

Semester: Fall 2022

## Course Descriptions

**Dr. Arifur Khan, MECH 4336 (CRN 15997) , MECH 4366 (15841), MECH 4395( 16754):**

**ECO Marathon Shell**

To design, analyze, assemble, test, and build a highly energy-efficient car (Electric Vehicle, EV), students will be working in teams to develop each sub-system, such as powertrain, drivetrain, structure, electrical, etc. Few teams will be working on the thermal management system considering all safety aspects and requirements. Each team will be working on the documentation as well. Students will be assessed based on the deliverables, design reviews and required to participate in the ECO-MARATHON SHELL competition whenever it is available.

**Omar Cedillos Barraza, MECH 4336(CRN 19263) , MECH 4366( CRN 19272) , and MECH 4395 (CRN 16109) :**

**Baja SAE**

**Miguel Cedeno, MECH 4336 (15999), MECH 4366 (16849), and MECH 4395 (CRN 15276):**

**Rocket Team**

This class develops, designs, tests, and builds a Rocket for the Spaceport America Cup competition. The class involves simulation, design, prototyping, and building (hands-on activities).

**Methaq Abed, MECH 4366 (CRN 19273) Senior Design**

**FSAE (Formula Lombardi)**

This course develops the students' skills in the design of racing car components, including but not limited to suspension, chassis, engine, derivation, aerodynamics, ergonomics, quality controls, DAQ, and vehicle dynamics. Finite element analysis to be used to check the design requirements and check with the SAE code. The course also required a prototype, design assembly, documentation, and safety.

**Yirong Lin, MECH 4366 (CRN 19274) Senior Design**

This senior design will be focused on materials and structures for 3D printing of ceramics and polymers. These projects will be provided by Los Alamos National Lab, and Honeywell FM&T.



Semester: Fall 2022

**Chris Danek & Frank Medina, MECH 4366 (CRN 19275) Senior Design****Senior Design Project - Rapid Innovation**

This Senior Design class will allow you to apply design thinking and agile teamwork to a real-world project and work with industry and DOD mentors. The course focuses on rapid innovation using advanced manufacturing technologies and engineering simulation and emphasizes stakeholder feedback. Past project topics have included additive manufacturing, biomedical applications, sustainable energy, or aerospace applications.

**Chris Danek & Barry Benedict, MECH 4366 (CRN 19302) Senior Design****Senior Design Project - Rapid Innovation**

This Senior Design class will allow you to apply design thinking and agile teamwork to a real-world project and work with industry and DOD mentors. The course focuses on rapid innovation using advanced manufacturing technologies and engineering simulation and emphasizes stakeholder feedback. Past project topics have included additive manufacturing, biomedical applications, sustainable energy, or aerospace applications.

**John Bird, MECH 4395 (CRN 15275): State Estimation for Robotics and Autonomous Systems**

State estimation is concerned with determining the internal states of a system by combining sensor measurements. Estimation is critical to many mobile robotics, aerospace, and process control systems. In this course, we will study basic probability and system theory underlying estimation, how to determine if a state can be estimated from available observations, and state estimation algorithms for linear and nonlinear systems.

**Evgeny Shafirovich, MECH 4394(CRN 19306): Special Topics in Thermal Fluid area**

Special Topics in Thermal Fluids: Renewable Energy Renewable energy is the fastest-growing energy source in the United States, increasing 100% from 2000 to 2018. In 2019, U.S. renewable energy consumption surpassed coal. The course covers the fundamentals of renewable energy technologies that utilize solar, wind, hydro, geothermal, biomass, and ocean energy resources. Textbook: Kanoglu, Cengel, and Cimbala, Fundamentals, and Applications of Renewable Energy, McGraw Hill.

**Arifur Khan, MECH 4393 (CRN 19305) : Special Topics in Electro-Mechanical Systems.**

The Special Topics in Electromechanical System will teach the fundamental of coding of microcontroller that controls any electromechanical system. The coding language would be based on C++ (Arduino), MATLAB, and/or LabVIEW. The flowchart will be used to design a full project made by a beginner to the intermediate coder to run and control any hardware in loop (HIL) engineering system.



Semester: Fall 2022

**Joel Quintana, MECH 4392 (CRN 19303) : Special Topics in Computations**

National Instruments (NI) LabVIEW and its various data logging and control hardware packages are ubiquitous within the aerospace industry, including notable examples such as NASA, Blue Origin, Raytheon, and Lockheed Martin. This course aims to introduce students to developing test and evaluation programs on performance, including simple programs enabling rapid development of experiments to complex control and data acquisition algorithms and architectures for ongoing academic research projects and beyond.