MASc & MEng Field in Design

PROPOSAL FOR ADDING A NEW MASc & MEng FIELD WITHIN THE EXISTING MECHANICAL ENGINEERING MASTER'S PROGRAM AT THE FACULTY OF ENGINEERING AND APPLIED SCIENCE (FEAS)

Submitted to:

Ontario Council on Graduate Studies

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Related Quotes:

"As businesses have become good at managing quality, quality has become a sort of commodity - necessary but not sufficient to ensure success. When everyone offers quality, quality no longer stands out. Businesses must look elsewhere for differentiation. The next arena for competition has become innovation."

Hugh Dubberly (2008)

"Innovation involves risk and invites calamities that, ironically, can enhance the integrity and hence safety of subsequent designs."

Henry Petroski (1992)

1. PREAMBLE

Over the last two decades, product, process, technology and service innovation became the principal indicators for market differentiation among the key global industries. Since then, successfully getting customer-focused innovative designs to the market within shortest possible lead times has been of paramount importance for company survival. Consequently, today's companies that are making the greatest profits are the innovative ones, not the low-cost ones. Although companies normally use design innovation to improve on existing products, sometimes these efforts evolve into even creating a completely new class of products that begin to dominate an entire market segment. Chrysler, for example, promoted the first minivan in 1983 and since introducing this innovative vehicle class has never lost its market lead. We are currently witnessing the unsurpassed market success of novel communication and business machine solutions and technologies spearheaded by Apple.

Regrettably, contemporary statistical figures indicate that about 93 percent of new product ideas fail. This clearly indicates that the majority of today's companies still fail to recognize that winning products are launched through establishing a proper combination of people, processes, and technologies while listening and addressing adequately the needs of potential customers. This lack of success also shows that most companies do not develop ideas through sound engineering fundamentals and do not rely on computer-based tools to evaluate and refine designs in the earliest stages of the product development process. As a consequence, the cost of design changes increases exponentially with each subsequent stage of development, thus making changes costly during detailed design, very expensive during prototype testing, and tremendously high during production.

Innovative Design Engineering encircles the complex engineering efforts involved in creating new ways of addressing customers' needs, by using a fresh approach to launching new concepts and to engineering problem solving. Considering this, a compelling additional objective arises before the engineering education system. It should focus on assisting related industries through collaboration and by better educating design engineers so that they become more capable of utilizing and creating innovative design tools and methods as well as managing the development, implementation, documentation, and dissemination of innovative design engineering principles and practices. A radical shift in attitude and new ways of linking project success criteria to customer experience goals have to be explored in order to achieve a thorough understanding of product desirability, technological feasibility, and business viability. This approach to design engineering requires a new kind of "hybrid" engineering professional having sound technological knowledge, creative design skills, and a clear understanding of business; i.e., a professional who will be capable of balancing user-focused design with the application of novel technologies. Conversely, an advanced design engineering education system resulting in a powerful body of highly qualified people able to think creatively, state-of-the-art research facilities, and close collaboration and interaction with academic and industrial leaders is what is fundamentally needed to generate breakthrough ideas and convert them into useful and profitable products. We are very fortunate that UOIT theoretically provides the ideal setting for attaining the above goals. It is up to us to decide whether or not we want to make use of these unique opportunities.

2. EXECUTIVE SUMMARY

There are strong reasons to focus on helping engineering students become more effective designers. In order to enhance their ability to meet future challenges, career goals and professional aspirations, many undergraduate and graduate engineering students have expressed the desire to pursue graduate level academic curricula within the engineering education system that would combine pure engineering science and applied engineering in such a way as to capture the changes of technology and the changing expectations of society in a timely manner. On the other hand, the stakeholder community consisting of mainly industrial employers suggests that fresh engineering graduates demonstrate satisfactory analysis abilities but lack competence in the areas of synthesis, design, and innovation. Employers seek engineers possessing advanced competencies in innovation, creativity, design engineering, and the concurrent product development process.

It is for these reasons that Innovative Design Engineering was the fundamental block on which the design strategy of the mechanically oriented programs in UOIT's Faculty of Engineering and Applied Science (FEAS) has been developed from its inception. Through incorporating specific strategies into the engineering curriculum and intensive collaboration with industry these engineering curricula were designed to extend and promote the most advanced concepts of design and innovation into the general engineering educational setting and beyond.

However, although innovation in Design Engineering is the principal engine of economic growth, currently none of UOIT's engineering programs provides a limited concentration of design engineering courses. It is therefore not surprising that Design is the core of the proposed Chair's initiative, as detailed in the present proposal. In order to assist graduate engineering students in discovering and/or enhancing their abilities and interests in the context of their higher education, UOIT's Chair in Innovative Design Engineering envisioned in his Action Plan introducing an additional package of graduate level academic objectives through establishing and launching a new field in Design within the existing Master's Program in Mechanical Engineering offered by the FEAS.

This initiative reinforces the educational strategies of both UOIT and the FEAS which include strong commitments to provide coherent and non-obsolete undergraduate and graduate education that includes a comprehensive set of integrated learning opportunities. This proposal is focused on the details and the rationale for adding such a field as one of the options available to students pursuing Master's studies within the framework of the existing Mechanical Engineering graduate program. An overarching objective of the new graduate studies field will be to understand and employ the synergistic effect between design and innovation as the key for sustaining corporate performance and competitiveness, particularly in manufacturing and knowledge-based industries, and to meaningfully integrate these ideas into engineering curricula. Another key objective of the new field will be to embed innovation in design engineering while ensuring that the educative design engineering cases are industry driven and realistic, follow modern methods, and focus on real time and new products and processes.

3. INTRODUCTION

The University of Ontario Institute of Technology (UOIT) is a young institution. The past seven years of UOIT's brief history were clearly marked by a rapid growth of UOIT's engineering programs. As a result, undergraduate as well as graduate engineering degrees at both master's and doctoral levels at UOIT are currently offered by both the Faculty of Engineering and Applied Science (FEAS) and the Faculty of Energy Systems and Nuclear Science (FESNS).

In retrospect, UOIT accepted its first undergraduate engineering students in the fall of 2003 which coincides with the time when FEAS established and offered its first undergraduate program in Manufacturing Engineering. In the fall of 2004, FEAS added a new undergraduate program in Mechanical Engineering with three options: (i) Mechanical Engineering Comprehensive, (ii) Energy Engineering and (iii) Mechatronics Engineering, whereas in the fall of 2005, FEAS expanded further by offering three more undergraduate programs: Automotive Engineering, Electrical Engineering, and Software Engineering. All undergraduate engineering programs offered at FEAS have been fully CEAB accredited.

Since its opening in 2003, FEAS has had a great increase in the number of students who wish to study engineering. Currently, undergraduate engineering education at FEAS comprises two basic components: the Faculty-wide general engineering education core requirements, which are usually completed during the first two years of the undergraduate university experience; and the program-specific academic requirements which are covered in two years. An extra year of business and management courses is integrated into the upper two years of study for students who opt for an Engineering and Management program.

The first FEAS graduate program in Mechanical Engineering leading to the degrees of Master of Applied Science (MASc) and Master of Engineering (MEng) was approved to commence by the Ontario Council on Graduate Studies (OCGS) in January, 2006. In 2008, FEAS was able to expand its graduate programs by offering MASc and MEng programs in Automotive Engineering and Electrical Engineering. In the fall of 2008, the first doctoral degree program in Mechanical Engineering at FEAS was launched. It was then followed by launching a doctoral degree in Electrical Engineering. Most recently, a new MEng program in Engineering Management is being prepared for submission to OCGS.

Since the first launch of graduate studies in 2006, FEAS had a permanent increase in the number of graduate students who wish to study engineering. Currently, graduate engineering education at the master's level at FEAS comprises two basic options: the MASc and the MEng programs. The MEng program has two options: MEng-Project which consists of a combination of courses and a project and MEng-Course which consist only of courses.

Clearly, the critical mass and the necessary level of FEAS institutional maturity for launching a new field in Design within its existing Mechanical Engineering master's program have been successfully reached. This has been enabled by the hard work and the strong academic expertise of its faculty, as well as the commitment of its engineering specialists and administrative support staff to make the best possible use of available state-of-the-art facilities and infrastructure foundations.

4. OVERVIEW OF THE NEW DESIGN FIELD

4.1 Definition

Because design engineering activities often involve the transformation of information such as objectives and constraints into the description of an open-ended structure which is capable of fulfilling these objectives, design engineering is regarded as the central focus of the engineering profession. Design engineering is exactly the coherent thread that correlates the various engineering and scientific subjects taught. Although design is concerned with application of knowledge rather than its acquisition, knowledge is of vital importance to the design engineering process.

Creation is the core of all design engineering activities. However, the principal goal of design engineering is not always to invent novel and original solutions, but it is also to achieve optimal solutions in the given conditions. Thus, if the currently best incorporation of properties in a product is considered as the state of the art, an invention would be a new idea devised for completing a technical artifact that is not deducible from the current state of the art. Such inventions are often patentable. Another role of invention is to improve the state of the art mainly by suggesting and creating new embodiments of operational principles into a candidate product that will become an innovation when it appears on the market and is implemented. However, since one's "motherwit and creativity cannot compensate for defects in methodology, science, and technical knowledge," the role of the educators in the articulation of each instruction form is critical in design engineering education.

