October 30, 2024

FACULTY OF ENGINEERING
MECHANICAL, AUTOMOTIVE & MATERIALS ENGINEERING

NOTICE RE GRADUATE ASSISTANT (GA) POSITIONS AVAILABLE FOR WINTER 2025

In accordance with Article 12:01 of the CUPE 4580 Collective Agreement, the Department of Mechanical, Automotive & Materials Engineering invites applications for GA positions for the Fall 2024 term. The total number of Graduate Assistantships allocated to MAME for 2024-2025 (S24, F24, W25) is 240. It is anticipated that 80 GA positions for 140 hours each (maybe be split between courses) will be required for Winter 2025, subject to final budgetary approval and sufficient enrolment.

Expected GA duties

Assistants cannot commence their GA/TA duties until email confirmation of the approval of their contract is received from Human Resources (email titled "Authorization to Commence GA/TA Duties").

GA employees are expected to make themselves available to report for all assigned duties, **both in-person/on-campus and remote/online duties**. Most classes across the University are held face-to-face on campus or have a face-to-face component. Refer to the University's current health and safety regulations.

List of courses that may utilize Graduate Assistants for Winter 2025 which will run from January 3, 2025 – April 30, 2025:
Students CANNOT serve as the GA for a course they are also registered in.

Course # and Name	Course Description	R=Required / P=Preferred Skills	Projected # of GAs
AUTO-8010-01/ Mobility and Society	The course will provide insights into societal contexts and issues related to road vehicle transportation, economics and the changes to society and infrastructure caused by the mass adoption of electric vehicles and ubiquitous charging systems. EDI and ID-related topics such as Canada's interactions with its Indigenous peoples and broader societal and cultural issues such as urbanization, demographics will be examined in the context of the needs of all people for safe, reliable, and affordable transportation while reviewing the life-cycle analysis and impact of EVs on sustainability, the environment and public infrastructure such as charging and hydrogen fueling systems for fuel cells. This course will examine these topics in a manner that promotes student's ability to clearly and concisely communicate (verbally, in written and mathematical formats), from the viewpoint of an engineer.		0.5
AUTO-8020-01/ Vehicle Systems	Introduction to primary automotive systems including engine types and configurations, vehicle dynamics, powertrain and vehicle propulsion. Advanced driver assist systems (ADAS), tractive effort, energy requirements, vehicle duty cycles and usage patterns, propulsion system efficiency, regenerative braking systems, emission, and fuel economy standards as they relate to internal combustion, electric, hybrid, hydrogen fuel cell electric propulsion systems and the relative merits of each will be incorporated. Identification and discussion of industry issues and trends including vehicle safety standards (FMVSS/CMVSS, NCAP and ECE, for example) and emerging technologies and standards (i.e. SAEJ1772, J3400 (NACS), SAE J2601and ISO-26262)		0.5
AUTO-8030-01/ Engineering Project Management, Automotive Lean and Quality Processes	This course will examine the basic principles and tools used in engineering project management through topics such as project scope definition, consideration of time, cost, risk, procurement, and stakeholder management. The course will also review topics associated with the principles of process management used in lean manufacturing (the 5 Lean Principles, House of Value and 6S attributes) and specialized automotive quality processes such as design failure modes and effects analysis (DFMEA), production part approval process (PPAP). and advanced product quality planning (APQP) that are used in the auto industry to ensure on-time delivery of the right product with the right attributes, overall product quality and sound financial management of product development processes. Principles, methods, and best practices (such as life cycle analysis), Poka-Yoke design, design for manufacturability and assembly (DFMA) that are used by industry to reduce waste and operate more efficiently will also be covered.		0.5

