

The Ottawa-Carleton Institute for Mechanical and Aerospace Engineering

Room C406
Colonel By Hall
University of Ottawa

The Institute

Director of the Institute:

S. 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. 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. 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 Modeling 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)

Julius Lukasiewicz, * *Aerodynamics, Railway Transportation, Impact of Technology on Society* (C)

J.M.J. McDill, *Adaptive Methods for 3-D Finite Element Analysis* (C)

R.E. Milane, *Combustion* (O)

S. Mirza, *Vibrations, Stress Analysis* (O)

H. Moustapha, * *Turbomachinery, Aerodynamics* (C)

M.B. Munro, *Composite Materials* (O)

D.S. Neculescu, *Reliability and Control* (O)

E.G. Plett, *Energy Systems, Fluid Mechanics, Thermodynamics and Heat Transfer*

D. 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)

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)

S.M. Taboun, *Manufacturing Systems and Industrial Ergonomics* (O)

* Adjunct Professor, Adjunct Research Professor

C.L. Tan, *Solid Mechanics, Boundary Integral and Finite Element Methods* (C)
 S. Tavoularis, *Fluid Mechanics, Experimental Techniques* (O)
 William Tyson,* *Advanced Materials* (C)
 J.Y. Wong, *Vehicle Engineering, Transportation Technology* (C)
 G.S. Vukovich,* *Control Systems* (C)
 M.J. Worswick, *Solid Mechanics, Stress Analysis, Fracture* (C)
 M.I. Yaras, *Turbomachinery, Aerodynamics, Computational Fluid Dynamics* (C)

- Eighteen 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-six course credits for the Ph.D.

Master's Degree

Admission Requirements

The normal requirement for admission to the master's program is a bachelor's degree with at least high honors 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:

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	89.591 (MCG5191)
88.543 (MCG5343)	Combustion in Premixed Systems
Advanced Thermodynamics	89.592 (MCG5192)
88.547 (MCG5347)	Combustion in Diffusion Systems
Conductive and Radiative Heat Transfer	
88.548 (MCG5348)	<i>Solid Mechanics and Materials</i>
Convective Heat and Mass Transfer	88.517 (MCG5317)
88.549 (MCG5349)	Experimental Stress Analysis
Two-Phase Flow and Heat Transfer	88.550 (MCG5350)
88.570W(MCG5493)	Advanced Vibration Analysis
Special Topics in Mechanical and Aerospace Engineering — Energy Management	88.561 (MCG5361)
88.570Y(MCG5495)	Creative Problem Solving and Design
Special Topics in Mechanical and Aerospace Engineering — Microgravity or Low Gravity Science	88.562 (MCG5362)
88.570Z (MCG5470)	Failure Prevention (Fracture Mechanics and Fatigue)
Special Topics in Mechanical and Aerospace Engineering — Computational Fluid Dynamics	88.563 (MCG5381)
89.511 (MCG5111)	Lightweight Structures
Gas Dynamics	88.565 (MCG5365)
89.531 (MCG5131)	Finite Element Analysis I
Heat Transfer by Conduction	88.566 (MCG5366)
89.532 (MCG5132)	Finite Element Analysis II
Heat Transfer by Convection	88.567 (MCG5367)
89.533 (MCG5133)	The Boundary Integral Equation (BIE) Method
Heat Transfer by Radiation	88.568 (MCG5368)
89.534 (MCG5134)	Advanced Engineering Materials
Heat Transfer with Phase Change	88.570H(MCG5478)
89.536 (MCG5136)	Special Topics in Mechanical and Aerospace Engineering — Introduction to Random Vibrations
Special Studies in Fluid Mechanics and Heat Transfer	88.570I (MCG5479)
89.541 (MCG5141)	Special Topics in Mechanical and Aerospace Engineering — Stability Theory and Applications
Statistical Thermodynamics	89.501 (MCG5101)
89.548 (MCG5551)	Theory of Elasticity
Théorie d'écoulement visqueux	89.502 (MCG5102)
89.549 (MCG5552)	Advanced Stress Analysis
Théorie de turbulence	89.503 (MCG5103)
89.550 (MCG5557)	Theory of Perfectly Plastic Solids
Méthodes numériques en mécanique des fluides	89.504 (MCG5104)
89.551 (MCG5151)	Theory of Plates and Shells
Laminar Flow Theory	89.505 (MCG5105)
89.552 (MCG5152)	Continuum Mechanics
Theory of Turbulence	89.507 (MCG5107)
89.555 (MCG5155)	Advanced Dynamics with Applications
Inviscid Flow Theory	89.508 (MCG5108)
89.556 (MCG5156)	Finite Element Analysis
Measurement in Fluid Mechanics	89.509 (MCG5109)
89.557 (MCG5157)	Advanced Topics in Finite Element Analysis
Computational Fluid Mechanics	89.510 (MCG5110)
89.558 (MCG5158)	Micromechanics of Solids
Industrial Fluid Mechanics	89.514 (MCG5114)
89.561 (MCG5161)	Analysis and Design of Pressure Vessels
Environmental Engineering	89.517 (MCG5117)
89.566 (MCG5166)	Introduction to Composite Materials
Nuclear Engineering Fundamentals	89.518 (MCG5118)

