Mechanical and Aerospace Engineering (MAAE)

Mechanical and Aero Engineer (MAAE) Courses

Mechanical & Aerospace Eng.

Faculty of Engineering & Design

MAAE 2001 [0.5 credit]
Engineering Graphical Design
Engineering drawing techniques; fits and tolerances; working drawings; fasteners. Elementary descriptive geometry; true length, true view, and intersection of geometric entities; developments. Assignments will make extensive use of Computer-Aided Design (CAD) and will include the production of detail and assembly drawings from actual physical models.
Precludes additional credit for ECOR 1001.
Prerequisite(s): ECOR 1010 or ECOR 1000 before 2003.
Lectures and tutorials two hours a week, laboratory four hours a week.

MAAE 2101 [0.5 credit]
Engineering Dynamics
Review of kinematics and kinetics of particles: rectilinear and curvilinear motions; Newton's second law; energy and momentum methods. Kinematics and kinetics of rigid bodies: plane motion of rigid bodies; forces and accelerations; energy and momentum methods.
Precludes additional credit for CIVE 2101 or ECOR 2101.
Prerequisite(s): ECOR 1101 and MATH 1005 and MATH 1104.
Lectures three hours a week, problem analysis three hours a week.

MAAE 2202 [0.5 credit]
Mechanics of Solids I
Review of Principles of Statics; friction problems; Concepts of stress and strain at a point; statically determinate and indeterminate stress systems; torsion of circular sections; bending moment and shear force diagrams; stresses and deflections in bending; stress and strain transformations.
Precludes additional credit for CIVE 2200.
Prerequisite(s): ECOR 1101, MATH 1005 and MATH 1104.
Lectures three hours a week, problem analysis and laboratory three hours a week.

MAAE 2300 [0.5 credit]
Fluid Mechanics I
Fluid properties. Units. Kinematics, dynamics of fluid motion: concepts of streamline, control volume, steady and one-dimensional flows; continuity, Euler, Bernouilli, steady flow energy, momentum, moment of momentum equations; applications. Fluid statics; pressure distribution in fluid at rest; hydrostatic forces on plane and curved surfaces; buoyancy.
Prerequisite(s): MATH 1005, MATH 1104 and ECOR 1101.
Lectures three hours a week, laboratory and problem analysis three hours a week.

MAAE 2400 [0.5 credit]
Thermodynamics & Heat Transfer
Basic concepts of thermodynamics: temperature, work, heat, internal energy and enthalpy. First law of thermodynamics for closed and steady-flow open systems. Thermodynamic properties of pure substances; changes of phase; equation of state. Second law of thermodynamics: concept of entropy. Simple power and refrigeration cycles. Introduction to heat transfer: conduction, convection and radiation.
Prerequisite(s): CHEM 1101 or CHEM 1001 and CHEM 1002, MATH 1005 and MATH 1104.
Lectures three hours a week, laboratory and problem analysis three hours a week.

MAAE 2700 [0.5 credit]
Engineering Materials
Materials (metals, alloys, polymers) in engineering service; relationship of interatomic bonding, crystal structure and defect structure (vacancies, dislocations) to material properties; polymers, phase diagrams and alloys; microstructure control (heat treatment) and mechanical properties; material failure; corrosion.
Precludes additional credit for CIVE 2700.
Prerequisite(s): CHEM 1101 or CHEM 1001 and CHEM 1002 and ECOR 1101.
Lectures three hours a week, problem analysis and laboratory three hours a week.

MAAE 3004 [0.5 credit]
Dynamics of Machinery
Kinematic and dynamic analysis of mechanisms and machines. Mechanism force analysis. Static and dynamic balancing. Kinematic and dynamic analysis of cams. Free and forced vibration of single-degree-of-freedom systems. Introduction to multibody dynamics.
Prerequisite(s): MAAE 2101.
Lectures three hours a week, problem analysis and laboratories two hours a week.