Course # and Name	Course Description	R=Required / P=Preferred Skills	Projected # of GAs
AUTO-8040-01/MECH-8000-04 Vehicle Propulsion	This course will provide an examination of propulsion systems such as clean burning IC engine propulsion, electric vehicle (EV) propulsion (battery, hybrid, plug-in hybrid) and fuel cell electric vehicle propulsion. Topics will include combustion processes and pollution prevention for IC engines, and chemical and material properties and processes for electric propulsion along with key performance metrics. Charging systems and their integration with, and influence on, the electric power grid and potential future developments will be reviewed.		0.5
AUTO-8050-01/MECH-8067-01 Vehicle Energy and Thermal Management	This course will examine control of the passenger compartment environment, occupant comfort and powertrain thermal management for different types of propulsion (i.e. internal combustion engines, battery electric engines, hybrid, and hydrogen fuel cells) along with energy management topics as it relates to vehicle energy and thermal management. Software will be introduced to aid with system and component sizing and performance calculations.		0.5
GENG-1102-01/ Engineering Graphics	Visualization techniques, graphical communication using sketching, descriptive geometry, and computer-aided design (CAD) for orthographic projection, pictorial drawings, dimensioning, section views, and auxiliary views. Reading engineering drawings. Engineering graphics e-portfolio and CAD project to develop visualization skills and task completion skills.	R - Must have Knowledge of DRAFTING: Sketching, orthographic views, auxiliary views, section views, familiar with mechanical drafting conventions/standard, Knowledge of AutoCAD software, only 2D - Drafting and Annotation Workspace and fluent in English. P - Previously taken/GA'd the course	1
GENG-1201-01/ cornerstone Design	The engineering design process: problem formulation, functional requirements and constraints, competitive evaluation and areas of improvement, conceptual design through ideation sketches, selection of design, communication of the design solution, prototype construction, testing, iteration, reporting. Includes group work to develop personal, teamwork, leadership, and task completion skills as part of the design process.	R – GA's must have previously taken GENG-1201 – Cornerstone Design or have experience with Arduino programming, writing instructions and reports, and making presentations, in English). GA's must be proficient in comprehending and composing written English as well as communicating orally in English. Must be available during class labs/tutorials, to help with the hands-on activity and assessment of projects. P - Previously taken or GA'd the course	0.5
GENG-2201-01/ Engineering Design II	This course covers: problem formulation, functional requirements and constraints, competitive evaluation and areas of improvement, conceptual design through ideation sketches, selection of design, communication of the design solution, prototype construction, testing, iteration, reporting. Includes team work to develop personal, partnership, leadership, and task completion skills.	R - Familiar with MATLAB essential P - Previously taken or GA'd the course	0.5
GENG-2220-01/ Probability and Statistics for Engineering	Treatment of engineering data using the concepts of frequency distribution; measures of central tendency and dispersion. Probability; random variables; discrete and continuous distributions. Tests of hypotheses; estimation; goodness-of-fit test; linear regression and correlation. Applications using computers in engineering design problems, quality control, and manufacturing processes.	R - Experience with Intermediate Statistics, Microsoft Excel required. P - Previously taken/GA'd the course preferred.	12
GENG-3400-60/ Mechatronics System Design	This course will introduce concepts to integrate mechatronic components such as mechanical, electronic, optical and computer programming. Basic concepts and fundamental principles in mechatronic system-based design for automation, packaging and other applications will be reviewed. Students will develop the knowledge and skills necessary to adopt an interdisciplinary approach to mechatronic system design. The hands-on laboratory activities will assist in developing the skills in designing and troubleshooting integrated mechatronic systems. Students will be organized into teams of three or four students, and each team will be proposing, conceptualizing, designing, building and demonstrating a significant hands-on mechatronic project. Through this course and team project the students will be prepared for the final Capstone Mechatronics.	P - Previously taken/GA'd the course	0.5