The new field in Design will be extensively used as a means for overcoming the inherent difficulty of teaching creativity, strategic thinking and innovation in design engineering education. The systematic training of interested FEAS graduate students in design will include strategically aiming towards igniting engineering curiosity and finding new methodologies to focus innovation efforts so they foster breakthrough engineering ideas while establishing a strong relationship within and across the engineering disciplines. Students will attain competence in finding and capturing design knowledge for intelligent and innovative reuse later. This approach will serve as the basis on which the newly proposed field in Design will be developed and introduced within the Master's of Mechanical Engineering program in the FEAS.

This approach to learning and training engineering students in innovative design engineering is intended to establish and preserve a coherent design thread by allowing students to learn and implement their knowledge of calculus, physics, chemistry, writing, solid mechanics, strength of materials, various computer applications, basics of marketing and economics, etc., in a concurrent, simultaneous and integrated course format that builds its contents around the most advanced real-world design concepts. In addition, the establishment of the new field will substantially elevate the awareness of the general public of engineering design and its crucial role in everyday life.

4.2 The Rationale

The economic, ecological and social challenges facing the world now and in the future require rapid implementation of radically new approaches to the product realization process, in which design engineering plays a crucial role. Thus, a novel kind of design engineering education and training is necessary in order to graduate engineers who will be able to address efficiently and effectively the increasing challenges caused by economic uncertainty, constrained resources and stiff global competition. These challenges call for accelerated innovation, research, and development in the fields of engineering and applied science with a focus on the highest levels of achievement in design engineering, product development, management engineering, processing technology, and environmental stewardship. Lean design engineering of innovative products, processes, technologies and systems so that they optimally combine high efficiency with low resource use without compromising robustness, reliability and versatility of application, constitutes a feasible solution since lean design is an approach that enables a company to design out waste from a process by focusing on reducing the non-value added elements of designs.

4.3 The Mission

To further reaffirm the importance of engineering design in the product realization process, a culture change in teaching design engineering is necessary to ensure that engineering graduates embark on their industrial careers prepared for the challenge. The mission of the proposed field in Design within the Master's in Mechanical Engineering program is to promote design engineering by providing and facilitating new educational opportunities in the field of innovative design engineering, which complement and/or enrich the other requirements of graduate programs in FEAS. Another important component of the Design field's mission is to allow students to build on a second interest by offering the benefit of acquiring significantly enhanced breadth and depth of studies in the area of interest. The establishment of the proposed Design field will thus simultaneously provide the University the means for addressing the concerns of students who wish to study design engineering intensively but are often hindered by another program, and therefore enter into engineering programs that do not provide education in mechanical engineering-related design engineering (e.g., Electrical Engineering, Software Engineering), or do not enter into engineering programs at all. For example, the proposed field in Design will provide both engineering and non-engineering undergraduates a unique opportunity to combine and complement a bachelor's degree in such areas as Software Engineering or Science with a Master's in Mechanical Engineering with a specialization in Engineering Design. The proposed field will improve the design engineering education at FEAS by providing a multidisciplinary, concurrent and intensive approach to learning with an investigative approach to understanding and solving open ended design engineering problems and promoting hands-on familiarity with conventional, advanced, and novel design engineering tools.

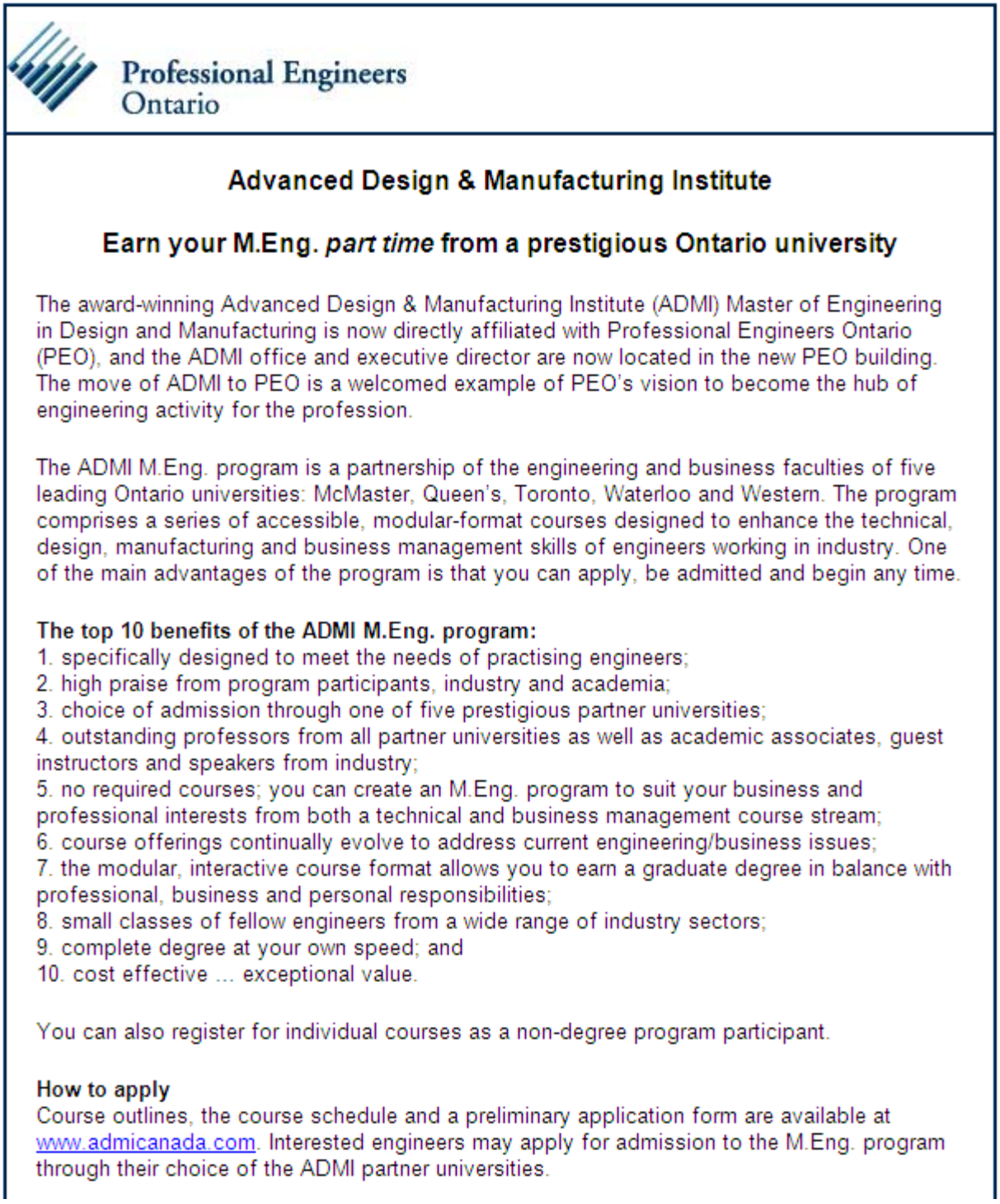
4.4 The Vision

As indicated by Torsten and Gunter, new technologies are shaped by the social and economic framework in which they are developed. This framework determines not only the design of the technologies themselves, but also the expectations and the behaviour of the users of these technologies. However, the speed and efficiency of the diffusion of innovation through the economy is critical to productivity and economic growth. In this context, the new Design field will be instrumental in advancing the understanding and application of innovative design engineering and the education of students in design engineering. This includes a knowledge of the broader cultural issues associated with the contemporary role of design engineering in the creation, implementation and application of a wide variety of innovative enabling technologies.

The fundamental vision of the proposed new Design field in the Master's in Mechanical Engineering is to provide a significant contribution to the growing Canadian and global awareness of the importance of engineering discovery and innovation in addressing the compelling needs of today's world. This vision requires advances in the design engineering discipline, and includes educating highly capable design engineers. This will be done through the introduction and propagation of distinctive educational approaches aimed at training competent engineers who will be instrumental in meeting effectively emerging needs for innovative products, processes, technologies and services. Through deliberate exposure to extensive use of state-of-the-art multi-media technology and other design engineering and analysis tools, the students will also receive the opportunity to "work virtually" as future members of virtual corporate design teams that use collaborative networks to design and develop products innovatively.

The curriculum of the new Design field will provide interested students with more rigorous exposure to design engineering by demonstrating design engineering fundamentals via hands-on experience and experimentation and by exposing students to advanced and emerging technologies and design engineering tools. It will also focus on introducing design concepts and standards, as well as intellectual property and patenting aspects. Enrolled graduate students will thereby get the opportunity to gain an in depth understanding of design engineering principles and methodologies that are directly applicable to the immediate area of their research interests. The students will also design, develop, build, evaluate, and optimize product prototypes as well as design, execute, and interpret the results of engineering experiments relevant to their research areas. The students will study and apply design team and leadership skills as they are practiced in industrial settings and develop an understanding of the importance of introducing innovation in design engineering solutions to create competitive breakthrough products.

