The Ottawa-Carleton Institute for Mechanical and Aerospace Engineering

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The Institute

Director of the Institute:
Stavros Tavoularis

Established in 1984, the Institute combines the research strengths and resources of the Departments of Mechanical and Aerospace Engineering at Carleton University and Mechanical Engineering at the University of Ottawa. Programs leading to master's and Ph.D. degrees are available through the Institute in a range of fields of mechanical and aerospace engineering. Graduate students may pursue their research on either university campus, depending upon the choice of supervisor. Registration will be at the university most appropriate to the student's program of studies and research. Requests for information and applications for admission may be sent to the Director of the Institute.

Members of the Institute

The "home" department of each member is indicated by (C) for the Department of Mechanical and Aerospace Engineering, Carleton University, and by (O) for the Department of Mechanical Engineering, University of Ottawa.

F.F. Afagh, *Dynamics, Vibrations, Solid Mechanics* (C)
M.G. Akben, *Metallurgy* (O)
P.E. Barrington, *Aerodynamics, Aeroelasticity* (C)
Robert Bell, *Finite Element Analysis, Stress Analysis, Solid Mechanics* (C)
M.J. Bibby, *Materials and Manufacturing Engineering, Weld Analysis* (C)
S.C. Cheng, *Heat Transfer, Numerical Methods* (O)
M.C. de Malherbe,* *Design, Manufacturing Engineering Processes* (C)
B.S. Dhillon, *Reliability* (O)
A.E. Fahim, *CAD/CAM, Controls* (O)
R.C. Flanagan, *Dynamics, Internal Combustion Engines* (O)
P.R. Frise, *Fracture Mechanics, Fatigue* (C)
K.R. Goheen, *Controls, CAD/CAM/CIM* (C)
J.A. Goldak, *Computer-Integrated Manufacturing Processes, Finite Element Modelling of Manufacturing* (C)
D.J. Gorman, *Vibrations* (O)
D.C. Groeneveld,* *Heat Transfer, Two Phase Flow* (O)
Y.M. Haddad, *Applied Mechanics, Finite Element Analysis* (O)
W.L. Hallett, *Fluid Mechanics, Combustion* (O)
Geza Kardos, *Design, Fatigue, Fracture Mechanics, CAD, Composite Materials* (C)
R.J. Kind, *Aeronautical Engineering, Industrial Turbomachinery, Wind Engineering* (C)
James Kirkhope, *Stress and Vibrations, Finite Element Analysis* (C)
A.S. Krausz, *Fracture, Plasticity*, Professor Emeritus (O)
Y. Lee, *Heat Transfer, Nuclear Engineering* (O)
J.M. McDill, *Adaptive Methods for 3-D Finite Element Analysis* (C)
R.E. Milane, *Combustion* (O)
Shaukat Mirza, *Vibrations, Stress Analysis* (O)
Hany Moustapha,* *Turbomachinery, Aerodynamics* (C)
M.B. Munro, *Composite Materials* (O)
D.S. Necsulescu, *Reliability and Control* (O)
E.G. Plett, *Energy Systems, Fluid Mechanics, Thermodynamics and Heat Transfer* (C)
David Redekop, *Applied Mechanics* (O)
W.G. Richarz, *Aeronautical Engineering, Acoustics, Instrumentation* (C)
J.T. Rogers, *Heat Transfer, Energy Systems, Nuclear Engineering* (C)
D.L. Russell, *Dynamics, Controls, Robotics* (C)
H.I.H. Saravanamuttoo, *Gas Turbine Performance, Engine Health Monitoring* (C)
J.Z. Sasiadek, *Control Systems, Robotics, Microprocessor Applications* (C)
H.M. Schwartz, *Automation, Robotics, Controls* (C)
J.S. Sinkiewicz,* *Robotics, Guidance, Navigation, Space* (C)
S.A. Sjolander, *Aerodynamics, Turbomachinery, Wind-Tunnel Engineering* (C)
D.A. Staley, *Spacecraft Dynamics and Control* (C)
P.V. Straznicky, *Design, Light Weight Structures* (C)
C.L. Tan, *Solid Mechanics, Boundary Integral and Finite Element Methods* (C)
Stavros Tavoularis, *Fluid Mechanics, Experimental Techniques* (O)
W. Wallace,* *Materials Engineering* (C)
J.Y. Wong, *Vehicle Engineering, Transportation Technology* (C)
G.S. Vukovich,* *Control Systems* (C)

* Adjunct Professor, Adjunct Research Professor

M.J. Worswick, *Solid Mechanics, Stress Analysis, Fracture* (C)

Master's Degree

Admission Requirements

The normal requirement for admission to the master's program is a bachelor's degree with at least high honours standing in mechanical engineering or a related discipline.

