sustainable freshwater production in coastal and island communities by developing a modular, off-grid seawater desalination unit powered entirely by solar energy.	**MECT361, 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 a small rectangular or cylindirical bed filled with porous balls with heat storage materials.	**MENG246, MENG345**
3	**Assoc. Prof. Dr. Devrim Aydin**	**Sustainable Air Conditioning System** Students are expected to develop and develop 2 kW regenerative evaporative cooler for building air conditioning. System will use aluminium plate heat exchangers water reservoir , fan and a pump.	**MENG246, MENG345**
4	**Assoc. Prof. Dr. Devrim Aydin**	**Vapour Compression System** Students are expected to develop a small-scale vapour compression system for integration with a regenerative evaporative cooler for overall cooling performance enhancement. An existing vapour compression system (i.e. from a water fountain) will be modified for the proposed application.	**MENG246, MENG345**
5	**Assoc. Prof. Dr. Devrim Aydin**	**Atmospheric Water Harvesting Device** Students are expected to develop a small scale passive atmospheric water harvesting device using natural materials. System will be capable of harvesting potable water from air for locations with water scarcity. System will use hygroscopic materials to absorb water from the air, solar energy to evaporate the water and radiant surfaces to condense the vapour.	**MENG246, MENG345**
6	**Assoc. Prof. Dr. Devrim Aydin**	**Evaporatively cooled shading panel** Students are expected to develop a shading panel with air flow channels for providing indirect evaporative cooling effect for enhancing the outdoor thermal comfort. Successful development of such panel could have wide range of applications in residential buildings as well as commercial buildings such as restaurants and cafees.	**MENG246, MENG345**
7	**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**
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,MENG353**
10	**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 alll safety functions and accesssories.	**MENG201, MENG353, MENG375, MENG376**
11	**Assoc. Prof. Dr. Babak Safaei**	**High-performance materials** The development of high-performance nano composites with improved mechanical, thermal, and electrical properties is a current hot topic. Research is being conducted to optimize the processing conditions, interface bonding, and particle/fiber alignment to create nano composites with enhanced properties.	MENG303, MENG331, MENG364, MENG375,MECT375, MECT361, MECT444 SPECIAL REQUIREMENT: At least 2 team members should be from the Mechatronics Program. Software: Solidworks, ANSYS, Abaqus
12	**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
13	**Prof. Dr. Qasim Zeeshan**	**Quadruped Robot - 1.0:** 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 allows to maintain smooth movements. The most effective movement pattern such as; crawling and slithering 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 territories and ability to move around in complex environments. 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, ROS
14	**Prof. Dr. Qasim Zeeshan**	**SPIRAL ROBOTIC ARM - 1.0 (An Octopus-Inspired Robotic Arm):** SpiRobs morphologically replicate the logarithmic spiral that is ubiquitous in natural organisms. They are easy and fast to build across scales via 3D printing. They are actuated by cables, which allows for fast and life-like movements. Besides, a single robot can handle a wide variety of objects (in terms of size, shape, and weight). A key to this is a bioinspired grasping strategy that is found in the octopus.The octopus's remarkably versatile arms are used across a variety of behaviors, including locomotion, search, manipulation, and excavation. Without a skeleton, these arms can conform their shape to the environment and successfully manipulate objects of any geometry, maneuver over variable and irregular terrain, and search over complex surfaces. This project focuses on the esign, development, control, and experimental evaluation of a soft robot arm whose actuation is inspired by the muscular structure of the octopus arm, one of the most agile biological manipulators.. Modular design must give the robot flexibility to reach different territories and ability to move around in complex environments. 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, ROS
15	**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 allows to maintain smooth movements. The most effective movement pattern such as; crawling and slithering 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 territories and ability to move around in complex environments. 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, ROS
16	**Prof. Dr. Qasim Zeeshan**	**Automated Guided Vehcile - Mobile Robot** - Automated guided vehicle can be used in indoor environment, such as warehouse, hospitals, grocery stores, etc. They are designed for logistic purposes, disinfection and cleaning. The aim of the project is to design an automated guided vehicle robot that uses Lidar and SLAM to create a map of its environment and uses Robotic Operating System (ROS) to navigate the robot in the environment.	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
17	**Prof. Dr. Qasim Zeeshan**	**Ocean Wave Energy Generator - (Phase IV)** Phase I - Ocean Wave Energy Tank - Completed Phase II - Ocean Wave Generator System - Completed Phase III - Ocean Wave Energy Convertor - Completed - Refurbishment of the Wave Tank, Oscillating Water Column Chamber, Ocean Wave Energy Converter (OWEC) - Wells turbine **Phase IV - Data Acquisition System: Refurbishment of the existing OCWEG System, Integration of Sensors** **Software Data Acquisition, Simulation and Experimental Validation. The work will cover several key areas of mechanical and mechatronics engineering.**	MENG303, MENG331, MENG364, MENG375, MECT361, MECT444, EENG320, EENG350, EENG410, EENG428 SPECIAL REQUIREMENT: At least 2 team members should be from the Mechatronics Program. Software: Solidworks, MATLAB, Simulink, ANSYS, ARDUINO, PLC
18	**Prof. Dr. Qasim Zeeshan**	**Human-powered Solar/Electric hybrid vehicles (aka Power-assisted Vehicle)** A human–electric hybrid vehicle is a hybrid vehicle, or more specifically a hybrid human-powered vehicle, whose drivetrain consists of a human being and an electric motor/generator (and one or more electricity-storage device(s) such as a battery(ies) or ultracapacitor(s)). Some vehicles are able to operate off both human power and be plugged in to operate on battery power. The main aim of the project is to develop a hybrid electric human-powered vehicle. The work will cover several key areas of mechanical and mechatronics engineering.	MENG303, MENG331, MENG364, MENG375, MECT361, MECT444, EENG320, EENG350, 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.