Other than a partnership between McMaster University, Queen's University, University of Toronto, University of Waterloo, and University of Western Ontario to offer a joint program in Design & Manufacturing through the Advanced Design and Manufacturing Institute (ADMI), there is no graduate program or field being offered in Ontario's universities dedicated to Engineering Design. The latest news about the move of ADMI to PEO is presented on the next page.



Professional Engineers Ontario

Advanced Design & Manufacturing Institute

Earn your M.Eng. *part time* from a prestigious Ontario university

The award-winning Advanced Design & Manufacturing Institute (ADMI) Master of Engineering in Design and Manufacturing is now directly affiliated with Professional Engineers Ontario (PEO), and the ADMI office and executive director are now located in the new PEO building. The move of ADMI to PEO is a welcomed example of PEO's vision to become the hub of engineering activity for the profession.

The ADMI M.Eng. program is a partnership of the engineering and business faculties of five leading Ontario universities: McMaster, Queen's, Toronto, Waterloo and Western. The program comprises a series of accessible, modular-format courses designed to enhance the technical, design, manufacturing and business management skills of engineers working in industry. One of the main advantages of the program is that you can apply, be admitted and begin any time.

The top 10 benefits of the ADMI M.Eng. program:

1. specifically designed to meet the needs of practising engineers;
2. high praise from program participants, industry and academia;
3. choice of admission through one of five prestigious partner universities;
4. outstanding professors from all partner universities as well as academic associates, guest instructors and speakers from industry;
5. no required courses; you can create an M.Eng. program to suit your business and professional interests from both a technical and business management course stream;
6. course offerings continually evolve to address current engineering/business issues;
7. the modular, interactive course format allows you to earn a graduate degree in balance with professional, business and personal responsibilities;
8. small classes of fellow engineers from a wide range of industry sectors;
9. complete degree at your own speed; and
10. cost effective … exceptional value.

You can also register for individual courses as a non-degree program participant.

How to apply

Course outlines, the course schedule and a preliminary application form are available at www.admicanada.com. Interested engineers may apply for admission to the M.Eng. program through their choice of the ADMI partner universities.

Therefore, the proponent believes that the present proposal is timely and to the point and that it will provide an important opportunity for graduate students interested in studying Engineering Design through UOIT's Faculty of Engineering and Applied Science.

5. THE FACULTY

The following members of the Faculty of Engineering and Applied Science could be offered to be involved in teaching and supervision/co-supervision of graduate students in the proposed Design field. Brief outlines of FEAS active core faculty members are provided below to demonstrate the link between their research interests and the proposed field.

5.1 Full Professors

Dr. Ibrahim Dincer, P.Eng. - Hydrogen and Fuel Cell Systems, Renewable Energies, Energy and Exergy, Energy Conversion and Management, Heat and Mass Transfer, Thermodynamics, Drying, Refrigeration, Thermal Energy Storage.

Dr. Ebrahim Esmailzadeh, P.Eng. - Vibrations of Machines and Flexible and Distributed Systems, Nonlinear Dynamical Systems, Vehicle Dynamics, Nonlinear Adaptive and Optimal Control Systems, Active vibration control, Intelligent and electric vehicles.

Dr. Hossam Kishawy, P.Eng. - Manufacturing, High Speed Machining, Modelling and Optimization, Finite Element Modelling, Residual Stresses and Stress Analysis.

Dr. Greg Naterer, P.Eng. - Multiphase Flows with Heat Transfer, Hydrogen Production by Thermochemical Water Splitting, Entropy Based Design for Improved Energy Utilization, Micro and Nano Energy Systems.

Dr. Marc Rosen, P.Eng. - Thermodynamics, Exergy Analysis, Modelling and Simulation of Energy Systems, District Energy, Thermal Energy Storage, Solar Energy, Hydrogen Energy and Fuel Cells, Electricity Generation, Cogeneration, Integrated Energy Systems, Environmental Impact Assessment and Reduction, Heat Transfer.

5.2 Associate Professors

Dr. Scott Nokleby, P.Eng. - Robotics, Mechatronics, Mechanisms, Automation, Advanced Kinematics of Robots and Mechanisms, Redundant Manipulator Systems, Mobile–Manipulator Systems, Mechanism and Robot Design, Optimal Design.

Dr. Remon Pop-Iliev, P.Eng. - Engineering Design, Manufacturing Engineering, Engineering Materials, Design and Development of Technologies for the Manufacture of Cellular Materials and Composites, Design and Development of Sustainable Mobility Solutions, Design of Multifunctional Components Utilizing Smart Materials.

Dr. Bale Reddy, P.Eng. - Biomass Combustion and Gasification, Fluidized Bed Combustors, Combined Cycle Power Generation, Exergy Analysis, Thermal Design and Optimization, Cogeneration, Waste Heat Recovery, Heat Transfer, Advanced Energy Systems, Advanced Power Plant Cycles, Gas-Solid Flows in Advanced Combustors, Energy Conservation, Solar Energy.

Dr. Ghaus Rizvi, P.Eng. - Processes and materials for tissue scaffolds and skeletal structures. Advanced Polymer and Composite Processing and Characterization. Artificial Wood. Macromolecular, Nano-composite, and Biomaterials Development.

Dr. Dan Zhang, P.Eng. - Robotics and Mechatronics, Parallel Robotic Machine Tools, Reconfigurable Systems, Advanced Manufacturing Technologies, Advanced Engineering Design Methodology, Modeling and Simulation of Flexible Manufacturing Systems, Design Optimization.

5.3 Assistant Professors

Dr. Marnie Ham, P.Eng. - Asymmetric Incremental Sheet Forming, Sheet Metal Forming, Surface Texture and Quality, LCE (Life Cycle Engineering) and EcoDesign, Applied Statistics, and Statistical Quality Control.

Dr. Yuping He, P.Eng. - Vehicle System Dynamics, Automated Design Synthesis, Modelling and Simulation, Application of Multidisciplinary Optimization, Mechatronic Systems.

Dr. Greg Rohrauer, P.Eng. - Advanced Composite Materials, Analysis and Design of Composite Pressure Vessels, Materials Testing, Alternate Fueled and Hybrid Vehicles Development, Vehicle Dynamics, Manufacturing Technology and Application.

5.4 Complementary Faculty

Brief outlines of FEAS complementary faculty members are provided below to demonstrate the link between their areas of expertise and the proposed field.

Dr. Ahmad Barari, P.Eng – Design Methodologies, Design Rigidity

Dr. Michael Bennett, P.Eng. - Engineering Management

Dr. George Platanitis, P.Eng. – Design Methodologies, Engineering Education and Course Development.

Dr. Vinh Quan, P.Eng. - Staff Scheduling/Timetabling, Applications of Integer Programming & Complementary Programming.

With the exception of Drs. Kishawy, Barari, Bennett and Platanitis, curricula vitae for all core faculty included in Section 5 of this brief were provided in the UOIT submission for the PhD in Mechanical Engineering. CVs for these four additional faculty members are provided in Appendix A.

6. DEGREE REQUIREMENTS

The proposed field in Design within the Master's of Mechanical Engineering at UOIT will include core coursework in Design and opportunities for interdisciplinary interaction, communication, and synthesis via elective courses. An enrolment of 25 to 30 students in this field is envisioned.

The degree requirements for the students selecting the new Design field for their master's degree program are the same as those for all students in the existing MASc/MEng programs in Mechanical Engineering.

Program Option	***# of courses***				
MASc	5 courses	+	Thesis	+	Non-credit seminar
MEng (Course option)	10 courses				
MEng (Project option)	7 courses	+	Project		

Students who select the Design field will be required to take at least one course from the new ENGR 527XG Design offerings listed in Section 7. They may select their remaining courses from those listed below or from the new Design course electives listed in Section 7. Their research areas and theses or projects (if applicable) will focus on this specialized area of study.

