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 May 21, 2022. 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 2022 (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 3004 [0.5 credit]  
Dynamics of Machinery**


Includes: Experiential Learning Activity  
Prerequisite(s): MAAE 2101 and MATH 1005.

Lectures three hours a week, problem analysis and laboratories two 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 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 5005 [0.5 credit]**

**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.

**MECH 5105 [0.5 credit]**

**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 [0.5 credit]**

**Wind Engineering**

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 5500 [0.5 credit]**

**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 5601 [0.5 credit]**

**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 5602 [0.5 credit]**

**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.

**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 2023 (January – April)**

**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 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 4105 [0.5 credit]
Introduction to Nuclear Engineering
Prerequisite(s): Fourth-year status in Engineering.
Lectures three hours a week.

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 5006 [0.5 credit]
Solar Energy
This course will take an in-depth look at solar radiation fundamentals, solar collector design and performance, heat transfer characteristics of solar collectors, energy storage, passive and active thermal systems, photovoltaics and applications of solar energy for collection and utilization.

MECH 5304 [0.5 credit]
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 5809 [0.5 credit]
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 2022 (September - December)

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.

Winter 2023 (January - April)

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.