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

Gr. No	Supervisor	Project Title	Pre-Requisites
1	Assoc. Prof. Dr. Murat Özdenefe	**Atmospheric Water Generator** Atmospheric water generator is a device which produces potable water from humid air using vapor compression or desiccant systems. This project will be designing and manufacturing of an Atmospheric Water Renerator through a vapor compressin system. The mechanical subsystem (vapor compression) for condensing the water from humid air, water collection and purification subsystem and the storage & dispenser subsystems will be designed and manufactured and integrated.	MENG246/MENG244 and MENG345. At least one student must be from Mechatronics Program.
2	Assoc. Prof. Dr. Murat Özdenefe	**Reconditioning of U-Value Measurement Hot-Box** Hot-Box for U- Value Measurement is a device that is used for measuring the thermal transmittance (U-Value) of the building elements. It comprised from two controlled chambers, hot and cold chambers for mimicking the indoor and outdoor environments respectively. The specimen which its U-Value will be measured is installed to the device, equipped with temperature and heat flux sensors and its surfaces are exposed to the hot and cold chambers. The temperature and heat flux measurements are logged, and the test is continued until the steady state conditions are achieved. The U-Value is calculated using the necessary relations then. The current project will be the reconditioning of U-Value Measurement Hot-Box device which is located at the EMU Civil Engineering Building. The device's hot and cold cambers will be ensured to work properly, chambers' thermal insulation and air tightness will be fixed, if necessary, temperature and heat flux sensors will be installed, and a proper logging system will be established. Subsequently, several typical construction samples from buildings of Cyprus will be prepared and their U-Values will be measured.	MENG345/MENG244-MECT361. At least one student must be from Mechatronics Program and two students must be from Civil Engineering Program.
3	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.
4	Assoc. Prof. Dr. Murat Özdenefe	**Sail boat Dynamic Simulator** The project objectives are to design, develop a dynamic simulator that entertains and helps students learn how to sail. Using the simulator,the instructor can teach in a school, a gymor in an open space all the fundamental techniques for conducting a sailboat before having to tackle the same in the water. These simulators, through an electronic rudder, allow the student reproduce the various reaches. A tilting system simulates the rolling, allowing the student to become familiar and gain confidence with instability and face his first excursion out on the water with ease.	MENG345, MECT361, MECT444, MENG364, EENG350
5	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 or MENG244, MENG345
6	Assoc. Prof. Dr. Devrim Aydin	**Air Dehumifier** Students are expected to develop a small scale moving bed air dehumidifier using natural absorbent materials. System will be used to remove excess moisture from the air to provide thermal comfort.	MENG246 or MENG244, MENG345
7	Assoc. Prof. Dr. Devrim Aydin	**Small scale window heat recovery unit** Students are expected to develop a small scale window heat recovery unit which could be used for ventilation in domestic buildings.	MENG246 or MENG244, MENG345
8	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 or MENG244, MENG345
9	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
10	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
11	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 accessories.	MENG201, MENG353, MENG375, MENG376
12	Prof. Dr. Hasan Hacisevki	**Smart Solar-Powered Portable Water Purification System** This capstone project aims to design and prototype a cost-effective, solar-powered portable water purification system for rural and emergency use. Addressing the global lack of access to clean drinking water, the system will operate independently of grid electricity and incorporate solar energy, energy storage, and multi-stage filtration. The project includes system modeling, CAD design, prototype fabrication, performance testing, and cost evaluation to deliver a durable and sustainable off-grid water treatment solution.	MENG345, MENG353, MECT361, MENG364
13	Assoc. Prof. Dr. Babak Safaei	**Thermoelectric Heat Exchanger** This project focuses solely on the thermoelectric heat-exchanger module, excluding optical concentration or full system integration. It involves designing, building, and testing a heat-exchanger assembly that transfers heat from a generic hot source to commercial thermoelectric generators (TEGs), with air or liquid cooling on the cold side. Emphasis is on thermal design, materials, contact mechanics, and undergraduate-level manufacturability, extending slightly beyond standard coursework.	MENG303, MENG364, MENG375,MECT375, MENG353, MENG345, MECT361 Software: Solidworks, ANSYS, Abaqus
14	Assoc. Prof. Dr. Babak Safaei	**Architectural structures inserts in Additively Manufactured channels** The project evaluates two aspects of performance: mechanical response under compression (energy absorption, peak force, and stability of progressive collapse) and thermal–fluid behavior under forced convection (heat-transfer enhancement versus the pressure-drop penalty). Teams will use FDM printing to fabricate consistent specimens and will compare experiments (simple compression tests and, when available, a basic flow/heat rig) with numerical simulations (FE for crushing and CFD for flow and heat transfer). The final outcome is a practical design recommendation identifying which insert geometry is best for a given objective maximum energy absorption, reduced peak load, maximum heat transfer, or best overall efficiency.	MENG303, MENG364, MENG375,MECT375, MENG353, MENG345 Software: Solidworks, ANSYS, Abaqus
15	Assoc. Prof. Dr. Babak Safaei	**Solar Thermal Receiver** This project isolates the optical/thermal receiver subsystem, without TEG integration or space constraints. Students design, fabricate, and test a small cavity/plate absorber with mirrors/lenses, using lab lights or sunlight, focusing on optics, heat transfer, materials, and high-temperature structures via undergraduate workshops.	MENG303, MENG364, MENG375,MECT375, MENG353, MENG345, MECT361 Software: Solidworks, ANSYS, Abaqus
16	Assoc. Prof. Dr. Babak Safaei	**FDM-Printed Lattice/TPMS Cores** This topic studies FDM-printed crash-boxes with internal lattice/TPMS cores to evaluate both energy absorption and cooling performance. Mechanically, specimens with the same outer geometry are compressed to obtain force–displacement curves and calculate absorbed energy, SEA, peak load, and CFE, linked to observed collapse modes. Thermally, the same core concepts are assessed using CFD in a channel, reporting Nu, Δp, and PEC to quantify the heat-transfer gain versus pumping penalty. With designs constrained by FDM printability, the outcome is a clear recommendation of which insert geometry best meets a chosen goal (high SEA, low peak force, high Nu, or best overall efficiency).	MENG303, MENG364, MENG375,MECT375, MENG353, MENG345 Software: Solidworks, ANSYS, Abaqus
17	Assoc. Prof. Dr. Babak Safaei	**Autonomous Underwater Vehcile** This capstone project proposes the design and development of a compact Autonomous Underwater Vehicle (AUV) capable of performing underwater inspection and environmental monitoring tasks without human intervention. The system will integrate a waterproof hull, multi-thruster propulsion, onboard sensors (IMU, depth sensor, sonar, and camera), and embedded control with autonomous navigation and stabilization algorithms. Unlike tethered systems, the AUV will execute pre-programmed missions independently, collect data, and surface to transmit results. The project aims to demonstrate innovation in marine robotics, AI-based sensing, and indigenous engineering, aligning with Teknofest's objectives in advanced autonomous systems and defense technologies.	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
18	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
19	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

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.
MECT students, please ensure that your project has sufficient incorporation and involvement of "Embedded System Design", in order to meet the ABET Mechatronics Program requirement .