Currently, graduate students enrolled in the MASc in Mechanical Engineering must complete five courses for a total of 15 credits. In addition, student must also successfully complete ENGR 5003G Seminar, as well as ENGR 5001G MASc Thesis (the thesis is worth 15 credits). For the MEng-Project option, students must complete 21 credits of coursework, along with 9 credits of project work (ENGR5002G – MEng Project). For the MEng-Course option, students must complete a total of 30 credits of coursework. The following Master's level courses are available to students:

ENGR 5001G MASc Thesis

ENGR 5002G MEng Project

ENGR 5003G Seminar

ENGR 5004G MASc/MEng Directed Studies

ENGR 5005G Special Topics

ENGR 5010G Advanced Optimization

ENGR 5011G Advanced Engineering Design

ENGR 5012G Advanced and Smart Materials

ENGR 5100G Advanced Energy Systems

ENGR 5101G Thermal Energy Storage

ENGR 5102G Fuel Cells and Hydrogen Systems

ENGR 5120G Advanced Fluid Mechanics

ENGR 5121G Advanced Turbo Machinery

ENGR 5122G Computational Fluid Dynamics

ENGR 5140G Advanced Heat Transfer

ENGR 5141G Heat Exchanger Design and Analysis

ENGR 5160G Advanced Thermodynamics

ENGR 5161G HVAC and Refrigeration Systems Design and Analysis

ENGR 5180G Advanced Nuclear Engineering

ENGR 5181G Advanced Radiation Engineering

ENGR 5221G Computer-Integrated Manufacturing

ENGR 5222G Polymers and Composite Processing

ENGR 5223G Advanced Manufacturing Processes and Methodologies

ENGR 5240G Advanced Dynamics

ENGR 5241G Advanced Mechanics of Materials

ENGR 5242G Advanced Vibrations

ENGR 5243G Mechanics and Dynamics of Machine Tools

ENGR 5260G Advanced Robotics and Automation

ENGR 5261G Advanced Mechatronics: MEMS and Nanotechnology

ENGR 5262G Manipulator and Mechanism Design

ENGR 5263G Advanced Control

6.1 Program Outcomes

As currently stipulated in the UOIT Graduate Academic Calendar, the objectives of the Master's of Mechanical Engineering are as follows:

- The objective of the MASc program in Mechanical Engineering is to prepare students for careers in research, development and advanced engineering. Graduates of the program will be able to work as engineers in R&D and other areas, in advanced technology companies or government agencies, or to continue their education and pursue a PhD degree. The objectives of the MASc program are achieved through a combination of course work, supervised research, a research seminar, and a research thesis.

- The objective of the MEng program in Mechanical Engineering is to provide the opportunity for engineers in industry to upgrade and expand their skills, including developing research skills. Graduates of the program will be able to apply what they have learned in a variety of applications in industry, government, and academia. The objective of the MEng program is achieved through either a combination of course work and a project or solely course work, depending on which option the student selects. MEng students have exposure to research through projects included in most of the graduate courses.

7. DESIGN FIELD COURSES

Five new courses have been designed for this field. Students who select the Design field will be required to take at least one course from the new Design course offerings listed below.

- ENGR 5271G: Innovative Design Engineering
- ENGR 5272G: Design Engineering Management
- ENGR 5273G: Design by Failure
- ENGR 5274G: Design of Sustainable Mobility Systems
- ENGR 5275G: Design for Product End of Life

The remaining courses may be selected from any of those listed above or those listed in Section 6 of this brief.

Outlines for the five new Design courses are provided on the pages that follow.

ENGR 5271G Innovative Design Engineering

Course Title: **ENGR 5271G: Innovative Design Engineering**

Year and Semester: N/A

- **Course Description and Content Outline:** This course introduces students to the theory, tools, and techniques of innovative design engineering and creative problem-solving. It provides a framework for designing breakthrough engineering solutions. The design process in engineering is considered and addressed by stressing its most creative aspects, especially problem definition and concept generation, through emphasis on current industry best practices. A short history of creative engineering solutions, effective methods for communicating new ideas, techniques for creative solutions and cost effectiveness and tools for innovation are considered and thoroughly addressed. The course involves fundamental coverage of principles of inventive problem solving (TRIZ). TRIZ provides a dialectic way of thinking, i.e., to understand the problem as a system, to make an image of the ideal solution first, and to solve contradictions. The course involves hands-on use of computer-aided design (CAD) tools and project management software in engineering applications. Prerequisite: None.
- **Content outline by topic:**
  1. Introduction. Creative engineering solutions.
  2. The engineering design process. Function versus form.
  3. Reinventing – the key concept of the study of Theory of Inventive Problem Solving (TRIZ).
  4. Methods of inventing. Invention. Inventing creativity. Classical TRIZ. Exercises.
  5. Algorithmic navigation of thinking. From praxis to theory. Discipline of creativity. Operative zone. From what exists to what is coming.
  6. Problem definition. Identifying contradictions. Concept generation. Exercises.
  7. Classical navigators of Inventing. Navigators for standard solutions. Navigators for solution of technical contradictions. Navigators for solution to physical contradictions. Navigators to search for new functional principles. Exercises.
  8. TRIZ models for innovative development.
  9. Tactics of Inventing. Diagnostics of the problem. Verification of the solution. Exercises.
  10. Art of Inventing. Exercises.
  11. Ten typical Mistakes.
  12. CAI: Computer Aided Innovation / Invention.
  13. Selected Works by Genrich Altshuller. Exercises.
- **Delivery Mode and Teaching Method(s):** Classroom presentation. Lectures: 3 hours/week.
- **Student Evaluation:** Students will be actively involved in execution of original individual and group projects considering the acquired knowledge from this course under faculty supervision. Students will prepare a final group term project involving a detailed report and an oral presentation.
- **Resources to be purchased by students:** To be determined by professor
- **Textbook requirements:** Michael A. Orloff (2006). Inventive Thinking through TRIZ: A Practical Guide, Second Edition (Springer-Verlag New York, LLC Hardcover, 351 pages, ISBN-13: 9783540332220).

- **Recommended reference literature:**

  Genrich Altshuller (2005). 40 Principles Extended Edition: TRIZ Keys to Technical Innovation (Technical Innovation Center, Inc., Paperback, 137 pages, ISBN 0-9640740-5-2).

- **Learning Outcomes**

  Students who successfully complete the course have reliably demonstrated the ability to:

  Outcome 1: explain TRIZ strategies relating to innovative design engineering;

  Outcome 2: solve open-ended engineering problems by using their creativity and through recognizing that technical systems evolve towards the increase of ideality by overcoming contradictions mostly with minimal introduction of resources;

  Outcome 3: demonstrate their ability to use the acquired knowledge in hands on creative case studies and/or miniature and term creative design projects by individuals and/or groups;

  Outcome 4: apply innovative tools to existing engineering situations and challenges to design and document innovative products from requirements definition through prototype fabrication;

  Outcome 5: be proficient in these skills through a variety of shop projects and in a final exercise that uses a combination of these skills.

Information About Course Designer/Developer: Course designed by faculty eligible to teach this course: Dr. Remon Pop-Iliev, P.Eng., Faculty of Engineering and Applied Science

Identify faculty to teach the course and/or statement "faculty to be hired": Dr. Remon Pop-Iliev, P.Eng.; Dr. Ahmad Barari, P.Eng; Dr. George Platanitis, P.Eng.;

If the method of instruction includes on-line delivery (technology-based, computer-based and web-based), what percentage of the course content will be offered on-line? N/A

Faculty qualifications required to teach/supervise the course: PhD degree in engineering and relevant experience in teaching and research. Faculty members will normally be registered P. Eng.

Classroom requirements: Standard computer enabled UOIT classroom equipped with VRC, DVD, data projectors, and wired and wireless internet access.

Equipment requirements: Stationary desktop PC units (or laptops) having a specific suite of software installed and wireless and wired internet access will be preferred.

ENGR 5272G Design Engineering Management

Course Title: **ENGR 5272G: Design Engineering Management**

Year and Semester: N/A

- **Course Description and Content Outline:** Design management considers the relationship between design and management and reveals how that relationship contributes to business. The objective of this course is to understand the key aspects of managing design within a corporate context effectively and systematically. Nowadays, to build a strong manufacturing corporate identity assumes successfully managing the innovative design process and creating the right relationship between design and the variety of other activities within a corporation. Managing the complexity of large innovative design projects creates pressures which can easily distract design managers from the true problem. As a result, these well-intentioned and smart people often make costly mistakes by not defining well the design problems they wish their teams to solve from the very outset. This course seeks to identify and reinforce key challenges in the management of the design of innovative mechanical engineering devices, processes, technologies and services while exploring established and innovative practices. The course is structured around the importance of the interaction between design, business and management items in design organizations and how to make the existence of the innovative design activity visible in the corporate structure by means of strategic planning. Case studies are used to stimulate the students to explore specific issues and/or draw from their own experience, providing valuable knowledge to be shared in class. The course material is intended to meet the needs of those who will be required to undertake a design management role to those who just want to understand more about managing the innovative design process. It is indispensable to design students and anyone involved in design management, marketing, media communications, and business study, as well as everyone interested in the balance between design and creativity. Prerequisite: None.
- **Content outline by topic:**
  1. Introduction. Planning and implementing a project from conception to delivery. Underlying strategy and process of good design management.
  2. Creating corporate strategy and creating design strategy. Design value: A framework for measurement. Analytic enhancements to strategic decision making.
  3. Corporate strategy. Bringing design management into the fold. Innovation growth and getting where you want to go.
  4. Implementing design strategy. Design strategies for technology adoption. Strategy for the real world. Developing tangible strategies.
  5. Method and integration of design strategy. The design imperative in consumer goods. Visual thinking: A leadership strategy.
  6. From lock-in to lock-out: using design to create fiercely loyal customers.
  7. Law meets design: Transforming valuable designs into powerful assets.
  8. Measuring the future brand effect of graphic design.
  9. Design managers as company strategies: The power of the eight S.
  10. Solving the right problem: A strategic approach to designing today's workplace.
  11. Managing collaborative design teams, the design process and design projects across organizations. Managing Intellectual Property (IP).
  12. Cases in design strategy. A new airplane for the new world: The Boeing 787 Dreamliner.