Program Requirements

The requirements for course work are specified in terms of credits: one credit is one hour/week for one term (thirteen weeks). The requirements for the master's degree by thesis are:

- Eighteen course credits
- Participation in the Mechanical and Aerospace Engineering seminar series
- Thesis

The requirements for the master's degree by course work are: twenty-seven course credits plus a project equivalent to nine course credits (Engineering 88.598 for Carleton University students; MCG6000 for University of Ottawa students).

Doctor of Philosophy

Admission Requirements

The normal requirement for admission to the Ph.D. program is a master's degree in mechanical or aerospace engineering or a related discipline. Students who have been admitted to the master's program may be permitted to transfer into the Ph.D. program if they show outstanding academic performance and demonstrate significant promise for advanced research.

Program Requirements

The requirements for the Ph.D. degree (from the master's degree) are:

- Fifteen course credits
- Participation in the Mechanical and Aerospace Engineering seminar series
- Successful completion of qualifying examinations
- Thesis. The examining board for all theses will include professors from both departments and an external examiner who is a member of neither university

Students who have been permitted to transfer into the Ph.D. program from a master's program require thirty-three course credits for the Ph.D.

Graduate Courses

In all programs, the student may choose graduate courses from either university with the approval of the adviser or the advisory committee. The available graduate courses are listed below, grouped by subject area. Course descriptions are to be found in the departmental section of the calendar concerned. All courses are of one term duration. Not all courses are necessarily offered during any particular academic year. The following codes identify the department offering the course:
"88" Department of Mechanical and Aerospace Engineering, Carleton University
"89" Department of Mechanical Engineering, University of Ottawa

Thermofluids

88.500	(MCG5300)	Fundamentals of Fluid Dynamics
88.501	(MCG5301)	Theory of Viscous Flow
88.503	(MCG5303)	Incompressible Non-Viscous Flow
88.504	(MCG5304)	Compressible Non-Viscous Flow
88.508	(MCG5308)	Experimental Methods in Fluid Mechanics
88.509	(MCG5309)	Environmental Fluid Mechanics Relating to Energy Utilization
88.521	(MCG5321)	Methods of Energy Conversion
88.522	(MCG5380)	Safety and Risk Assessment of Nuclear Power
88.530	(MCG5330)	Engineering Acoustics
88.531	(MCG5331)	Aeroacoustics
88.532	(MCG5332)	Instrumentation Techniques
88.534	(MCG5334)	Computational Fluid Dynamics of Compressible Flows
88.543	(MCG5343)	Advanced Thermo-dynamics
88.547	(MCG5347)	Conductive and Radiative Heat Transfer
88.548	(MCG5348)	Convective Heat and Mass Transfer
88.549	(MCG5349)	Two-Phase Flow and Heat Transfer
88.570W	(MCG5493)	Special Topics in Mech-anical and Aerospace Engineering — Energy Management

88.570Y	(MCG5495)	Special Topics in Mechanical and Aerospace Engineering — Microgravity or Low Gravity Science
89.511	(MCG5111)	Gas Dynamics
89.531	(MCG5131)	Heat Transfer by Conduction
89.532	(MCG5132)	Heat Transfer by Convection
89.533	(MCG5133)	Heat Transfer by Radiation
89.534	(MCG5134)	Heat Transfer with Phase Change
89.536	(MCG5136)	Special Studies in Fluid Mechanics and Heat Transfer
89.541	(MCG5141)	Statistical Thermodynamics
89.548	(MCG5551)	Théorie d'ecoulement visqueux
89.549	(MCG5552)	Théorie de turbulence
89.550	(MCG5557)	Méthodes numériques en mécanique des fluides
89.551	(MCG5151)	Laminar Flow Theory
89.552	(MCG5152)	Theory of Turbulence
89.555	(MCG5155)	Inviscid Flow Theory
89.556	(MCG5156)	Measurement in Fluid Mechanics
89.557	(MCG5157)	Numerical Computation of Fluid Dynamics and Heat Transfer
89.558	(MCG5158)	Industrial Fluid Mechanics
89.561	(MCG5161)	Environmental Engineering
89.566	(MCG5166)	Nuclear Engineering Fundamentals
89.591	(MCG5191)	Combustion in Premixed Systems
89.592	(MCG5192)	Combustion in Diffusion Systems

