

## Call for Instructors for the Master of Mechanical Engineering (Automotive Option) Winter 2024

The Faculty of Engineering in collaboration with the Mechanical, Automotive, and Materials Engineering Department at the University of Windsor is currently seeking instructors to teach in the Master of Mechanical Engineering (Automotive Option) for the Winter 2024 term.

### **Winter, 2024**

Contract Dates:	December 25, 2023 – April 30, 2024
Class Dates:	January 8, 2024 – April 8, 2024
Make Up Date:	April 8 (for March 29 classes), 2024
Exam Period:	April 11, 2024 – April 22, 2024
Alternative Exam Day:	April 23, 2024

### **Program Holidays:**

Study Week	February 17, 2024 – February 25, 2024
Family Day	February 19, 2024
University Closed	February 23, 2024
Good Friday	March 29, 2024

We are currently seeking instructors for the following courses offered in Winter 2024.

***Please be aware that the University of Windsor is planning for face-to-face delivery of courses in the Winter 2024 semester.***

### **MECH 8000-1, Materials and Manufacturing Methods**

This course will present the mechanisms associated with elastic, plastic, and creep behaviour of materials and models for material deformation. Mechanical testing of materials to assess basic material properties will be presented. Materials selection for automotive applications will be thoroughly discussed focusing on (i) design analyses for material selection, (ii) mechanical properties of engineering materials (applicable to automotive applications, including metallic, polymeric, and composite materials), (iii) processing methods of engineering materials and treatment of such materials. Analytical and numerical modeling of automotive materials during processing and in-field conditions will also be extensively discussed in this course. **This course will be presented in 3 lecture hours per week.**

### **MECH 8000-3, Automotive Hybrid Power Train**

Environmental concerns due to fossil fuel combustion and an alarming depletion of fossil fuel reserves are the two primary reasons that have encouraged the development of hybrid electric vehicles (HEVs). HEVs typically integrate an internal combustion engine with an electric motor and a power source to significantly reduce fuel consumption and harmful emissions, partly due to their regenerative capability which can provide a 20% improvement in fuel efficiency. The present commercial success of HEVs due to these advantages is a strong indicator that HEVs are here to stay. The high-voltage electrical system in HEVs plays an important role on the efficiency and performance of these vehicles. The hybrid vehicle electric power system consists of an electric motor, a power electronic converter driven by a control algorithm and a source of electrical energy. A variety of challenges accompany the development and production of optimized and energy efficient electric power systems in terms of motor and power converter selections, their design and control requirements and operational characteristics, battery selection and sizing. This course will deal with these issues by studying and evaluating the design of the hybrid electric power system in order to enhance the performance of HEVs, as well as design considerations for plug-in hybrid and electric vehicles. **This course will be presented in 3 lecture hours per week.**

### **MECH 8000-5, Controls for Electric Vehicles**

This course covers the principles of Battery Management Systems (BMS) for monitoring, diagnosis, and control of batteries in Hybrid Electric Vehicles (HEVs) and Battery Electric Vehicles (BEVs). The course is targeted towards systems engineers, research scientists, and academics who want to gain a fundamental understanding of battery modeling, analysis, state of charge, and state of health estimation. Topics include introduction to battery systems, battery equivalent circuit-based modeling, battery electrochemical modeling, cell balancing, thermal management, state of charge, and state of health estimation. Concepts such as parameters estimation, system identification, optimization, filtering, and control theory will be applied to battery systems. The techniques covered in this course are mostly related to Li-ion cells and packs as used in automotive applications. These can however also be applied to other battery chemistries. **This course will be presented in 3 lecture hours per week.**