- **Delivery Mode and Teaching Method(s):** Classroom presentation. Lectures: 3 hours/week.
- **Student Evaluation:** Students will be actively involved in execution of original individual and group projects considering the acquired knowledge from this course under faculty supervision. Students will prepare a final group term project involving a detailed report and an oral presentation.
- **Resources to be purchased by students:** To be determined by professor.

  Textbook requirements: Thomas Lockwood (Editor) and Thomas Walton (Editor) (2008). Building Design Strategy: Using Design to Achieve Key Business Objectives. (Allworth Press, ISBN-13: 978-1-58115-653-9; ISBN-10: 1-58115-653-7).
- **Recommended reference literature:**

  Kathryn Best (2006). Design Management: Managing Design Strategy, Process and Implementation. (AVA Publishing, ISBN 2940373124, 9782940373123; 215 pages)

  Thomas Lockwood (Editor) (2009). Design Thinking: Integrating Innovation, Customer Experience, and Brand Value. Third edition. (Allworth Press, ISBN 1581156685, 9781581156683; 256 pages)

  Phillips, Peter L (2004). Creating the Perfect Design Brief: How to Manage Design for Strategic Advantage. Allworth Press: New York (6 x 9, 208 pages. Paperback; ISBN 978-1-58115-324-8).

  Kathryn Best (2010). The Fundamentals of Design Management (to be published in the near future).
- **Learning Outcomes**

  Students who successfully complete the course have reliably demonstrated the ability to:

  Outcome 1: explain design management strategies relating to corporate businesses;

  Outcome 2: demonstrate their ability to use the acquired knowledge in hands on creative case studies and/or miniature and term creative design management projects by individuals and/or groups;

  Outcome 3: apply innovative design management tools to existing business situations;

  Outcome 4: be proficient in these skills through a variety of shop projects and in a final exercise that uses a combination of these skills.

Information About Course Designer/Developer: Course designed by faculty eligible to teach this course: Dr. Remon Pop-Iliev, P.Eng., Faculty of Engineering and Applied Science

Identify faculty to teach the course and/or statement "faculty to be hired": Dr. Remon Pop-Iliev, P.Eng.; Dr. Ahmad Barari, P.Eng; Dr. George Platanitis, P.Eng.; Dr. Michael Bennett, P.Eng.

If the method of instruction includes on-line delivery (technology-based, computer-based and web-based), what percentage of the course content will be offered on-line? N/A

Faculty qualifications required to teach/supervise the course: PhD degree in engineering and relevant experience in teaching and research. Faculty members will normally be registered P. Eng.

Classroom requirements: Standard computer enabled UOIT classroom equipped with VRC, DVD, data projectors, and wired and wireless internet access.

Equipment requirements: Stationary desktop PC units (or laptops) having a specific suite of software installed and wireless and wired internet access will be preferred.

ENGR 5273G Design by Failure

Course Title: **ENGR 5273G: Design by Failure**

Year and Semester: N/A

- **Course Description and Content Outline:** Design pervades our lives. Unfortunately, we have built success on the back of failure. Modern engineering disasters routinely occur due to avoidable errors in the design process. New technologies are not well understood and designs are conservative. As a result, innovative design engineering is living with failure. The goal of the innovative design engineer can be also identified "as the obviation of failure". Very often invention comes from a failure of design. Therefore, well-engineered products may nevertheless represent failures from the perspective of design and business. Prudent engineering designers and managers shape their knowledge into real skills by learning from others failures. This course examines the nature of design failure and shows how analysis of failure can be used in improving new designs. Through analysis of historical and contemporary case studies of catastrophes well known worldwide students acquire learning experiences from past mistakes to avoid repeating them in the future. The course covers Shippaigaku, the Japanese way to research accidents, scandals, and other failures to uncover the root cause, reveal the scenario that led to the unwanted event, and describe what happened so students can clearly repeat the steps in their mind, and propose ways to avoid those mistakes in the future. Various other methods for failure mode identification are also covered. Prerequisite: None.
- **Content outline by topic:**
  1. Introduction.
  2. Success through failure. Fact-based analysis of how we can learn from past failures.
  3. From Plato's cave to PowerPoint: An illustrated lecture on the illustrated lecture.
  4. Good, better, better: The evolution of imperfect things.
  5. Success and failure in design.
  6. Engineering design failures case studies. Examples include: child-resistant packaging for drugs, national constitutions, medical devices, the world's tallest skyscrapers, long-span bridges, and more.
  7. System failures-case studies. Examples include: the destruction of the Tacoma Narrows Bridge in 1940, the space shuttle disasters of recent decades, the collapse of the World Trade Center in 2001, and more.
  8. Shippaigaku - methodology to research accidents, scandals, and other failures to uncover the root cause.
  9. Intangible things.
  10. Things small and large.
  11. Building on success.
  12. Stepping-stones to super-spans.
  13. The historical feature: the persistence of failure.
- **Delivery Mode and Teaching Method(s):** Classroom presentation. Lectures: 3 hours/week.
- **Student Evaluation:** Students will be actively involved in execution of original individual and group projects considering the acquired knowledge from this course under faculty supervision. Students will

prepare a final group term project involving a detailed report and an oral presentation.

- **Resources to be purchased by students:** To be determined by professor.

  Textbook requirements: Henry Petroski (2006). Success through Failure: The Paradox of Design. (Princeton University Press. ISBN-13: 978-0-691-13642-4; 256 pages)

- **Recommended reference literature:**

  Hatamura, Yotaro (Editor) (2008), Learning From Design Failures, (Springer. XVI, 484 p. 321 illus., Hardcover, ISBN: 978-4-431-25372-3). Hardcover: 484 pages

  Hatamura, Yotaro. Shippaigaku no Susume (Invitation to the Science of Failure)

  Henry Petroski (2006). To engineer is human: the role of failure in successful design

  Henry Petroski (1996). Invention by Design; How Engineers Get from Thought to Thing.

  Articles from the: Engineering Failure Analysis Journal, Elsevier.

- **Learning Outcomes**

  Students who successfully complete the course have reliably demonstrated the ability to:

  Outcome 1: identify and explain past design failures and implement the respective lessons learned into failure mode identification of novel designs;

  Outcome 2: demonstrate their ability to use the acquired knowledge in hands on creative case studies and/or miniature and term creative design management projects by individuals and/or groups;

  Outcome 3: apply design by failure strategies to developing and existing engineering design situations;

  Outcome 4: be proficient in these skills through a variety of shop projects and in a final exercise that uses a combination of these skills.

Information About Course Designer/Developer: Course designed by faculty eligible to teach this course: Dr. Remon Pop-Iliev, P.Eng., Faculty of Engineering and Applied Science

Identify faculty to teach the course and/or statement "faculty to be hired": Dr. Remon Pop-Iliev, P.Eng.; Dr. George Platanitis, P.Eng.;

If the method of instruction includes on-line delivery (technology-based, computer-based and web-based), what percentage of the course content will be offered on-line? N/A

Faculty qualifications required to teach/supervise the course: PhD degree in engineering and relevant experience in teaching and research. Faculty members will normally be registered P. Eng.

Classroom requirements: Standard computer enabled UOIT classroom equipped with VRC, DVD, data projectors, and wired and wireless internet access.

Equipment requirements: Stationary desktop PC units (or laptops) having a specific suite of software installed and wireless and wired internet access will be preferred.

