843. Turbulence  
Winter, Summer. 4(4-0)  MMM 810  or approval of department.
Basic equations of turbulent motions including momentary and long-term, scalar contaminants, correlation and spectrum functions. Basic elements of statistical descriptions, isotropic and shear flows, phenomenological theories and hot-wire anemometry.

850. Advanced Space and Orbit Ballistics  
Fall of odd-numbered years. 3(3-0)  MMM 200; MTH 215, 309.
Particle motion; Missile trajectories; motion of a rocket; orbit; effects of oblateness on satellite orbit; orbital lifetime; rendezvous transfer in earth-moon system; optimization; low thrust space propulsion systems; trip to Mars.

852. Mechanical and Aero-Space Optimization  
Winter. 3(3-0)  MTH 494.
Elementary fundamentals of calculus of variations, maximum principle. Optimization techniques applied to fluids, gas dynamics, optimization of propellants, fuel consumption, heat transfer, wave propagation in solids and physical properties in plasmas.

880. Special Topics  
Fall, Winter, Spring, Summer. 2 to 4 credits. May re-enroll for a maximum of 9 credits. Approval of department.
Special topics in mechanical engineering of current interest and importance.

889. Research  
(EGR 999.) Fall, Winter, Spring, Summer. Variable credit. Approval of department.

917. Statistical Thermodynamics and Kinetic Theory of Gases  
Fall of even-numbered years. 3(3-0)  MTH 416; MTH 432 or 423; or approval of department.

920. Theory of Vibrations II  
(MMM 804.) Winter of odd-numbered years. 4(4-0)  MTH 494; or approval of department. Interdepartmental with and administered by the Metallurgy, Mechanics and Materials Science Department.

921. Theory of Vibrations III  
(MMM 803.) Spring of odd-numbered years. Summer. 3(3-0)  MTH 494; or MMM 930 or approval of department. Interdepartmental with and administered by the Metallurgy, Mechanics and Materials Science Department.

923. Wave Motion in Continuous Media II  
Winter of even-numbered years. 4(4-0)  MTH 422; MMM 810; or approval of department.

924. Wave Motion in Continuous Media II  
Spring of even-numbered years. 4(4-0)  MTH 443; 925.

925. Mechanical Engineering Problems  
Fall, Winter, Spring, Summer. Variable credit. May re-enroll for a maximum of 9 credits. Approval of department.
Analysis of advanced engineering problems involving design, thermodynamics, fluid dynamics, gas dynamics, space.

930. Seminar  
Fall, Winter, Spring. 1 credit. May re-enroll for a maximum of 9 credits. Approval of department.
Seminar in advanced topics in aerospace engineering.

941. Advanced Gas Dynamics II  
Fall of odd-numbered years. 3(3-0)  MTH 482.
Transonic flows, blunt bodies in supersonic flows, three-dimensional supersonic flows, hodograph methods, characteristics, unsteady phenomena, physical gas dynamics.

942. Viscous Fluids  
Fall of even-numbered years. 3(3-0)  MMM 810 or CHE 841.
Exact solutions of Navier-Stokes equations, i.e., Oscillatory Motion, Laminar Jet, Converging Channel, etc.; Hydrodynamic Stability including free convection, surface tension, gravitational and free-surface instabilities, and Tollmein-Schlichting waves.

952. Slip and Free (Neutron) Molecular Fluxes  
Spring. 3(3-0)  419, 432.
Distribution function; Boltzmann equation; solutions of Enskog-Burnett, Grad, slip, flow coefficient; heat transfer. Free molecule flow: elastic and inelastic reflections; flow around bodies; resistance coefficient; heat; oblation; meteors.

953. Plasma Dynamics (Magnetogas Dynamics)  
Winter. 3(3-0)  432; PHY 491.
Fundamental equations of hydrodynamics; Maxwell equations; continuum; channel flow; boundary layer; shocks; Alfvén wave propagation; one and two fluid theories; discrete particle approaches; plasma oscillations; flow around bodies and in nozzles; space propulsion systems.

954. Ion Flow Dynamics  
Spring. 3(3-0)  953.
Continuation of 953 as applied to the ion flow; extraction of the neutral flow turbulence into electromagnetic turbulence, and method of characteristics applied to the ion flow dynamics.

990. Research  
(EGR 999.) Fall, Winter, Spring, Summer. Variable credit. Approval of department.