Fall 2026-27 - 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 compression 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 and 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**	**Hybrid solar system for air and water heating** Students are expected to refurbish and improve an existing solar system for air and water heating. The proposed system will operate in air heating, water heating, or hybrid heating (solar + air heating) modes. Students will use the necessary sensors and instrumentation and conduct experimental assessments.	MENG246 or MENG244, MENG345
6	**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 energy-saving ventilation in domestic buildings.	MENG246 or MENG244, MENG345
7	**Assoc. Prof. Dr. Devrim Aydin**	**A small-scale thermochemical energy storage testing unit with internal heat recovery** Students are expected to develop a small scale testing rig with necessary instrumentation for testing thermochemical material performances at different bed thicknesses for solar thermal energy storage	MENG246 or MENG244, MENG345
8	**Assoc. Prof. Dr. Babak Safaei**	**Design and Manufacture of a Lightweight Prosthetic Foot/Ankle Energy-Absorbing Core:** The project should focus on the mechanical component, not clinical claims.design a lightweight internal lattice structure for a prosthetic foot or ankle component and analyze its mechanical behavior using finite element simulation. The optimized design will then be 3D printed and tested to evaluate stiffness, deformation, energy absorption, and weight reduction.	MENG303, MENG364, MENG375,MECT375, MENG353, MENG345, MECT361 Software: Solidworks, ANSYS, Abaqus
9	**Assoc. Prof. Dr. Babak Safaei**	**Design and Manufacture of a Lightweight Robotic Gripper Finger with Internal Lattice Structure:** Redesign a conventional robotic gripper finger by introducing an internal lattice structure to reduce weight while maintaining sufficient strength and stiffness. The design will be analyzed using finite element simulation, manufactured by 3D printing, and experimentally tested under gripping/bending loads to compare its performance with a solid finger.	MENG303, MENG364, MENG375,MECT375, MENG353, MENG345 Software: Solidworks, ANSYS, Abaqus
10	**Assoc. Prof. Dr. Babak Safaei**	**Design and Fabrication of a Desktop Filament Extrusion and Recycling System for FDM 3D Printing:** design and manufacture a compact machine that converts shredded thermoplastic waste or failed 3D-printed parts into reusable filament with controlled diameter. The project can include mechanical design, heater/extrusion analysis, fabrication, temperature and motor-speed control, filament-diameter monitoring, and printing tests using the recycled filament.	MENG303, MENG364, MENG375,MECT375, MENG353, MENG345, MECT361 Software: Solidworks, ANSYS, Abaqus
11	**Assoc. Prof. Dr. Babak Safaei**	**Design and Fabrication of a Low-Cost Continuous Conveyor-Belt FDM 3D Printer** design and manufacture a continuous FDM 3D printer using a moving conveyor-belt build platform for automated and uninterrupted production of polymer components. The project will include mechanical design, structural analysis, fabrication and assembly, control-system development, calibration, and experimental evaluation of printing accuracy and quality.	MENG303, MENG364, MENG375,MECT375, MENG353, MENG345 Software: Solidworks, ANSYS, Abaqus
12	**Assoc. Prof. Dr. Babak Safaei**	**Design and Testing of a 3D-Printed Passive Cooling System for Solar Panels** This project develops an additively manufactured cooling channel to reduce solar-panel temperature. Its effect on temperature, electrical efficiency, and overall energy output will be experimentally evaluated.	MENG303, MENG364, MENG375,MECT375, MENG353, MENG345 Software: Solidworks, ANSYS, Abaqus
13	**Assoc. Prof. Dr. Babak Safaei**	**Robotic Structural Inspection System with AI Crack Detection** A robotic system inspects structures such as buildings and bridges by capturing images of their surfaces. AI analyzes these images to automatically detect cracks and identify areas requiring maintenance.	MENG303, MENG364, MENG375,MECT375, MENG353, MENG345 Software: Solidworks, ANSYS, Abaqus
14	**Prof. Dr. Qasim Zeeshan**	**Quadruped Robot - 1.0:** The Quadruped Robot – 1.0 project aims to design, manufacture, and test a low-cost four-legged mobile robot capable of stable walking and basic obstacle negotiation, integrating lightweight mechanical structures, servo actuators, sensors, and microcontroller-based control. With a maximum budget of USD 1,000, the project emphasizes Design for Cost, Availability, Manufacturability, Sustainability, Safety, and Reliability, using locally available and 3D-printed components where practical. The project will involve kinematic analysis, CAD design, gait generation, fabrication, electronics integration, programming, and experimental testing, while contributing to UN SDG 4 (Quality Education), SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation and Infrastructure), and SDG 12 (Responsible Consumption and Production) through hands-on engineering education, robotics innovation, automation, and sustainable product development.	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**	**GeoWind Turbine:** The project aims to design and develop a low-cost, compact, and sustainable small-scale wind energy harvesting system optimized for the environmental conditions of North Cyprus and similar low-to-moderate wind regions. The project will investigate an appropriate turbine configuration, aerodynamic performance, structural integrity, electrical power generation, control, and energy-storage requirements, followed by CAD modeling, simulation, prototype manufacturing, and experimental validation. With a target budget of approximately USD 1,000, the design will emphasize Design for Cost, Availability, Manufacturability, Sustainability, Safety, and Reliability, using locally available materials and commercially available components wherever possible. The prototype will be evaluated in terms of power output, efficiency, starting wind speed, rotational speed, structural stability, and operational reliability, while considering relevant engineering standards and the UN Sustainable Development Goals, particularly SDG 7 (Affordable and Clean Energy), SDG 9 (Industry, Innovation and Infrastructure), and SDG 12 (Responsible Consumption and Production).	MENG303, MENG331, MENG364, MENG375, MENG345, 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
16	**Prof. Dr. Qasim Zeeshan**	**Beach cleaning Machine:** a low-cost, battery-powered, walk-behind mechanical system designed to remove litter, seaweed, stones, and other debris from sandy beaches while minimizing unnecessary sand removal and environmental disturbance. The proposed prototype combines an adjustable front collection mechanism with a vibrating screening system to separate debris from reusable sand, supported by a lightweight chassis, electric drive, rechargeable battery, and interchangeable screening components. With a conservative budget of USD 1,000, the project emphasizes Design for Cost, Availability, Manufacturability, Sustainability, Safety, and Reliability, while providing students with practical experience in mechanical design, mechatronics, manufacturing, CAD/CAE, electrical systems, engineering standards, FMEA, testing, and system integration. The objective is to produce a functional, safe, maintainable, and environmentally responsible beach-cleaning working prototype suitable for small-scale coastal applications. The project also contributes to the UN Sustainable Development Goals (SDGs), particularly SDG 11 (Sustainable Cities and Communities) through cleaner and more accessible coastal environments, SDG 12 (Responsible Consumption and Production) through resource-efficient design, SDG 13 (Climate Action) through low-emission electric operation, and SDG 14 (Life Below Water) by supporting cleaner beaches and reducing coastal pollution.	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
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.** The Ocean Wave Energy Converter supports SDG 7 (Affordable and Clean Energy), SDG 9 (Industry, Innovation and Infrastructure), SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action), and SDG 14 (Life Below Water) by developing a sustainable, innovative, and low-carbon marine renewable-energy technology.	MENG303, MENG331, MENG364, MENG375, MENG345, 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

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.