ENGR 5274G Design of Sustainable Mobility Systems

Course Title: **ENGR 5274G: Design of Sustainable Mobility Systems**

Year and Semester: N/A

- **Course Description and Content Outline:** Urban air pollution is a major issue of concern today. One source is attributed to vehicle exhaust emissions, including carbon dioxide (CO2), hydrocarbon (HC), and nitrogen oxides (NOx). This course is designed to provide an appreciation of a vision increasingly referred to as sustainable mobility, one in which vehicles pollute less, consume less, and improve the quality of our lives and the environment that sustains us. In this context, although internal combustion will continue to play a major role for some time, even as other options are being explored and brought to the highway, many still believe that the ultimate solution will be the hydrogen powered fuel cell vehicle. This course is intended to explore a fresh thinking upon the possible engineering synergies of such alternative concepts in a custom setting. Topics cover the design and development strategies for Hybrids and Plug-in Hybrid Vehicles, Electric Vehicles, Natural Gas, Biofules and Flex Fuels Vehicles, as well as Advanced Gasoline Engines. The students will learn how to use appropriate engineering design methods and apply knowledge of mathematics, science, and engineering science into creatively solving design problems conditioned with realistic constraints while using state of the art engineering CAD/CAM/CAE tools and while incorporating engineering standards and communicating effectively their work. Prerequisite: None.
- **Content outline by topic:**
  1. Introduction. Environmental impact and history of modern transportation. Air pollution. Global warming.
  2. History of Electric vehicles. History of hybrid electric vehicles. History of fuel cell vehicles.
  3. Vehicle fundamentals. Vehicle movement. Vehicle resistance. Dynamic equation. Tire-ground adhesion. Power plant. Vehicle performance. Fuel economy. Breaking performance.
  4. Internal combustion engines.
  5. Electric vehicles. Configuration. Performance. Tractive effort. Energy consumption.
  6. Hybrid electric vehicles. Concept of hybrid drive trains. Architecture of hybrid drive trains. Series hybrid electric drive trains. Parallel hybrid electric drive trains.
  7. Electric propulsion systems. DC motor derives. Induction motor drives. Permanent magnetic brushless DC motor drives. Switched reluctance motor drives.
  8. Series hybrid electric drive train design.
  9. Parallel hybrid electric drive train design.
  10. Mild hybrid electric drive train design.
  11. Energy storage. Specific power. Energy efficiency
  12. Electrochemical batteries. Battery technologies. Lead- acid based batteries. Nikkel-based batteries. Lithium-based batteries.
  13. Ultracapacitors.
- **Delivery Mode and Teaching Method(s):** Classroom presentation. Lectures: 3 hours/week.
- **Student Evaluation:** Students will be actively involved in execution of original individual and group projects considering the acquired knowledge from this course under faculty supervision. Students will

prepare a final group term project involving a detailed report and an oral presentation.

- **Resources to be purchased by students:** To be determined by professor.

  Textbook requirements: Mehrdad Ehsani, Yimin Gao, Sebastien E. Gay, and Ali Emadi (2005). Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design.(CRC Press LCC, ISBN 0-8493-3154-4; 387 pages)

- **Recommended reference literature:**

  Iqbal Husain (2003). Electric and Hybrid Vehicles: Design Fundamentals.

  John M. Miller (2003), Propulsion Systems for Hybird Vehicles.

  Ron Hodkinson and John Fenton (2001). Lightweight Electric/Hybrid Vehicle Design.

  D. Sperling and D. Gordon (2009). Two Billion Cars: Driving Toward Sustainability.

- **Learning Outcomes**

  Students who successfully complete the course have reliably demonstrated the ability to:

  Outcome 1: explain design of sustainable mobility systems tools and implement them in novel designs;

  Outcome 2: demonstrate their ability to use the acquired knowledge in hands on creative case studies and/or miniature and term creative design management projects by individuals and/or groups;

  Outcome 3: apply design of sustainable mobility systems strategies to engineering design situations;

  Outcome 4: be proficient in these skills through a variety of shop projects and in a final exercise that uses a combination of these skills.

Information About Course Designer/Developer: Course designed by faculty eligible to teach this course: Dr. Remon Pop-Iliev, P.Eng., Faculty of Engineering and Applied Science

Identify faculty to teach the course and/or statement "faculty to be hired": Dr. Remon Pop-Iliev, P.Eng.; Dr. Greg Rohrauer, P.Eng., Dr. Ahmad Barari, P.Eng; Dr. George Platanitis, P.Eng.;

If the method of instruction includes on-line delivery (technology-based, computer-based and web-based), what percentage of the course content will be offered on-line? N/A

Faculty qualifications required to teach/supervise the course: PhD degree in engineering and relevant experience in teaching and research. Faculty members will normally be registered P. Eng.

Classroom requirements: Standard computer enabled UOIT classroom equipped with VRC, DVD, data projectors, and wired and wireless internet access.

Equipment requirements: Stationary desktop PC units (or laptops) having a specific suite of software installed and wireless and wired internet access will be preferred.

ENGR 5275G Design for Product End of Life

Course Title: **ENGR 5275G: Design for Product End of Life**

Year and Semester: N/A

- **Course Description and Content Outline:** This course is about environmental consciousness which is rapidly becoming a fundamental product design focus in a variety of industries, especially in the electronics industry where rapid technology cycles obsolete products at staggering rates. Product end-of-life management is a growing problem in all industrialised countries. The progressive shortening of the effective useful life as a result of technological obsolescence causes serious difficulties in ensuring adequate forms of disposal for the millions of products disposed each year. To date, two different approaches have been applied separately. On the one hand, disassembly and re-cycling technologies have been developed which are used when the product reaches the end of its useful life, while on the other, Design for Disassembly (DfD) and Design for Recycling (DfR) techniques have sought to provide features as early as the design phase which make it easier to dispose of or re-cycle products.
- **Content outline by topic:**
  1. Problems with end-of-life products.
  2. Trends in material usage. Strategies for waste reduction.
  3. Recycling and product recovery. Plastics recycling. Metals recycling.
  4. Profitability of recycling. Scrap material characteristics and prices.
  5. Energy recovery.
  6. Legislation on waste from consumer goods.
  7. End-of-life vehicles.
  8. Waste electrical and electronic equipment.
  9. Hazardous substances.
  10. Consequences of legislation on the design of new products.
  11. Product disassembly processes. Non-destructive disassembly. Destructive disassembly.
  12. Recovery processes for typical consumer products.
  13. Disassembly planning. Disassembly optimization strategies. Disassembly factories.
  14. Design for disassembly and product recovery. Process selection guidelines.
  15. Material compatibility and selection. Plastics selection.
  16. Component design and product structure. Fasteners guidelines.
  17. Smart materials.
  18. Trade-offs between product design and product recovery.
- **Delivery Mode and Teaching Method(s):** Classroom presentation. Lectures: 3 hours/week.
- **Student Evaluation:** Students will be actively involved in execution of original individual and group research projects considering the acquired knowledge from this course under faculty supervision. Students will prepare a final group research project involving a detailed report and an oral presentation.

- **Resources to be purchased by students:** To be determined by professor.
- **Textbook requirements:** None
- **Recommended reference literature:**

Fred Lambert, Surendra M. Gupta (2007). Disassembly Modeling for Assembly, Maintenance, Reuse and Recycling

Fabio Giudice, Guido La Rosa, and Antonino Risitano (2006). Product Design for the Environment: A Life Cycle Approach.

W. Wimmer, Rainer Züst, and Kun-Mo Lee (2004). ECODESIGN Implementation: A Systematic Guidance on Integrating Environmental Considerations into Product Development.

Mahendra Hundal (2001). Mechanical Life Cycle Handbook: Good Environmental Design and Manufacturing.

Helen Lewis, John Gertsakis, Tim Grant, and Nicola Morelli (2001). Design and Environment: A Global Guide to Designing Greener Goods.

- **Learning Outcomes.** Students who successfully complete the course have reliably demonstrated the ability to:

  Outcome 1: explain strategies relating to design for product end of life.
  Outcome 2: demonstrate their ability to use the acquired knowledge in hands on product end of life related projects
  Outcome 3: access and use a variety of resources (human, equipment, tools, plans, vendors and materials) to plan and complete product end of life projects according to process and time requirements.
  Outcome 4: be proficient in these skills through a variety of shop projects and in a final exercise that uses a combination of these skills.

Information About Course Designer/Developer:

Course designed by faculty eligible to teach this course: R. Pop-Iliev, PhD, P. Eng, Faculty of Engineering and Applied Science

Identify faculty to teach the course and/or statement "faculty to be hired": Dr. Ghaus Rizvi, P.Eng.; Dr. A. Barari, P.Eng.; Dr. George Platanitis, P.Eng.;

If the method of instruction includes on-line delivery (technology-based, computer-based and web-based), what percentage of the course content will be offered on-line? N/A

Faculty qualifications required to teach/supervise the course: PhD degree in engineering and relevant experience in teaching and research. Faculty members will normally be registered P. Eng.

Classroom requirements: Standard computer enabled UOIT classroom equipped with VRC, DVD, data projectors, and wired and wireless internet access.

Equipment requirements: Stationary desktop PC units (or laptops) having a specific suite of software installed and wireless and wired internet access will be preferred.

8. ADMISSION REQUIREMENTS

The introduction of the new master's field in Design will not necessitate any changes to the minimum admission requirements for the MASc and MEng programs. Applicants to the MASc and MEng must meet the following requirements (in addition to the general requirements for graduate studies at UOIT):

- Completion of an undergraduate engineering degree in a relevant field from an accredited engineering program at a Canadian university, or its equivalent from a recognized institution.
- Overall academic standing of at least a B (GPA = 3.0 on a 4.0/4.3 scale), with a minimum B in the last two full-time years (four semesters) of undergraduate work or equivalent, although a B+ is preferred for MASc applicants.
- Applicants must possess maturity and self-motivation. Close technical contact with a faculty member is an essential part of graduate education in engineering. Prior to being accepted into the program, MASc students must find a professor who specializes in the applicant's desired area of research and who is willing to act as a supervisor. MEng students who select the MEng-Project option must also find a professor who is willing to act as a project supervisor. In the event the MEng student cannot find a project supervisor, the student may be considered for admission into the MEng-Course option.