Course # and Name	Course Description	R=Required / P=Preferred Skills	Projected # of GAs
GENG-4210-01/ Engineering & Society	The technology-society relationship in a historical context; the nature of technological change and its consequences; the engineer's role in the control of technology and sustainable development; the responsibility of engineers for health and safety in the workplace, including OHSA, WHMIS. The development of the engineering profession; professional registration and the code of ethics; the duties and responsibilities of engineers; the engineer and the law.	R - Familiarity with Canadian law and Ontario as well Professional Engineer licensing requirements. P - Previously taken or GA'd the course	0.5
GENG-4300-60/ Intelligent and Digital Manufacturing	Manufacturing methods are shifting towards smart tools that are adaptive and self-aware. This course will introduce concepts and components for intelligent machining tools and interfacing them with digital manufacturing that will create the knowledge of Industry 4.0. Integration of smart sensors and controls, data processing, interconnected machines, digital link between design and production, analysis of manufacturing processes and supply chains will be discussed.	P - Previously taken or GA'd the course	0.5
GENG-4500-60/ Artificial Intelligence and Machine Learning	This course is an introduction to the area of Artificial Intelligence and designing intelligent machines. Artificial intelligence aims to understand thinking and intelligence in ways that enable the construction of computer systems that are able to reason in uncertain environments. Work in AI has supported the development of driverless cars and house-cleaning robots as well as systems that have defeated world chess champions and planned space explorations. The course has three core sections: search, representation, and uncertainty. Each section will provide a thorough understanding of major approaches, representational techniques and core algorithms. Students completing this course will have an in-depth understanding of three core areas of AI and the connections among them, and with such other key AI areas as machine learning, robotics, natural language processing and multi-agent systems.	P - Previously taken or GA'd the course	0.5
GENG-8040-40/ MEM - Engineering Management Capstone	This is a jointly instructed and administered course between the Faculty of Engineering and the Odette School of Business. The course is the last course students take in the Masters of Engineering Management program and has mandatory prerequisites. The goal is to allow students to practice all business and management theory they learned in previous courses by completing one of: 1) an engineering management report 2) an engineering feasibility study, or 3) a new venture business plan. This course is entirely project-based.	P - Previously GA'd the course is preferred	0.5
INDE-4000-01/ IE senior capstone design	Student teams, supervised by faculty, undertake a significant design project, which integrates mathematics, basic sciences, engineering sciences and complementary studies in making informed, thoughtful and creative decisions in devising a product, system, component, or process to meet specified needs. It is a creative open-ended and generative activity often iterative and multidisciplinary, subject to constraints which may be governed by corporate standards or applicable legislation to varying degrees depending upon the project. These constraints may relate to economic, health, safety, environmental, social or other pertinent factors. Course requirements include seminars, group meetings, oral presentations, and written reports. Faculty advisors and industrial preceptors will advise project groups and evaluate the progress and results of the design projects.	R - graduated from a Canadian Engineering program	1
INDE-4120-01/ Operations Research II	Probabilistic O.R. models. Markov chains and their properties; continuous-time Markov chains. Queuing theory; the role of Exponential and Poisson distributions. Applications of queuing theory in production systems. Markovian decision processes. Reliability. Renewal Theory. Use of computer software programs to solve optimization problems in queues and Markov Processes.	R - Must have knowledge in probabilistic operations research (Markov chains and Queuing theory) and should be comfortable with the software LINGO and Excel solver. P - Previously taken or GA'd the course.	0.5
INDE-4310-01/ FMS - Flexible Manufacturing Systems	Production Systems, Flexible Automation, Computer-Integrated Manufacturing, Group Technology And Cellular Manufacturing, Flexible Manufacturing Systems, Assembly Systems, Materials and tools handling, Robotics In Manufacturing, Principles Of Design For Manufacture, Process Planning And Concurrent Engineering, New Trends-Lean, Agile And Re-Configurable Manufacturing Systems.	R - Working knowledge and experience with the Flexsim discrete events systems simulation software required. P - Previously GA'd or taken the course preferred.	0.5

