

Aerospace Engineering (AERO)

Department of Mechanical and Aerospace Engineering
Faculty of Engineering

AERO 3002 [0.5 credit] (formerly 87.302*)

Aerospace Design and Practice

Design approach and phases. Design integration. Influence of mission and other requirements on vehicle configuration. Trade-off studies, sizing and configuration layout. Flight vehicle loads, velocity-load factor diagram. Structural design: overall philosophy, role in design process, methods. Prerequisites: MAAE 2001 and third-year registration. Lectures three hours a week, problem analysis three hours a week.

AERO 3101 [0.5 credit] (formerly 87.311*)

Lightweight Structures

Structural concepts; theory of elasticity; bending, torsion and shear in thin-walled beams having single or multi-cell sections; work and energy principles; deformation and force analysis of advanced structures, including stiffened thin-wall panels; finite element methods. Stability and buckling of thin-walled structures. Prerequisite: MAAE 3202.

Lectures three hours a week; problem analysis and laboratories one hour a week.

AERO 3700 [0.5 credit] (formerly 87.370*)

Aerospace Materials

Properties, behaviour and manufacturing methods for metals, polymers and ceramics used in aerospace applications. Specialty alloys for gas turbines. Properties and manufacture of aerospace composites. Behaviour of materials in space. Prerequisite: MAAE 2700.

Lectures three hours a week; problem analysis and laboratories one hour a week.

AERO 4003 [0.5 credit] (formerly 87.403*)

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. Prerequisite: MAAE 3202 and AERO 3002.

Lectures three hours a week, problem analysis three hours a week.

AERO 4300 [0.5 credit] (formerly 87.430*)

Acoustics and Noise Control

Behaviour of compressible fluids, sound waves and properties of sound sources; measurement of sound; human perception of sound; prediction methods based on energy considerations; sound propagation in realistic environments: outdoors, rooms, ducts; absorption and transmission loss, noise control; case studies. Prerequisite: MATH 3705 and fourth-year registration.

Lectures three hours a week.

AERO 4302 [0.5 credit] (formerly 87.432*)

Aerodynamics & Heat Transfer

Differential equations of motion. Viscous and inviscid regions. Potential flow: superposition; thin airfoils; finite wings; compressibility corrections. Viscous flow: thin shear layer approximation; laminar layers; transition; turbulence modeling. Convective heat transfer: free versus forced convection; energy and energy integral equations; turbulent diffusion. Also offered at the graduate level, with additional or different requirements, as MECH 5000, for which additional credit is precluded. Prerequisite: MAAE 3300.

Lectures three hours a week.

AERO 4304 [0.5 credit] (formerly 87.434*)

Computational Fluid Dynamics

Differential equations of motion. Numerical integration of ordinary differential equations. Potential flows: panel methods; direct solution; vortex-lattice methods. Finite-difference formulations: explicit versus implicit methods; stability. Parabolized and full Navier-Stokes equations; conservation form. Transonic and supersonic flows: upwind differencing. Grid transformations. Computer-based assignments. Prerequisite: AERO 4302.

Lectures three hours a week.

AERO 4306 [0.5 credit] (formerly 87.436*)

Aerospace Vehicle Performance

Morphology of aircraft and spacecraft. Performance analysis of fixed wing aircraft: drag estimation, propulsion, take-off, climb and landing, endurance, payload/range, manoeuvres; operational economics. Performance analysis of rotorcraft: rotor-blade motion, hovering and vertical ascent, forward flight, and autorotation. Rocket propulsion; escape velocity; orbital dynamics. Prerequisite: MAAE 3300.

Lectures three hours a week.

AERO 4308 [0.5 credit] (formerly 87.438*)

Aircraft Stability & Control

Static stability and control: equilibrium requirements; longitudinal stability requirements; neutral points; manoeuvring flight; control forces and control requirements; flight envelope diagram. Lateral stability requirements. Introduction to dynamic stability: axis systems; remarks on governing equations; phugoid and short period modes; lateral dynamic modes. Closed-loop control. Also offered at the graduate level, with additional or different requirements, as MECH 5101, for which additional credit is precluded. Prerequisites: MAAE 3300 and MAAE 4500 or MAAE 3502 (taken before 1999-2000).

Lectures three hours a week.

AERO 4402 [0.5 credit] (formerly 87.442*)

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. Prerequisites: MAAE 2400 and MAAE 3300.

Lectures three hours a week.