9. CONTRIBUTIONS TO THE UNIVERSITY'S MISSION

The addition of the field of Design to the Master's programs in Mechanical Engineering will fulfill the need to provide students with educational opportunities in engineering design, as well as allow students to build on a second interest. Such is in line with one key element of the University's mission - to provide innovative programs which are responsive to the needs of students and employers and which advance the highest quality of research and learning, teaching, and professional practice in a technologically enabled environment. Also, focused study in Design will contribute to the growing Canadian and global awareness of the requirement of innovative engineering solutions to meet today's needs.

10. IMPACT OF NEW FIELD ON THE MASTER'S IN MECHANICAL ENGINEERING

The addition of the Design field offers a complement to existing Mechanical Engineering fields by appealing to the distinct segment of the student population interested in studying intensely engineering design. The introduction of the new field in the program will not result in the diversion of faculty from previous graduate courses and/or supervision. The students in the proposed field can be easily integrated into existing courses and the overall graduate student culture and research environment of the Mechanical Engineering program. The faculty members who will participate in this graduate field are tenured or tenure-track core faculty and complementary faculty members.

APPENDIX A: CURRICULA VITAE FOR FACULTY NEW TO MECHANICAL ENGINEERING PROGRAM

- Dr. Hossam Kishawy — Full Professor
- Dr. Ahmad Barari — Complementary Faculty
- Dr. Michael Bennett — Complementary Faculty
- Dr. George Platanitis — Complementary Faculty

CURRICULUM VITAE

a) NAME: rank, status

Kishawy, Hossam, Professor, tenured
Member of the Graduate Faculty: yes

b) DEGREES:

Ph.D. McMaster University, Canada, 1998
MSc, Tuskegee University, USA, 199
BSc., Helwan University, Egypt, 1990

c) EMPLOYMENT HISTORY:

Present	Associate Professor, Faculty of Engineering and Applied Science, Ontario Institute of Technology
2003-2008	Associate Professor, Mechanical engineering Department, University of New Brunswick.
2004-2006	Director of Graduate Studies.
2000-2003	Assistant Professor, Mechanical engineering Department, University of New Brunswick.

d) HONOURS: (F.R.S., F.R.S.C., Governor Generals Award, honorary degree, etc...)

2010	NSERC-Discovery Accelerator Supplements Award ($120,000).
2007	Nominated for the University Research Scholar Award.
2005	Nominated for the Allen P. Stuart Award for Excellence in Teaching.
2003	UNB Research Merit Award.
2001	"Best Paper" Finalist Award at the 4th Int. Machining & Grinding Conf., SME/MTA, Troy, Michigan.
1998	My Ph.D. thesis was chosen to represent McMaster University for the best thesis award competition in engineering field for 1998 nation wide.
1998	Postdoctoral Fellowship (NSERC Scholarship).
1997	Short-list for the best paper award for 1997 from ASME, International Mechanical Engineering Conference and Exposition, Dallas, Texas.
1997-1998	Chairman Scholarship, McMaster University, Hamilton ON., Canada.
1996-1997	Ontario Graduate Student Scholarship (OGS), Hamilton, ON., Canada.
1994-1996	Graduate Scholarship, McMaster University, Hamilton ON., Canada.
1992-1994	Graduate Scholarship, Tuskegee University, Al., U. S. A.
1987-1988	Outstanding Students Award, Helwan University, Cairo, Egypt.
1986-1990	Academic Excellence Award, Helwan University, Cairo, Egypt.

e) SCHOLARLY AND PROFESSIONAL ACTIVITIES: past 7 years only (eg. executive and editorial positions but not memberships in societies)

2005-present Associate Member (elected), The International Academy for Production Engineering (CIRP).
1997- present Member of ASME
2009-present Associate editor of the journal of Machining Science and Technology
2004-2006 Director of Graduate Studies. UNB
2006-present Member, Editorial Board, International journal of Machining and Machinability of Materials

f) GRADUATE SUPERVISIONS: masters, doctoral, postdoctoral - completed/in progress

Completed: 12 MSc, 1 Ph.D.
In progress: 2 MSc.., 2 Ph.D.

NAME OF STUDENTS supervised within the past seven years, title of thesis of project, year of first registration and year of completion:

1. Lei **Pang** (MSc), Oxley Based Force Model for End Milling, 2005- 2008.
2. Abdultatah **Maftah** (MSc), Finite Element Simulation of Orthogonal Metal Cutting Using an ALE Approach, 2006-2008.
3. Trevor **Desroches** (MSc) Machining Titanium with a Tapered Ball-End Mill, 2005-2007.
4. Thakare **Swapnil** (MSc), Machining of Titanium Alloys with Self-Propelled Tools, 2005-2007.
5. Sathish **Kannan,** (PhD), Machining of Metal Matrix Composites: Forces, Tool Wear and Attainable Surface Quality, 2002-2006.
6. Sagar **Kaware** (MSc), A Study of The Drilling Process of Aluminum alloys, 2004-2006.
7. Mahendran **Mani** (MSc), An Investigation of Control Strategies on A Machine Tool, 2004-2006.
8. Leiming **Li**(MSc), A Force Model for Turning with Self-Propelled Rotary Tools, 2003-2005.
9. Khaled **Ibrahim** (MSc), Characteristics of Cutting Forces in End Milling, 2003-2005.
10. Andrew **Haglund** (MSc), On Friction Modeling in Orthogonal Machining: An Arbitrary Langrangian_Eulerian Finite Element Model, 2003-2005.
11. Yaopeng **Zhu** (MSc) *2004,* On Machining Metal Matrix Composite: A Finite Element Model, 2002-2004.
12. Yuxiang **Zhang** (MSc), An Assessment Of Self-Propelled Rotary Tools During Machining Hardened Steel, 2001-2003.
13. Nihad **Balihodzic** (MSc), A Numerical Investigation of Orthogonal Machining, 2000-2002.

g) GRADUATE COURSES: past 7 years, by year

2001-2003 Principles of Metal Cutting,
2002-2007 Machine tools Dynamics and Control

h) 1. EXTERNAL RESEARCH FUNDING:

Year	Source	Type*	Amount per year	Purpose**
2010-13	NSERC	DAS	40,000/year	
2010-15	NSERC	Discovery	32000/year	research
2007-08	AUTO21.	C	$7,500	research
	.	Principal investigator: M. Elbestawi.		
2006	NBIF.	C	$10,000	research
	.	Principal investigator: H. Kishawy		
2005	P&W Canada.	O	$18,500($25,000 in-kind)	research
		Principal investigator: H. Kishawy.		
2005	United Technology (USA)	O	$30,000 (in-kind)	research
		Principal investigator: H. Kishawy.		
2005-06	AUTO21	C	$7,500	research
		Principal investigator: M. Elbestawi		
2005-10	NSERC- Discovery	C	$23,000	publication
		Principal investigator: H. kishawy.		
2003-04	AUTO21.	O	$25,500($25,000 in-kind)	research
		Principal investigator: M. Elbestawi		
2005	P&W	O	$3,000 (in-kind)	research

*Type: C-Granting councils; G-Government; F-Foundations; O-Other
** Purpose: research, travel, publication, etc.

2. INTERNAL RESEARCH FUNDING:

i) PUBLICATIONS:

1) Life-time summary (count) according to the following categories:

- Papers in refereed journal..... 37
- Papers in refereed conference proceedings..... 37
- Technical reports 8

2) Details for past **seven (7) years:**

Publications in Refereed Journals:

1- Kishawy, H. A., H. Gabbar, "Review of Pipeline Integrity Management Practices" Accepted for consideration for publication in the International Journal of Pressure Vessels and Piping, 2010.
2- Hosseini, B. Moetakef-Imani, H.A. Kishawy, "Mechanistic Modeling for Cutting with Serrated End Mills- A Parametric Representation Approach" submitted for publication in the Proceedings of the Institution of Mechanical Engineers, Part B, Journal of Engineering Manufacture.
3- L. Pang, H. A. Kishawy and T. I. EI-Wardany" Constitutive Equation Based Analysis of Forces in End Milling," In press, International Journal of Advances in Machining and Forming Operations, **2010**.
4- Deiab, I., L. Pang, H. A. Kishawy, N. AlKheily "Effect of Coolant Strategy on Cutting Tool Performance During Machining Hardened Steel, " submitted for publication in the Proceedings of the Institution of Mechanical Engineers, Part B, Journal of Engineering Manufacture, **2010**.
5- Gabbar, H., H. A. Kishawy "Framework of Pipeline Integrity Management ", Accepted for publication in the international journal of process system engineering, 2010.
6- Kannan S., Kishawy, H. A., and Balazinski M, "Analysis of Two and Three Body Abrasive Wear During Machining MMC" Accepted with minor modification for publication in the Machining Science and Technology, **2010.**
7- Kishawy, H. A., L. Pang and T. I. El-Wardany "New Approach for Modeling Cutting Forces in End Milling" International Journal of Materials Engineering and Technology, pp 171-190, **2009**.
8- Kannan S., Kishawy, H. A., and Deiab I. M., "Cutting Forces and TEM Analysis of The Generated Surface During Machining Metal Matrix Composites" Journal of Material Processing Technology. Vol. 29, No. 5, pp. 2260-2269, **2009**
9- Kannan, S. and Kishawy, H. A., "Machining of Alumnium Metal Matrix Composites: Tool Wear Progression and Its Implications" International Journal of Machining and Machinability of Materials, Vol. 3, No.3/4 pp. 241 - 251, **2008**.
10- Haglund , A., Kishawy H A., and Rogers, R.J. "An Exploration of Friction Models For The Chip Tool Interface Using An Arbitrary Lagrangian-Eulerian Finite Element Model," Journal of Wear, Vol. 265, issue 3-4, pp. 452-460, **2008**.
11- Kishawy H A., Deiab, I. M. and Haglund, A. J., "ALE Analysis on Cutting with a Honed Tool," Proceeding of the Institution of Mechanical Engineers: Part B, Journal of Engineering Manufacture, Vol. 222, pp. 155-162**, 2008.**
12- Kannan S. and Kishawy, H. A., "Tribological Aspects of Machining Aluminium Metal Matrix Composites " Journal of Materials Processing Technology, Vol 198, No. 3, pp. 399-406, **2008.**
13- Kannan S. and Kishawy, H. A., "Surface Characteristics of Machined Aluminium Metal Matrix Composites," International Journal of Machine Tool and Manufacture, Vol. 46, pp 2017-2025, **2006**.
14- Kishawy, H. A., A. J. Haglund, M. Balazinski, "Modelling of Material Side Flow in Hard Turning," Annals of the CIRP, Vol. 55, No.1, pp. 85-88, **2006**.