Course # and Name	Course Description	R=Required / P=Preferred Skills	Projected # of GAs
INDE-4350-01/ DOE Techniques for Manufacturing	Use of designed experiments (DOE) in engineering product and process design processes. Experiments involving one factor; ANOVA; fixed, random, and mixed models; randomized blocks, Latin squares, and incomplete block designs. Factorial designs. Fractional designs. The Taguchi method and robust product/process design. Emphasis is put on industrial applications of various designs.	P - Strong mathematical background and prior experience in Design of Experiments and MiniTab software preferred.	0.5
INDE-8210-01/ Industrial Exp. & appl Stats	Distributions of functions of variables, estimations and tests of hypotheses, power of tests, non-parametric tests, sampling techniques, analysis of variance, randomized blocks. Latin squares and factorial experiments.	R - knowledge of statistics and preferred experience with Quality issues required	1
INDE-8360-01/MECH-8920-09 Computer-Aided Design (CAD)	This course in CAD/CAM/CAE is directed towards students preparing to work as technical professionals and mechanical designers in industry. This course is based on from theory to practice and discusses important integration issues and approaches. The lectures present basic and generic principles and tools; this is supplemented with significant hands-on practice and engineering applications. Much of the learning will result from "hands-on" experience operating CAD software and learning the machining tools and a bit of programming (CAM) as well.	R - Familiar with CAD software such as Solid works or NX required	1
INDE-8900-28/ Facilities Design and Logistics	Approaches to establishing location and layout of space, equipment and services for industrial facilities. Criteria and data for generating & comparing alternatives. Computerized layout planning models, storage systems, AS/RS, Material handling, scope, definitions, and principles, unit load design, types of equipment, flow of material and line balancing. Environmental, human and cost considerations. Electrical and lighting systems and atmospheric systems.	R - hands-on knowledge of features and commands of software packages; Pro Balance, Flow Planner, Workplace Planner as well as PlanOpt P - Previously taken or GA'd the course.	0.5
MATL-8810-01/ Solidification Fundamentals	Fundamental principles of solidification theory including thermodynamics, kinetics, solid-liquid interface morphology and growth mechanics. Solidification mechanisms of pure metals. Heat flow phenomena in casting and crystal growth. Effect on solidification heat transfer of process variables, casting and mold properties, metal and mold temperatures. Students will apply the fundamentals of thermodynamics and kinetics to materials processes such as casting and welding.	P - Previously taken or GA'd the course.	0.5
MATL-8890-10/MECH-8240 Applied Finite Element Analysis	This course focuses on the modeling aspects of the finite element method using three well known commercial Finite Element Analysis (FEA) software packages known as DYNA, IDEAS and ANSYS. A variety of stress analysis problems in two and three dimensions are studied and the accuracy of the simulations are assessed through comparison with available theoretical and experimental results. Both static and dynamic situations are covered. The students are expected to prepare a final report summarizing their work and an oral presentation.	P - Previously taken or GA'd the course.	0.5
MECH-2210-01/ Dynamics	Review of kinetics and kinematics of particles; workenergy and impulse-momentum methods; moments of inertia of areas and masses; kinematics of rigid bodies; plane motion; forces and accelerations for rigid bodies, energy and momentum methods for rigid bodies in plane motion.	P - previously taken/GA'd the course, studying, at the graduate level, within the Solid Mechanics field. Experience with Working Model 2D software is also preferred.	0.5
MECH-2230-01/ Advanced Engineering and Design	Computer aided design applications for engineering graphic communication. Solid modeling; orthographic projection and isometric drawing; sections and conventions; dimensioning and tolerancing. Design portfolio and project.	R - Fluent in English essential. Good knowledge of CATIA for specific workbenches: sketching, part design, assembly design, drafting workbench and knowledge of drafting techniques and mechanical drafting conventions required.	5.5
MECH-3221-60/ Control Theory I	Control system concepts, linear modelling and analysis of response and stability of physical systems, complex variables and Laplace transforms, frequency, and transient response analysis and performance specifications.	R - Familiarity with electrical, mechanical, fluid dynamics and kinematics modeling; Familiarity with control theory concepts (state-space systems, Laplace transform, bode plots, PID controllers, stability, accuracy, vibration), familiarity with MATLAB and SIMULIN required. P - Previously taken or GA's this	0.5