Introduction to Plasticity	89.576 (MCG5176)
89.519 (MCG5119)	Industrial Control Systems
Introduction to Fracture Mechanics	89.577 (MCG5177)
89.525 (MCG5125)	Robot Mechanics
Fatigue of Materials and Structures	89.578 (MCG5178)
89.526 (MCG5126)	Advanced Topics in CAD/CAM
Deformation of Materials	89.579 (MCG5179)
89.529 (MCG5129)	Flexible Manufacturing
Hot Working of Metals	
89.537 (MCG5137)	<i>Transportation Technology</i>
Special Studies in Solid Mechanics and Materials	88.510 (MCG5310)
89.538 (MCG5138)	Performance and Economics of Aircraft
Advanced Topics in Mechanical Engineering	88.511 (MCG5311)
89.580 (MCG5180)	Dynamics and Aerodynamics of Flight
Advanced Topics in Composite Materials	88.514 (MCG5314)
89.581 (MCG5181)	Ground Transportation Systems and Vehicles
Advanced Vibrations	88.521 (MCG5321)
89.582 (MCG5182)	Methods of Energy Conversion
Theory of Elastic Instability	88.530 (MCG5330)
89.586 (MCG5186)	Acoustics and Noise
Non-linear Discontinuous Dynamics and Control	88.531 (MCG5331)
	Aeroacoustics
<i>Design and Manufacturing</i>	88.541 (MCG5341)
88.552 (MCG5352)	Turbomachinery
Optimal Control Systems	88.541 (MCG5342)
88.553 (MCG5353)	Gas Turbines
Robotics	88.570V (MCG5492)
88.561 (MCG5361)	Special Topics in Mechanical and Aerospace Engineering — Orbital Mechanics and Spacecraft Control
Creative Problem Solving and Design	88.570T (MCG5490)
88.562 (MCG5362)	Special Topics in Mechanical and Aerospace Engineering — Guidance, Navigation and Control
Failure Prevention (Fracture Mechanics and Fatigue)	
88.570U (MCG5491)	
Special Topics in Mechanical and Aerospace Engineering — Computational Metallurgy	<i>General</i>
88.574 (MCG5374)	88.596 (MCG5395)
Computer Integrated Manufacturing Systems	Directed Studies
88.575 (MCG5375)	88.598 (MCG5398)
CAD/CAM	Independent Engineering Study (equivalent to nine course credits)
89.515 (MCG5115)	89.500 (MCG6000)
Non-linear Optimization	Mechanical Engineering Report(equivalent to nine course credits)
89.559 (MCG5159)	
Advanced Production Planning and Control	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.
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	