### **MECH 8011-1, Bluff Body Aerodynamics**

Atmospheric boundary layers. Flow around bluff bodies, separation and wakes. Lift and drag, pressure and force coefficients. Streamlined bodies, bluff bodies. Flow over flat plates and walls, rectangular prismatic shapes, circular cylinders. Fluctuating forces and pressures on bluff bodies. Wind tunnel testing, similarity requirements, wind tunnel techniques. Vehicle aerodynamics, drag and lift of passenger cars, cross wind stability, wind tunnel and road testing. Architectural aerodynamics, design wind speed, flow in and around building, wind-induced response of low-rise buildings, tall buildings, and large roof and sports stadium. Aerodynamics of Wind Turbines. (Pre-requisite: Undergraduate level Engineering Mechanics, Fluid Mechanics.) **This course will be presented in 3 lecture hours per week.**

### **MECH 8025-1/2, Automotive Applications for Noise, Vibration and Harshness (Section 1 and Section 2)**

This course introduces the automotive applications and tools for the evaluation of noise, vibration, and harshness. It includes reviews of measurement techniques presently used in the automotive industry to measure various aspects of noise, including the concept of sound quality, vibration, and the quantification of the term harshness. The course consists of a review of papers which are to be presented to the class. Participants perform critical reviews on the presentations. Course evaluation is based on weekly reports, presentations of reviews of papers and critical reviews by participants. **This course will be presented in 3 lecture hours per week.**

### **MECH 8030-1, Fundamentals of Automotive Engineering**

Overview of primary automotive systems. Engine types and configurations, combustion, emission control, vehicle performance. Powertrain, suspension, frame, and chassis. Materials and fabrication issues. Engine and vehicle dissection laboratory. Identification of industry issues and trends. **This course will be presented in 3 lecture hours per week.**

### **MECH 8067-1, Vehicle Thermal Management**

A study of controlled passenger compartment environment, and automotive thermal management hardware: radiator, heater core, air-conditioning components. Topics include the thermal comfort model of occupants in a vehicle, determination of heating and cooling loads, the practical application of refrigeration in automotive air-conditioning followed by design of equipment and HVAC system, description, and design of engine cooling system. **This course will be presented in 3 lecture hours per week.**

### **MECH 8290-27, Automotive Body Structures**

This course will focus on the fundamentals of automotive body structure design and analysis. Functional requirements for durability, NVH and crash safety will be translated to measurable structural design targets. Basic mechanics-based analysis procedures will be used to assess the body structure performance for global bending, torsion, modal frequency, and crashworthiness targets. **This course will be presented in 3 lecture hours per week.**

Students in this program will primarily be international students who will study and live in Canada for sixteen (16) months. The Master of Mechanical Engineering (Automotive Option) consists of 8 courses.

Classes will meet for twelve weeks and must be taught in 2 hour and 50-minute blocks, one time per week. Instructors are expected to hold one hour of office time per week for student consultation. There is some flexibility in scheduling of the days and time that each class is offered to meet instructor constraints. For more information on how to apply, please see **Appendix 1**. Graduate Assistant support may be provided if class enrolment exceeds the student number thresholds. Instructors may be required to attend an orientation session which will cover administrative details and other matters such as marking criteria, overall content coordination, and so on.

The Master of Mechanical Engineering (Automotive Option) program is an Executive Education Program and falls under the terms specified in Letter VII of Collective Agreement between the Faculty Association and the Board of Governors of the University of Windsor, 2021 to 2025 (see **Appendix 2**).

**Interested applicants are to submit applications to:**

**Dr. Bruce Minaker, Department Head**  
**Department of Mechanical, Automotive & Materials Engineering, Faculty of Engineering**  
**University of Windsor, Windsor, Ontario, N9B 3P4**  
[mameng@uwindsor.ca](mailto:mameng@uwindsor.ca)

**The deadline for receipt of complete applications is Monday, November 6, 2023.**

## **Appendix 1:**

### Application Procedure

Interested applicants must provide:

- 1) An MEng Auto Sessional Application Form. (to be completed by non-faculty members from the University of Windsor only)
- 2) A statement of interest in teaching in the program that specifies the particular course or courses the applicant wishes to be considered for. This statement should detail how the applicant meets the stated qualifications. (See attachment re: Instructor Selection Criteria)
- 3) An indication of the willingness of the instructor to teach one or both sections (if offered).
- 4) A copy of their CV.
- 5) Prior quantitative and qualitative student assessments of teaching capabilities and/or client testimonials are particularly welcome.
- 6) New applicants who have not previously taught the course for which they are applying should provide a tentative overview/instructional plan for the course for which they are applying. (This need not be as detailed as a course outline). This overview would specify a proposed structure for the course including topics to be covered and teaching methods to be employed, 2) how various teaching methods will be incorporated, and 3) proposed methods to determine grades.
- 7) Instructors who have previously taught the course for which they are applying should:
  - (i) Include their most recent course outline; and
  - (ii) Indicate what changes they propose to the original course structure. These changes should take into account student reactions and feedback.

Interested applicants will submit applications directly to [mameng@uwindsor.ca](mailto:mameng@uwindsor.ca)

We thank all applicants in advance for their interest in the University of Windsor, however, only those under consideration will be contacted. The University of Windsor is committed to employment equity and welcomes applications from Aboriginal Peoples, persons with disabilities and members of visible minorities. Applications from women are particularly encouraged. Applicants who wish to be considered for the privilege of Employment Equity need to self-identify as a member of the targeted groups. In accordance with Canadian immigration requirements, this advertisement is directed to Canadian citizens and permanent residents of Canada.

**Appendix 2:**

Letter VII – Executive Education Programs from the Collective Agreement between the Faculty association and the Board of Governors of the University of Windsor (July 1, 2021 -- June 30, 2025)

**LETTER VII --- EXECUTIVE EDUCATION PROGRAMS from  
COLLECTIVE AGREEMENT BETWEEN THE FACULTY ASSOCIATION AND  
THE BOARD OF GOVERNORS  
OF THE UNIVERSITY OF WINDSOR  
2021 --- 2025**