Course # and Name	Course Description	R=Required / P=Preferred Skills	Projected # of GAs
		course or similar course preferred	
MECH-3224-01/ Engineering Measurements	Basic concepts and applications in engineering data acquisition (DAQ), error analysis, signal conditioning and measurement presentation. Microcomputer-based data acquisition and analysis involving DAQ hardware, including sensors, and software will occur.	R – Previous experience with DAQ hardware and software, preferrably NI LabVIEW and the NI CompactDAQ DAQ system. Previous experiencing using sensors, including but not limited to, load cells, displacement transducers, and accelerometers in mechanical engineering measurement is also required. P – Previously taken/GA'd the course.	4
MECH-3224-60/ Engineering Measurements	Basic concepts in instrumentation; error analysis; instrumentation and measurement systems including sensors, transducer, signal conditioning and display; microcomputer-based data acquisition and analysis.	P - Previously taken or GA'd the course is preferred	0.5
MECH-3671-01/MATL-8890-17 Aerospace Materials and Manufacturing	Properties and selection of metals, ceramics, polymers, and composite materials for aerospace applications. Structural and gas-turbine alloys. Machining, casting, forming, heat treating, and joining processes for original manufacture and repair. Manufacture and application of composites. In-service materials degradation.	R - GA must attend all lab/tutorials P - students with Materials Engineering background, or those who previously taken or GA'd the course are preferred.	0.5
MECH-4200-01/ Mechanical Capstone Design	Student design teams, operating within a "company" environment, utilize the broad range of their undergraduate experience in interdisciplinary projects selected to promote interaction between the mechanical, automotive, and materials programs. Design methodologies and team interaction simulate future professional practice. Project milestones include: a design proposal with cost analysis and scheduling, construction and commissioning of the designed appartus, and a final report and presentation having both global and detail completeness.	P - Previously taken or GA'd the course is preferred	4
MECH-4211-01/ Design for Failure Prevention	Philosophy of machine design. Design factor/reliability relationships. Contemporary fatigue analysis, including low- and high-cycle, triaxial state of non-reversed stress and fatigue damage, with applications of selected mechanical elements.	R - GA must attend lab/tutorials P - Previously taken or GA'd the course is preferred	4
MECH-4218-01/ Thermofluid Systems Design	Evaluation of major thermofluid systems: HVACandR, power generation. Factors affecting design and selection of thermofluid devices: boilers, pumps and compressors, valves, piping systems, heat exchangers, evaporators, and turbines. Effect of device characteristics on process efficiency. Application of optimization techniques to thermofluid systems. (Prerequisites: MECH-3212, MECH-3233, MECH-3228; and either MECH-3217 or MECH-3220.)	R - Basic knowledge on thermodynamics, heat transfer, fluid mechanics, design; familiar with software packages (Finite element analysis, computational fluid dynamics, MATLAB, etc). P - Previously taken or GA'd this course preferred	4
MECH-4240-05/ Advanced Mechatronics	The course will cover advanced concepts in sensors, actuators, and the integration of mechanical, electrical, and control technologies for mechatronic system design. Topics covered will be fundamental theories and computational methodologies of complex mechatronic systems, selection and implementation of sensors and actuators, signal processing and advanced algorithms, microcontroller interfacing and programming, advanced motion control using PLC, and design of complex mechatronic systems and applications.	P - Previously taken or GA'd this course preferred	0.5
MECH-4240-60/ Biomedical Signal Processing	The goal of this course is to provide biomedical signal processing background on technical aspects. This course will cover biomedical signal generation, detection and measurement, and processing. The physiology of bio-electrical signal generation will cover ionic transport in cellular membranes and propagation of electrical signals in cells and tissues. Different kinds of biomedical signals such as the electromyography (EMG), the electrocardiography (ECG), the electroencephalography (EEG) will be covererd. Biopotential Electrode technology, instrumentation amplifiers, and safety standard will be covered. Processing includes filtering, frequency domain analysis, time domain analysis, removal of artifacts, feature extraction, classification, signal correlation, and event detection.	P - Previously taken or GA'd this course preferred	0.5

Course # and Name	Course Description	R=Required / P=Preferred Skills	Projected # of GAs
MECH-4250-01/ Gas Dynamics	Basic concepts and one-dimensional flow equations of gas dynamics. Emphasis on isentropic flows in variable area ducts as well as Fanno, Rayleigh and Isothermal flows in constant area ducts. Normal shock waves, their appearance in various flow types, their application in nozzles and diffusers. Oblique shock and Prandtl Meyer expansion waves. Considerations in compressible flow measurements.	R - Basic knowledge on thermodynamics, heat transfer, fluid mechanics. P - Previously taken a course on Gas Dynamics is preferred.	0.5
MECH-4253-01/ Heating, Ventilation and Air Conditioning	Principles of environmental air quality and occupant comfort control. Psychrometric analysis of buildings as applied to common air distribution system designs. Current solar radiation estimation techniques and other energy transfer mechanisms; their application to cooling and heating load calculations. Analytical and numerical calculations. Computational tools.	R - Basic knowledge on thermodynamics, heat transfer, fluid mechanics. P - Previously taken a course in HVAC is preferred.	1.5
MECH-4440-05/ Electric Vehicle Battery Systems	This course introduces technologies, safety requirements, and manufacturing practices for electric batteries for automotive applications. Topics include: battery chemistry; electric vehicle energy needs and design; battery safety; codes, standards, and regulations; designing for safety and manufacturing; Battery manufacturing; Future Technologies; and the Electric Vehicle Industry.	R - GA must know Ansys Motor CAD / Maxwell software P - Previously taken or GA'd the course is preferred	0.5
MECH-4463-01/ Vehicle Dynamics	Classification and analysis of suspension types and geometry, powertrain layout, and ride quality. Tire modeling, stability, and numerical simulation of vehicle dynamics, including longitudinal and lateral vehicle response to driver inputs. Selected topics from industry experts.	P - Previously taken or GA'd this course preferred	1.5
MECH-4471-01/MECH-4871 /MATL-8890-11 01 Automotive Materials and manufacturing methods	The objective of this course is to introduce both the metallic and non-metallic materials employed in automobiles. The metallic automotive materials are comprised of ferrous and nonferrous alloys. Although the traditional ferrous alloys – cast irons and steels are still present in automobiles, the advanced high strength ferrous alloys are emerging. The nonferrous alloys – aluminum and magnesium-based light alloys are increasingly used in the auto industry. Polymers as the non-metallic lightweight materials are widely employed in automobiles. The content to be covered ranges from the production of introduced automotive materials to their recent development. To understand the rationale for the usage of various automotive materials, the advantages of their manufacturability and properties are discussed. Various manufacturing processes corresponding to specific automotive materials are highlighted. The mechanical properties and microstructure of automotive materials are reviewed. The implementation of automotive materials in automobiles is presented. Upon the completion of this course, students are expected to understand basic principles of manufacturing, and advantages and disadvantages of introduced automotive materials over other materials in terms of performance and weight saving. The course also trains students in obtaining knowledge of advanced manufacturing processes, and structure characterization and property evaluation as well as component design of various automotive materials.	P - Previously taken or GA'd this course preferred	0.5
MECH-4670-01/ Aerospace propulsion	Application of gas dynamics and thermodynamics to aerospace engines. Analysis of engine cycles. Theory and design of propellers; turboprop engine analysis, Internal combustion and gas turbine engines. Component design for compressors, combustors, afterburners, exhaust nozzles.	R - Experience with air-breathing and/or rocket propulsion modelling, analysis, and design. P - Previous experience GAing this course is an asset	0.5
MECH-8000-01/ Materials and Manufacturing Methods	MENG-AUTO - This course will present the Mechanisms associated with elastic, plastic, and creep behavior 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.	P - Previously taken or GA'd this course preferred	1

