ESE 6312: Energy Policy Analysis and Economic Modeling (3-0)
The role of energy issues and policy options in economic and social development. Integrated national energy planning: conceptual framework, subsectoral analysis, sectoral integration, and implementation. Economic tools for energy systems.

ESE 6314: Energy Systems Engineering (3-0)
System level analysis of technological, environmental aspects of energy conversion and Utilization engineering. Discussion of latest technologies within each energy systems area, the opportunities and challenges of current and emerging energy technologies, and the energy vision for sustainable future.

ESE 6316: Sustainable Energy (3-0)
Concepts of sustainable development. Economic development and economic growth. Discussion of energy resources, extraction, conversion, and end use with an emphasis in meeting regional and global energy needs. Discussion of renewable energy technologies (solar, wind, biomass, and geothermal) in the context of political, social, economic, and environmental goals.

ESE 6318: Energy Use and Climate Change (3-0)

ESE 6320: Advanced Topics in Energy Engineering (3-0)
Contemporary advanced energy topics, such as secure and reliable energy supplies, clean power generation, hydrogen economy, energy efficiency, and critical infrastructure assurance.

ESE 6306 Principles of Experimental & Engineering Design (3-0)
Students with different backgrounds examine experimental and engineering design principles with special application to the solution of energy and environmental problems. Student teams will be formed to define an interdisciplinary environmental problem of regional interest.

ESE 6307 Interdisciplinary Environmental and Energy Problem-solving(3-0)
Students with different backgrounds will work in teams to examine interdisciplinary energy and environmental issues specific to the Far West Texas Border region and prepare team reports with recommendations, which consider scientific, political, economic and social aspects.

MECH 5301 Mathematical Methods for Mechanical Engineers (3-0)
The primary objective of this class is to give grounding in some basic mathematical analysis methods that are most relevant to mechanical engineers. Topics include linear algebra and vector spaces, tensorial calculus, ordinary and partial differential equations.

MECH 5302 Solid Mechanics I (3-0)
An introduction to continuum mechanics, elasticity, stress, strain and constitutive models for solid mechanics problems.

MECH 5303 Heat Transfer I (3-0)
Introduction to heat conduction and convection; steady state and transient solutions, analytical and numerical methods.
MECH 5304 Heat Transfer II (3-0)
Advanced topics in heat conduction, convection and radiation; Turbulent effects free convection, boundary layers.

MECH 5305 Computational Fluid Mechanics (3-0)
Flow models and governing equations, mathematical behavior of partial differential equation, discretization technique: finite difference and finite volume, basics of numerics: algorithms for solving systems of linear algebraic equations, numerical stability, heat conduction, convection and diffusion, calculation of the flowfield: SIMPLE and SIMPLER algorithm, grids and transformation, post processing.

MECH 5306 Fluid Mechanics (3-0)
Survey of the principal concepts of fluid mechanics, statics, continuity, momentum and energy relations for continuum fluids, kinematics of fluid motion, governing equations for motion of non-viscous fluid, vorticity and circulation, and Kelvin's theorem. Helmholtz theorem, Crocco's theorem, steam function, potential flow, conformal transformation, theory or lift, and wave phenomena in fluids.

MECH 5310 Thermodynamics (3-0)
Applications of general thermodynamic relations; study and applications of time-dependent energy relationships; analysis of power, refrigeration, cryogenic and direct energy conversion systems.

MECH 5311 Nonlinear Finite Element Analysis (3-0)
This class will give an introduction to theory and application of advanced nonlinear finite element analysis. Topics covered include Eulerian and Lagrangian grids, explicit and implicit schemes, solution methods, large deformations and nonlinear materials, and contact.

MECH 5312 Solid Mechanics II (3-0)
Advanced topics in solid mechanics; inelastic material response; continuum mechanics; fracture mechanics; computational mechanics; finite elasticity; micro-mechanics.

MECH 5313 Mechanics of Composite Materials (3-0)
Analysis, design and applications of laminated and fiber reinforced composites. Micro- and macro-mechanical analysis of elastic constants, failure modes and environmental degradation.

MECH 5318 Analytical Dynamics (3-0)
Velocity and acceleration analysis, motion of a point in space, rotating coordinate systems, balancing of masses; generalized coordinates, work and energy, and impulse and momentum.

MECH 5334 Space System Design (3-0)

MECH 5335 Aerospace Propulsion (3-0)
**MECH 5336 Aerospace Structures (3-0)**
Advanced mechanics of materials analysis of spacecraft and aircraft structural components: elasticity; torsion and bending of beams, analysis and design of thin-walled beams; failure modes; elastic buckling.

**MECH 5337 Aerospace Dynamics and Control (3-0)**

**MECH 5390 Special Topics in Mechanical Engineering (3-0)**
Advanced topics of contemporary interest in mechanical engineering. May be repeated for credit when topic varies.

**MECH 5391 Individual Studies (0-0-3)**
Individual variable-credit for non-thesis related research, design, or analysis on advanced phases of Mechanical Engineering problems conducted under the direct supervision of a faculty member. A maximum of 3 credit hours may be applied towards the MS degree. **Prerequisites:** Department approval.

**MECH 5396 Graduate Projects (0-0-3)**
Individual research, design, or analysis on advanced phases of engineering problems conducted under the direct supervision of a faculty member. **Prerequisite:** Department approval.

**MECH 5397 Graduate Projects (0-0-3)**
Individual research, design, or analysis on advanced phases of engineering problems conducted under the direct supervision of a faculty member. **Prerequisites:** Department approval.

**5398 Thesis (0-0-3)**
Initial work on the thesis. **Prerequisites:** Department approval.

**5399 Thesis (0-0-3)**
Continuous enrollment required while work on the thesis continues. **Prerequisites:** Department approval.