1. The University may operate Executive Education Programs in Business and Engineering approved by Senate and that are made up of credit courses not assignable as part of the normal workload of the member under Article 5, where the tuition fees and instructor stipends are market driven.
2. The programs are designed to meet the specific needs of professionals and business people seeking opportunities to acquire new knowledge and skills so as to enable them to improve or shift their careers and not compete with the University's academic programs.
3. With the agreement of the Faculty Association the University may operate Executive Education Programs in other fields. In such cases, Executive Education Program proposals shall be approved by the council of the contributing AAU(s) and shall be referred to the Faculty Association prior to final approval by the appropriate Senate committee.
4. Should the Faculty Association not agree to a University proposal to operate an Executive Education Program in a field other than Business and Engineering the matter may be referred to arbitration for determination of whether or not the program proposed by the University meets the criteria for Executive Education Programs referred to in this Letter VIII paragraph 2. The arbitrator shall be drawn from the panel of five (5) arbitrators referred to in clause [39:14 \(b\)](#). The University shall pay the fees and expenses of the arbitrator.
5. Executive Education Programs may be delivered at various locations using diverse delivery mechanisms, including alternative learning technologies and team teaching, and at times convenient to the students including teaching evenings, weekends and in intensive periods.
6. The Board of Management is responsible for the Executive Education Programs. It has the responsibility for the business aspects of the program and it is accountable to the University's Board of Governors.
7. The Board of Management is composed of the Provost, Deans of participating Faculties, and three (3) to five (5) representatives from business, industry, and professional organizations. In addition, there shall be one (1) faculty member representing each Executive Education Program.
8. Except as otherwise provided in this Letter VIII, the Board of Management sets the terms and conditions of employment of the instructors. The Executive Education Program's day-to-day operations are conducted by an Executive Director who reports to the Provost and is a member of the Academic Advisory Council.
9. Instructors are sought in accordance with procedures agreed by the appropriate AAU(s) and may include advertising, both externally and internally in the appropriate AAU(s), and by direct solicitation. Those appointed will have relevant experience and qualifications. The appointments are agreed, in accordance with the policies of the Board of Management, by the Dean following recommendation by the AAU appointments committee in the Faculty that is responsible for the academic aspects of the program.
10. Once appointed, instructors are members of the bargaining unit. Stipends are paid per course or per part of a course, and like the fees paid by students, are market driven. The stipends are negotiated on an individual basis and are determined by the Provost, in accordance with the policies set by the Board of Management.
11. The parties acknowledge that the Executive Education Programs inure to the benefit of the University and to the members of the Faculty Association as these programs provide additional revenue to the University, additional employment opportunities to the members of the Association, and serve to further enhance the reputation of the University as an innovative institution concerned with meeting the diverse needs of our community and providing excellence in teaching, research and service. The University thus attracts increased numbers of students. The additional revenues allow the University to support faculty research and academic programs.
12. The clauses of this Agreement listed below, and the terms and conditions set by the Board of Management referred to in paragraph 8 above, apply to those persons appointed to teach in Executive Education Programs. In the case of a conflict between the clauses of this Agreement listed below and the terms and conditions set by the Board of Management, the clauses of this agreement listed below shall apply: 1:01, 2:01, 3:01, 3:03, 4:01– 4:05, 10:02, 10:03 (as to religious beliefs, doctrines and practices), 10:04, 10:05, 11:01, 30:01–30:08, 32:01, 32:02, 38:01–38:07, 39:01–39:16, 50:01, 50:02, 51:01, 51:02, 53:01, 53:02, 58:01, 61:01(a).
13. Where the Faculty Association contests the interpretation and applicability of the terms and conditions set by the Board of Management and the University disagrees with the Faculty Association such disagreement shall be determined by arbitration. The arbitrator shall be drawn from the panel of five (5) arbitrators referred to in clause 39:14 (b). The University shall pay the fees and expenses of the arbitrator.
14. The University will pay a levy of five percent (5%) of the total gross stipends or fees paid to the instructors in the Executive Education Programs to the fund entitled "The Subsidy Plan for Retiree Health Benefits".

### **Appendix 3:**

#### Master of Mechanical Engineering (Automotive Option) Instructor Selection Criteria

##### **Overview**

The Master of Mechanical Engineering (Automotive Option) is an Executive Education Program that is offered through the Centre for Executive and Professional Education. The long-term success of this program is dependent on the reactions of students, which is directly related to the quality of instruction in the program. The overall goal of this hiring process is to select excellent instructors.

##### **Qualifications**

Instructors selected for this program will be expected to demonstrate:

- Appropriate educational qualifications as normally evidenced by a relevant Ph.D., Master's Degree and/or equivalent professional qualifications where appropriate (including a Professional Engineer designation)
- Except in exceptional circumstances, applicants should possess a proven track record of excellence in teaching at the graduate level. This would be evidenced by one or more of the following:
  - 1) Course evaluations from credit and non-credit courses,
  - 2) Qualitative student assessments,
  - 3) Client testimonials
- Appropriate subject matter knowledge/expertise. This should be evidenced by one or more of:
  - 1) Publications (refereed articles, textbooks, articles in professional journals, etc.),
  - 2) Work experience,
  - 3) Consulting experiences.
- Preference will be given to candidates who have some successful history of teaching international students and/or to a primarily international audience. This should be evidenced through either:
  - 1) A demonstrated history of international instruction, and/or,
  - 2) Successful experiences in similar or equivalent programs.
- Preference will be given to those qualified applicants who indicate an interest in teaching more than one section of the same course in one term.
- An expressed willingness to utilize non-traditional methods for student assessments.
- A willingness to learn and incorporate Brightspace into courses.
- A willingness to adapt their teaching methods and procedures to meet the unique needs of our students.