For the courses listed below, the Department of Mechanical and Aerospace Engineering is seeking qualified contract instructors with excellent communication and presentation skills; strong teaching skills established through successful teaching of engineering courses in an accredited Canadian university engineering program; and a high level of up-to-date expertise in the subject of the course, established through industrial experience and/or research in academia or government labs. Candidates must have a degree in a relevant field of engineering. A P.Eng. license in Canada is required for the instruction of most undergraduate courses.

Applications will be accepted until July 1, 2021. Applications with a covering letter and curriculum vitae including educational background, employment history, and related work experience, should be sent via email to the hiring committee care of Irene Helder, Department Administrator (irene.helder@carleton.ca).

The University may require that all or part of these courses be delivered remotely, including online.

Carleton University is strongly committed to fostering diversity within its community as a source of excellence, cultural enrichment and social strength. We welcome those who would contribute to the further diversification of our University including but not limited to women, persons with disabilities, visible minorities, Aboriginal peoples, and persons of any sexual orientation or gender identity.

Fall 2021 (September – December)

**AERO 4003 [0.5 credit]**
Aerospace Systems Design
Stress and deflection analysis; fatigue, safe life, damage tolerant design. Propulsion systems integration; landing gear; control and other subsystems. Mechanical component design. Airworthiness regulations and certification procedures. Weight and cost estimation and control. System reliability. Design studies of aircraft or spacecraft components.
Includes: Experiential Learning Activity
Prerequisite(s): AERO 3002 and fourth-year status in Engineering.
Lectures three hours a week, problem analysis three hours a week.

**MAAE 2400 [0.5 credit]**
Thermodynamics and Heat Transfer
Includes: Experiential Learning Activity
Prerequisite(s): Second-year status in Engineering.
Lectures three hours a week, laboratory and problem analysis three hours a week.

**MAAE 4903 [0.5 credit]**
Introduction to the principles and practice of air safety investigations. Air safety investigation processes including national and international regulations, on-site investigation procedures, analysis methods, and reporting techniques. Review of causes of aircraft accidents.
Prerequisites: Fourth-year status in Engineering.
Lectures three hours a week.

**MAAE 4907 [1.0 credit]**
Engineering Design Project
Team project in the design of an aerospace, biomedical, mechanical, or sustainable energy system. Opportunity to develop initiative, engineering judgement, self-reliance, and creativity in a team environment. Results submitted in a comprehensive report as well as through formal oral presentations.
Prerequisite(s): fourth-year status in Engineering and completion of, or concurrent registration in AERO 4003 or AERO 4842 or MECH 4003 or MECH 4013 or SREE 4001. Certain projects may have additional prerequisites.
MECH 4805 [0.5 credit]
Measurement and Data Systems

MECH 5105 [0.5 credit] (MCG 5315)
Orbital Mechanics and Space Control
Orbital dynamics and perturbations due to the Earth's figure, the sun, and the moon with emphasis on mission planning and analysis. Rigid body dynamics applied to transfer orbit and on-orbit momentum management and control of spacecraft. Effects of flexible structures on a spacecraft control system.

MECH 5206 Wind Engineering [0.5 credit]
This course is designed to cover all the theoretical and practical areas pertinent to the operation of wind turbines. After finishing the course, a student is expected to have gained the knowledge to (a) be considered as a wind engineer and (b) be prepared to work in any company engaged in designing, manufacturing or utilization of wind turbines and the associated components, or in utility companies.

MECH 5401 [0.5 credit] (MCG 5341)
Turbomachinery

MECH 5601 [0.5 credit] (MCG 5361)
Creative Problem Solving and Design
Problem-solving processes and how they can be applied in engineering design. Emphasis on learning methodologies rather than accumulating information. Techniques can be successfully applied in any engineering specialty.

MECH 5803 [0.5 credit] (MCG 5488)
Additive Manufacturing
Additive manufacturing (3D Printing) and its role in product development and innovation. Latest developments and critical challenges, related techniques, processes, equipment, and applications. Design tools, software and design considerations for additively manufactured components.

MECH 5805 [0.5 credit] (MCG 5482)
Uninhabited Aircraft Systems
Theory of flight and air vehicle performance; propulsion systems; launch and recovery. Regulatory development; privacy policies. Mission design; sensor performance. Guidance, navigation, control and communications theory. System-level reliability; life cycle cost assessment. This course may be offered in a blended online/in-person format.

SERG 5004 [1.0 credit]
Applied Interdisciplinary Project
Application of assessment tools, energy evaluation methods, engineering, economics and policy studies to actual sustainable energy projects. Precludes additional credit for SERG 5000 (no longer offered). Prerequisite(s): SERG 5003 and one of SERG 5001 or SERG 5002.
*This posting is to teach the first half of the two term course. The second half will be taught by a full-time faculty member.

Winter 2022 (January – April)

AERO 3841 [0.5 credit]
Spacecraft Design I
Design of spacecraft and spacecraft subsystems with emphasis on mission requirements and current design methods: spacecraft configuration, payload, structural, attitude control, thermal, power, and other related subsystems. Spacecraft integration and testing.
Includes: Experiential Learning Activity
Prerequisite(s): AERO 3240.
Lectures three hours a week, tutorials or laboratories three hours per week.