Course # and Name	Course Description	R=Required / P=Preferred Skills	Projected # of GAs
MECH-8025-01/ Automotive Application for Noise Vibration & Harness evaluation	MENG-AUTO - 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	Previously taken an undergraduate noise course or equivalent graduate noise class preferred. Experience with sound acquisition equipment is essential. background in fluid mechanics and CFD	2
MECH-8290-04/ Air Conditioning	This course discusses the principles of environmental air quality and occupant comfort control, Psychrometric analysis of buildings as applied to common air distribution system designs, solar radiation estimation techniques and other energy transfer mechanisms, and their application to cooling and heating load calculations.	R - Must be familiar with "Carrier's Hourly Analysis Program (HAP) and Engineering Economic Analysis (EEA). P - Previously taken or GA'd the course	0.5
MECH-8290-17/ INDE-8900-22 Additive Manufacturing	3D Printing, or additive manufacturing (AM), has captured the world's imagination. Complex component designs in the aerospace and medical industries, jewelry designs, fashion, archeological artifact reconstructions have all shown to be exciting growth areas for AM solutions. However, it is perceived that intricate designs can be 'done in one' using a one-button fabrication process, but the reality is not so optimistic. This course will introduce you to the AM process family, the workflow, materials, and system infrastructure requirements. Design for Additive Manufacturing and process planning elements will be covered. This course is designed to introduce several AM processes, providing a basic scientific understanding of the possibilities and limitations. Students will be exposed to several slicer software tools. Students should have CAD skills.	R - CAD skills, CURA / Slicr3r software skills, powder bed fusion & stereolithography experience, GD & T & some machining / manufacturing knowledge required. P - Knowledge of Insight / Prusa slicer software skills preferred. P - Previously taken or GA'd the course	0.5
MECH-8290-23/ Advanced Fluid Mechanics	This course provides a solid grounding in the principles of incompressible fluid mechanics for graduate students. The course covers advanced fluid mechanics topics and begins with review of the fundamental fluid mechanics conservation laws of mass, momentum (Navier-Stokes equations) and energy using tensorial (indicial) notations. The processes of how a fluid flow is modeled, the development of the basic equations of fluid mechanics, the simplification of these basic equations using appropriate assumptions, the establishment of proper boundary/initial conditions, and methods of reducing the resulting equations through judicious parameter scaling will be covered. The physical interpretation of the mathematical terms used in solutions to fluid mechanics problems applied to canonical flows, such as boundary layers, jets and wakes will be discussed. A brief introduction to turbulence, statistical representation of turbulence, turbulence spectra and Kolmogorov hypothesis are also planned. Various examples of analytical and numerical solutions to fluid problems will be analyzed as described in the current research literature. The course will provide an opportunity to review fluid mechanics fundamentals, to read research papers and build the necessary engineering intuition needed to practically employ effective numerical solution techniques	P - Previously taken or GA'd the course	0.5
MECH-8290-37/ Industrial Fluid Power	Fluid power encompasses most applications that use liquids or gases to transmit power in the form of mechanical work, pressure, and/or volume in a system. In this course, students will learn the benefits and limitations of fluid power, how to analyze fluid power components and circuits, and how to design and simulate fluid power circuits for applications.	P - Previously taken or GA'd the course	1.5
MECH-8290-44/ Vehicle Dynamics	An introduction to the development of mathematical models of vehicle motion. Simple models that are suited for algebraic manipulation, allowing qualitative characterization of vehicle behaviors, and more complex models, intended for numerical simulation, for precise quantitative predictions will be covered using Altair MotionView® Software. The effects of linear vs nonlinear models will be discussed. The course begins with an introduction to tire modelling, and proceeds to cover longitudinal, lateral, and vertical dynamics. Vehicle accelerating performance, stability and ride quality will be discussed, along with vehicle response to driver and road inputs.	R - familiar with multibody dynamic concept P - Previously taken or GA'd the course, Mechanical Engineering background	0.5