Solid Mechanics and Materials

88.517	(MCG5317)	Experimental Stress Analysis
88.550	(MCG5350)	Advanced Vibration Analysis
88.561	(MCG5361)	Creative Problem Solving and Design
88.562	(MCG5362)	Failure Prevention (Fracture Mechanics and Fatigue)
88.563	(MCG5381)	Lightweight Structures
88.565	(MCG5365)	Finite Element Analysis I
88.566	(MCG5366)	Finite Element Analysis II
88.567	(MCG5367)	The Boundary Integral Equation (BIE) Method
88.568	(MCG5368)	Advanced Engineering Materials
88.570H	(MCG5478)	Special Topics in Mechanical and Aerospace Engineering — Introduction to Random Vibrations
88.570I	(MCG5479)	Special Topics in Mechanical and Aerospace Engineering — Stability Theory and Applications
88.570J	(MCG5480)	Special Topics in Mechanical and Aerospace Engineering — Continum Mechanics with Application to Plasticity
89.501	(MCG5101)	Theory of Elasticity
89.502	(MCG5102)	Advanced Stress Analysis
89.503	(MCG5103)	Theory of Perfectly Plastic Solids
89.504	(MCG5104)	Theory of Plates and Shells
89.505	(MCG5105)	Continuum Mechanics
89.507	(MCG5107)	Advanced Dynamics with Applications
89.508	(MCG5108)	Finite Element Analysis
89.509	(MCG5109)	Advanced Topics in Finite Element Analysis
89.510	(MCG5110)	Micromechanics of Solids
89.514	(MCG5114)	Analysis and Design of Pressure Vessels
89.517	(MCG5117)	Introduction to Composite Materials
89.518	(MCG5118)	Introduction to Plasticity
89.519	(MCG5119)	Introduction to Fracture Mechanics
89.525	(MCG5125)	Fatigue of Materials and Structures
89.526	(MCG5126)	Deformation of Materials
89.529	(MCG5129)	Hot Working of Metals
89.537	(MCG5137)	Special Studies in Solid Mechanics and Materials
89.538	(MCG5138)	Advanced Topics in Mechanical Engineering
89.580	(MCG5180)	Advanced Topics in Composite Materials
89.581	(MCG5181)	Advanced Vibrations
89.582	(MCG5182)	Theory of Elastic Instability
89.586	(MCG5186)	Non-linear Discontinuous Dynamics and Control

Design and Manufacturing

88.552	(MCG5352)	Optimal Control Systems
88.553	(MCG5353)	Robotics

88.561	(MCG5361)	Creative Problem Solving and Design
88.562	(MCG5362)	Failure Prevention (Fracture Mechanics and Fatigue)
88.570K	(MCG5481)	Special Topics in Mechanical and Aerospace Engineering — Discrete Time Control Systems
88.570U	(MCG5491)	Special Topics in Mechanical and Aerospace Engineering — Computational Metallurgy
88.574	(MCG5374)	Computer Integrated Manufacturing Systems
88.575	(MCG5375)	CAD/CAM
89.515	(MCG5115)	Non-linear Optimization
89.559	(MCG5159)	Advanced Production Planning and Control
89.568	(MCG5168)	Industrial Organization
89.569	(MCG5169)	Advanced Topics in Reliability Engineering
89.570	(MCG5170)	CAD/CAM
89.571	(MCG5171)	Applied Reliability Theory
89.572	(MCG5185)	Multivariable Digital Control
89.573	(MCG5173)	Systems Engineering and Integration
89.576	(MCG5176)	Industrial Control Systems
89.577	(MCG5177)	Robot Mechanics
89.578	(MCG5178)	Advanced Topics in CAD/CAM
89.579	(MCG5179)	Flexible Manufacturing

Transportation Technology

88.510	(MCG5310)	Performance and Economics of Aircraft
88.511	(MCG5311)	Dynamics and Aerodynamics of Flight
88.514	(MCG5314)	Ground Transportation Systems and Vehicles
88.521	(MCG5321)	Methods of Energy Conversion
88.530	(MCG5330)	Acoustics and Noise
88.531	(MCG5331)	Aeroacoustics
88.541	(MCG5341)	Turbomachinery
88.542	(MCG5342)	Gas Turbines
88.570V	(MCG5492)	Special Topics in Mechanical and Aerospace Engineering — Orbital Mechanics and Space- craft Control
88.570T	(MCG5490)	Special Topics in Mechanical and Aerospace Engineering — Guidance, Navigation and Control

General

88.596	(MCG5395)	Directed Studies
88.598	(MCG5398)	Independent Engineering Study (equivalent to nine course credits)
89.500	(MCG6000)	Mechanical Engineering Report(equivalent to nine course credits)

In addition, graduate courses offered by departments in other disciplines may be taken for credit with approval by the department in which the student is registered.