AERO 4602 [0.5 credit] (formerly 87.462*)

Introductory Aeroelasticity

Review of structural behaviour of lifting surface elements; structural dynamics, Laplace Transforms, dynamic stability; modal analysis; flutter, Theodorsen's theory; flutter of a typical section; wing flutter, T-tail flutter, propeller whirl flutter; gust response; buffeting, limit cycle flutter. Prerequisites: MAAE 3004, MAAE 3300 and SYSC 3600.

Lectures three hours a week.

AERO 4608 [0.5 credit] (formerly 87.468*)

Composite Materials

Reinforcing mechanisms in composite materials; material properties. Strength and elastic constants of unidirectional composites; failure criteria. Analysis of laminated plates; bending and eigenvalue problems. Environmental effects and durability. Damage tolerance. Design of composite structures. Prerequisite: MAAE 3202.

Lectures three hours a week.

AERO 4801 [0.5 credit] (formerly 87.481*)

Spacecraft Design

Types of spacecraft; mission requirements. Systems design considerations: configuration control during design; planning and scheduling. Environmental considerations: thermal, effect of vacuum, debris impact. Design implementation:

mechanical, thermal, and electrical/electronic aspects. Spacecraft testing: vibrational, acoustic, vacuum, and thermal testing. Component testing. Simulation. Prerequisites: AERO 3002 or MECH 3002. Lectures three hours a week.

AERO 4907 [1.0 credit] (formerly 87.497)

Aerospace Engineering Project

Participation in team projects dealing with design and development of an aerospace vehicle or system. One or more such projects will be undertaken each year. Opportunities to exercise initiative, engineering judgment, self-reliance and creativity, in a team environment similar to industry. Oral presentations and reports.

Prerequisites: Completion of or concurrent registration in AERO 4003; and fourth-year registration in the Aerospace program.

Anthropology (ANTH)

Department of Sociology and Anthropology
Faculty of Arts and Social Sciences

ANTH 1000 [1.0 credit] (formerly 54.100)

Introduction to Anthropology

Introduction to the nature and evolution of human cultural systems and forms of adaptation from hunting and gathering to farming and stratified state formations. Attention is given to institutions such as the family, economics, politics and religion.

Precludes additional credit for SOAN 1000.

Students in any Sociology and/or Anthropology program should consult that program section of this Calendar.

Lectures three hours a week.

ANTH 2003 [1.0 credit] (formerly 54.203)

Introduction to Anthropological Research

Introduction to general theoretical and methodological issues in anthropological research. Topics include the relation between theory and observation, problems of research design, fundamental techniques of data collection, the actual experience of fieldwork, and problems in the ethics of research.

Precludes additional credit for SOCI 2003.

Prerequisite: one of SOCI 1000, ANTH 1000, SOAN 1000 or equivalent, or permission of the Department.

Lectures and workshop three hours a week.

ANTH 2006 [0.5 credit] (formerly 54.206*)

Ecology and Culture

Cultural adaptations to the environment are set within globalization processes. New ecologies – symbolic, historical and political – arise out of the hubris of classical models. The advocacy role of applied ecological anthropology and the consequences of Western cultures' adaptive capacities will be examined.

(Also listed as TSES 2006.)

Prerequisite: one of SOCI 1000, ANTH 1000, SOAN 1000 or equivalent, or permission of the Department.

Lectures three hours a week.

ANTH 2007 [0.5 credit] (formerly 54.207*)

The Anthropology of Conquest

What happens to non-Western societies in contact with colonial or industrial nation-states. Specific topics include forced labour, acculturation and ethnocentrism, wars of extermination, treaty-making and land policies, revitalization movements and other aboriginal responses to conquest.

Prerequisite: one of SOCI 1000, ANTH 1000, SOAN 1000 or equivalent, or permission of the Department.

Lectures three hours a week.

ANTH 2201 [0.5 credit] (formerly 54.221*)

Phonetics

Recognition, description, transcription and production of speech sounds; systems of transcription; the nature of the speech-producing mechanism; the acoustics of speech sounds. (Also listed as LALS 2001.)

Precludes additional credit for ANTH 3001 and LALS 3001.

Prerequisite: LALS 1000.

Lectures three hours a week.

ANTH 2203 [0.5 credit] (formerly 54.223*)

Language Analysis

Direction and practice in the analysis of grammatical material, including morphology and syntax. Models for the description of grammatical regularities. Course work consists principally of practical exercises. (Also listed as LALS 2003.)

Precludes additional credit for ANTH 3003 and LALS 3003.

Prerequisite: LALS 1000.

Lectures three hours a week.