MAAE 3202 [0.5 credit]
Mechanics of Solids II
Buckling instability: torsion of non-circular sections; unsymmetric bending and shear centre; energy methods; complex stresses and criteria of yielding; elementary theory of elasticity; axisymmetric deformations.
Precludes additional credit for CIVE 3202.
Prerequisite(s): MAAE 2202.
Lectures three hours a week, problem analysis and laboratory three hours a week.

MAAE 3300 [0.5 credit]
Fluid Mechanics II
Review of control volume analysis. Dimensional analysis and similitude. Compressible flow: isentropic flow relations, flow in ducts and nozzles, effects of friction and heat transfer, normal and oblique shocks, two-dimensional isentropic expansion. Viscous flow theory: hydrodynamic lubrication and introduction to boundary layers.
Precludes additional credit for MAAE 3303.
Prerequisite(s): MATH 2004 and MAAE 2300.
Lectures three hours a week, problem analysis and laboratory three hours a week.

MAAE 3400 [0.5 credit]
Applied Thermodynamics
Gas and vapour power cycles: reheat, regeneration, combined gas/vapour cycles, cogeneration. Heat pump and refrigeration cycles: vapour compression cycles, absorption refrigeration and gas refrigeration. Mixtures of perfect gases and vapours: psychometry and combustion. Principles of turbomachinery.
Prerequisite(s): MAAE 2400.
Lectures three hours a week, problem analysis and laboratories one hour a week.

MAAE 3901 [0.5 credit]
Mech & Aero Engineering Lab
Students perform a series of laboratory exercises dealing with a wide range of mechanical engineering topics. Included in this course is a group design project. Students relate theory and practice and develop experience with modern engineering equipment, measurement techniques and design methodology. Good reporting practice is emphasized.
Precludes additional credit for MAAE 4901.
Prerequisite(s): third-year status in Engineering.
Lectures and tutorials one hour a week, laboratory five hours a week.

MAAE 3999 [0.0 credit]
Co-operative Work Term

MAAE 4102 [0.5 credit]
Materials: Strength & Fracture
Analysis and prevention of failures in metals and composite materials; plasticity analysis and plastic collapse; micro-mechanisms of fracture, conditions leading to crack growth and transition temperature effects, fracture mechanics, fatigue, environmentally assisted cracking, non-destructive evaluation and testing. Mechanical properties of structural composites.
Prerequisite(s): MAAE 2700.
Lectures three hours a week.

MAAE 4500 [0.5 credit]
Feedback Control Systems
Introduction to the linear feedback control. Analysis and design of classical control systems. Stability and the Routh-Hurwitz criteria. Time and frequency domain performance criteria, robustness and sensitivity. Root locus, Bode and Nyquist design techniques. Control system components and industrial process automation.
Precludes additional credit for MAAE 3502 or SYSC 4505.
Prerequisite(s): MATH 3705 and SYSC 3600.
Lectures three hours a week.

MAAE 4906 [0.5 credit]
Special Topics: Mech & Aero Eng.
At the discretion of the Faculty, a course may be offered that deals with selected advanced topics of interest to Aerospace and Mechanical Engineering students.
Prerequisite(s): permission of the Department.

MAAE 4917 [0.5 credit]
Undergraduate Directed Study
Student carries out a study, analysis, and solution of an engineering problem. Results presented in the form of a written report. Carried out under the close supervision of a faculty member. Intended for students interested in pursuing graduate studies. Requires supervising faculty member and proposal from student.
Prerequisite(s): permission of the Department and completion of, or concurrent registration in, AERO 4907 or MECH 4907.

Summer session: some of the courses listed in this Calendar are offered during the summer. Hours and scheduling for summer session courses will differ significantly from those reported in the fall/winter Calendar. To determine the scheduling and hours for summer session classes, consult the class schedule at central.carleton.ca

Not all courses listed are offered in a given year. For an up-to-date statement of course offerings for the current session and to determine the term of offering, consult the class schedule at central.carleton.ca