**AERO 4009 [0.5 credit]**
*Aviation Management and Certification*
Product development, quality control. Strategic organizational analysis and design. Airworthiness, type certification and planning, delegation of authority, airplane flight manual. Aerospace system design and safety.
Prerequisite(s): fourth-year status in Engineering.
Lectures three hours per week.

**AERO 4402 [0.5 credit]**
*Aerospace Propulsion*
Propulsion requirements, effects of Mach Number, altitude, and application; basic propeller theory; propeller, turboshaft, turbojet, turbofan and rocket; cycle analysis and optimization for gas turbine power plant; inter-relations between thermodynamic, aerodynamic and mechanical designs; rocket propulsion; selection of aeroengines.
Precludes additional credit for MECH 4401.
Prerequisite(s): MAAE 2400, (MAAE 3300 or MECH 3310), and fourth-year status in Engineering.
Lectures three hours a week.

**MAAE 2400 [0.5 credit]**
*Thermodynamics and Heat Transfer*
Basic concepts of thermodynamics: temperature, work, heat, internal energy and enthalpy. First law for closed and steady-flow open systems. Thermodynamic properties of pure substances; changes of phase; equation of state.
Includes: Experiential Learning Activity
Prerequisite(s): Second-year status in Engineering.
Lectures three hours a week, laboratory and problem analysis three hours a week.

**MAAE 4907 [1.0 credit]**
*Engineering Design Project*
Team project in the design of an aerospace, biomedical, mechanical, or sustainable energy system. Opportunity to develop initiative, engineering judgement, self-reliance, and creativity in a team environment. Results submitted in a comprehensive report as well as through formal oral presentations.
Prerequisite(s): fourth-year status in Engineering and completion of, or concurrent registration in, AERO 4003 or AERO 4842 or MECH 4003 or MECH 4013 or SREE 4001. Certain projects may have additional prerequisites.

**MECH 4102 [0.5 credit]**
*Corrosion and Corrosion Control*
Prerequisite(s): Fourth-year status in Engineering.
Lectures three hours a week.

**MECH 4106 [0.5 credit]**
*Nuclear Power Plant Design*
The objective of the course is to describe the basic design and technology of nuclear reactors. The course will describe the major systems in a nuclear power plant as well as the important CANDU reactor safety principles and systems; describe the important systems and components of the Balance of Plant (BoP); describe how safety systems meet licensing requirements with particular reference to IAEA, CNSC and USNRC regulations on plant design and discuss some computer codes used in the safety assessments and design of nuclear power plants.

**MECH 4107 [0.5 credit]**
*Internal Combustion Engines*
This course will introduce students to the fundamentals of internal combustion engines. Emphasis will be placed on performance, operation, mechanical design, engine manufacturing processes, and environmental impact. At the completion of the course, the students will have broad understanding of engine operation, design, manufacturing and the ability to analyse engine size, configuration, mapping and efficiency for specific applications.

MECH 4407 [0.5 credit]
Heating and Air Conditioning
Prerequisite(s): MAAE 2400 and third-year status in Engineering.
Lectures three hours a week.

MECH 5204 [0.5 credit] (MCG 5483)
Fundamentals of Combustion

MECH 5304 [0.5 credit] (MCG 5334)
Computational Fluid Dynamics of Compressible Flows
Solution techniques for parabolic, elliptic and hyperbolic equations developed for problems of interest to fluid dynamics with appropriate stability considerations. A staged approach to solution of full Euler and Navier-Stokes equations is used. Grid generation techniques appropriate for compressible flows are introduced.

MECH 5500 [0.5 credit] (MCG 5350)
Advanced Vibration Analysis
General theory of continuous and discrete multi-degree-of-freedom vibrating systems. Emphasis on numerical techniques of solving complex vibrating systems, with selected applications from aerospace, civil, and mechanical engineering.

MECH 5602 [0.5 credit] (MCG 5362)
Failure Prevention (Fracture Mechanics and Fatigue)
Design of engineering structures to ensure against failure due to fatigue or brittle fracture. Nature of fatigue and brittle fracture; selection of suitable material, geometry, and inspection procedures for the load and environmental conditions.

MECH 5809 [0.5 credit] (MCG 5xxx)
Introduction to Smart Materials and Structures
The objective of this course is to give students an introduction to the fundamentals of smart materials and structures. It will cover (a) the definition and categories of the smart materials; (b) their fundamental characteristics, operating principals, physical properties; (c) Design of sensors and actuators from smart materials, their advantages and limitations; (d) the concept and design framework of smart structures; (e) signal processing, modeling and control experimentation of smart structures; (f) Application case studies.

* A note to all applicants: As per Articles 16.3 and 16.4 in the CUPE 4600-2 Collective Agreement, the posted vacancies listed above are first offered to applicants meeting the incumbency criterion. A link to the current CUPE 4600-2 Collective Agreement can be found at the Employment Agreements webpage on the Carleton University Human Resources website http://carleton.ca/hr/labour-relations/ and the CUPE 4600-2 website http://cupe4600.ca

The following courses have been assigned to graduate students, post-doctoral fellows, or visiting scholars. These courses are not open for applications but the department will contact the most senior incumbent to review their rights under Article 17.6 of the CUPE 4600-2 Collective Agreement.

Fall 2021 (September – December)
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.
Includes: Experiential Learning Activity
Prerequisite(s): Second-year status in Engineering.
Lectures three hours a week, laboratory and problem analysis three hours a week.