Course # and Name	Course Description	R=Required / P=Preferred Skills	Projected # of GAs
MECH-8290-53/ Elements of Ocean & Subsea Engineering	**Elements of Ocean and Subsea Engineering will examine the application of engineering principles to the ocean and subsea environments. An assortment of subsea devices and vehicles will be studied along with energy generating offshore structures and systems. While this course will concentrate on some technical design aspects and ocean engineering principles, the need for these devices, vehicles and systems for the exploration, exploitation, and security of a nation's oceanic resources and territory will also be emphasized, particularly with regard to the impact of rising sea levels, future global food security, and the shortcomings of subsea communication technologies. The engineering development of (a) national security systems, e.g., submarines, (b) underwater survey and measurement equipment, e.g., AUVs (autonomous underwater vehicles), (c) scientific and commercial submersibles, and (d) underwater and offshore energy enterprises, will be reviewed along with consideration of new systems such as gliders and drones.**	**P - Previous Experience as a Graduate Assistant preferred.**	**1.5**
MECH-8290-88/ Mechanism Design in Catia v5	**The focus of the course is to design mechanisms which are common in mechanical engineering applications. In addition to creating simple animation modes of such mechanisms, the kinematic laws are incorporated to accommodate their real-life behaviour. The CAD tool used for such purposes is the well known Catia v5 commercial code widely employed in the automotive and aerospace sectors.**	**P - Previously taken or GA'd the course**	**1**

Refer to the timetable (www.uwindsor.ca/registrar/timetable-information) for class and exam hours and location.

Eligibility requirements:
GA appointments shall be offered in accordance with the criteria specified in Article 12:03 of the Collective Agreement. Note that the number of G.A. positions for each course is determined by the enrolment in the course, instructor requests and laboratory requirements. In addition, previous experience of applicants in courses posted will be taken into consideration. Students must maintain fulltime registration throughout the term and must be in good standing in the degree program in order to hold a Graduate Assistantship. Students who meet the Phase I tuition refund deadline are therefore not eligible to hold a GA. A full graduate assistantship requires an average of 10 hours per week for a maximum of 140 hours per semester. Refer to Articles 12, 13, and 14 of the Collective Agreement for eligibility details.

All Graduate Assistants must meet the specific requirements related to the duties listed with the course(s) above.

"With respect to those students who have applied for and been accepted for Assistantships, the Assistant will not be paid for any shortfall of hours at the end of their respective program, provided the University has satisfied its obligation to post available positions each term in writing and on the AAU website and to offer the minimum terms of support in accordance with Article 13:01 (a) & (b) and provided that the Assistant has applied in writing or via e-mail by the application deadline for each term until they have received the minimum terms of support in accordance with Article 13:01 (a) & (b)."

In pursuit of the University of Windsor's Employment Equity Plan, members from the designated groups (Women, Aboriginal Peoples, Visible Minorities, Persons with Disabilities, and Members of Sexual Minorities) are encouraged to apply.

Online applications, submitted through Qualtrics link -

Ms. A. Haskell,
MAME Department, Room 2166 CEI

Deadline for completing the online application – 8:30am – Monday,

Dr. Minaker
Head