15- Kannan, S., Kishawy, H. A., Deiab, I. M., and Surappa, M. K., "On the Role of Reinforcements on Tool Performance During Cutting Metal Matrix Composites," Journal of Manufacturing Processes, SME, pp. 67-75, Vol. 8, No. 2, **2006**.
Kannan, S., H. A. Kishawy, M. Balazinski, "Flank Wear Progression During Machining Metal Matrix Composites," Transactions of the ASME, Journal of Manufacturing Science and Engineering, Vol. 128, pp 787-791, **2006.**
16- Li, L. and Kishawy, H. A., "A Model for Cutting Forces Generated During Machining with Self-propelled Rotary Tools," International Journal of Machine Tool and Manufacture, Vol. 46, pp.1388-1394, **2006**.
17- Kishawy, H. A., Li, L., and El-Wahab, A. I., "Prediction of Chip Flow Direction During Machining With Self-Propelled Rotary Tools," International Journal of Machine Tool and Manufacture, Vol. 46, pp.1680-1688, **2006**.
18- Kishawy, H. A., S. Kannan, M. Balazinski, "Analytical Modeling of Tool Wear Progression During Turning Particulate Reinforced Metal Matrix Composites," Annals of the CIRP, Vol. 54, No.1, **2005**.
19- El-Mounayri, H., Kishawy, H. A., and Briceno, J., "Optimization of CNC Ball End Milling: A Neural network-based model," Journal of Materials Processing Technology, Vol 166, pp. 50-62, **2004**.
20- Zhu, Y., Kishawy, H. A., "Influence of Alumina Particles on the Mechanics of Metal Matrix Composites Machining", International Journal of Machine Tool and Manufacture, Vol. 45, No. 4, pp. 389-398, **2005**.
21- Kishawy, H. A., Dumitrescu, M., E-G. Ng and Elbestawi, M.A., "Effect of Coolant Strategy on Tool Performance, Chip Morphology and Surface Quality During High Speed Machining of A356 Aluminum Alloy", International Journal of Machine Tool and Manufacture, Vol. 45, No. 2, pp. 219-227, **2005.**
22- Kishawy, H. A., S. Kannan, M. Balazinski, "An energy based Analytical Force Model for Orthogonal Cutting of Metal Matrix Composites," Annals of the CIRP, Vol. 53, No.1, pp. 91-94, **2004**.
23- Kishawy, H. A., and Gerber, A. G., "Characteristics of Heat Transfer During Machining With Rotary Tools," Transactions of the ASME, Journal of Manufacturing Science and Engineering, Vol. 126, No. 2, pp. 404-407, **2004**.
24- Kishawy, H. A., C. E. Becze, and McIntosh, D. G., "Tool Performance and Attainable Surface Quality During the Machining of Aerospace Alloys using Self-Propelled Rotary Tools," Journal of Materials Processing and Technology, Volume 152, No. 3, pp. 266-271, **2004**.
25- Kishawy, H. A. and Wilcox, J., "Tool Wear and Chip Formation During Hard Turning with Self-propelled rotary tool," International Journal of Machine Tool and Manufacture, Vol. 43, pp. 433–439, **2003**.
26- Kishawy, H.A., Rogers, R.J., and Balihodzic, N., "A Numerical Investigation of the Chip Tool Interface in Orthogonal Machining," International Journal of Machining Science And Technology, Vol. 5, No. 3, pp. 397-414, **2002**.
27- Kishawy, H. A. "Experimental Evaluation of Cutting Temperature During High Speed Machining Of Die Materials Using CBN Tools, " Journal of Machining Science and Technology**,** Vol. 6, No.1, pp. 67-79. **2002**.
28- Tandon, V., El-Mounayri, H., and Kishawy, H. A., "NC End Milling Optimization using Evolutionary Computation," International Journal of Machine Tool and Manufacture**,** Vol. 42, pp. 595-605, **2002**.
29- El-Mounayri, H., and Kishawy H. A., and Tandon, V., "Optimized CNC End Milling: A practical Approach" International Journal of computer integrated manufacturing, Vol. 15, No.5, pp. 453-470, **2002**.

30- Kishawy, H. A., and Elbestawi, M. A., "Tool wear and Surface Integrity During High Speed Machining of Hardened Steel with PCBN Tools," Proceeding of the Institution of Mechanical Engineers: Part B, Journal of Engineering Manufacture, 215 (6) pp. 755-767, **2001**.
31- El-Wahab, A. I., and Kishawy, H. A., "A New Method to Improve the Surface Quality During CNC Machining," International journal of Production Research, Vol. 38, No. 16, pp. 3711-3723, **2000**.
32- El-Wardany, T. A., Kishawy, H. A., and Elbestawi, M. A., "Surface Integrity of Die Materials in High Speed Hard Machining: Part 1, Micrographical Analysis," Transactions of the ASME, Journal of Manufacturing Science and Engineering, Vol. 122, No. 4, pp. 620-631, **2000**.
33- El-Wardany, T. A., Kishawy, H. A., and M. A. Elbestawi, "Surface Integrity of Die Material in High Speed Hard Machining: Part II, Microhardness Variations and Residual Stresses," Transactions of the ASME, Journal of Manufacturing Science and Engineering, Vol. 122, No. 4, pp. 632-641, **2000**.
34- Kishawy, H. A., and Elbestawi, M. A., "Effect of Process Parameters on Material Side Flow During Hard Turning," Int. Journal of Machine Tool and Manufacture, Vol. 39, pp. 1017-1030, **1999**.
35- Seif, M. A., and Kishawy, H. A., "Determining of Residual Stresses in Thin-Walled Ceramic/Ceramic Composite Pipes," Journal of American Ceramic Society, Vol. 82, No., 4, pp. 977-980, **1999**.
36- Seif, M. A., Kishawy, H. A., and Hassan, M. A., "Residual Stresses in Plastic Pipes by Laser Speckle Technique," ASTM, Journal of Testing and Evaluation, Vol. 25, No. 5, pp. 465-470, **1997**.

Publications in Refereed Conferences:

1- Pang, L., Kishawy, H. A., Deiab, I. M., and Al-Kheily, Towards an environmentally friendly Machining of Hardened Steel, IMS/4 International Conference on the Applications of Traditional & High Performance Materials in Harsh Environment. March, 24-25, 2010.
2- S. Sikder and H. Kishawy "Thermo-Mechanical Analytical Model for Force Prediction when Machining Metal Matrix Composite" 2nd CIRP Process Machine Interaction, PMI Conference on June 10-11, Vancouver, BC, Canada, **2010**.
3- Pang, L., Kishawy, H. A., Deiab, I. M., and Al-Kheily, N. A., "Effect of coolant strategy on cutting tool", Proceedings of The Canadian Society for Mechanical Engineering Forum 2010, CSME FORUM 2010, June 7-9, Victoria, British Columbia, Canada, **2010**.
4- R. Bejjani, B. Shi, H. Attia, M. Balazinski, H. A. Kishawy, " On the Machinability of Titanium Metal Matrix Composites" 2nd CIRP Process Machine Interaction, PMI Conference on June 10-11, 2010, Vancouver, BC, Canada.
5- Hosseini, A., Kishawy, H. A., "B-Spline Based General Force Model for Broaching Process", Transactions of the SME, North American Manufacturing Research Conference, **2010**.
6- Pang, L., Kishawy, H. A., and Balazinski, M., "GA Based Optimization for Determining Johnson-Cook Material Parameters Under Orthogonal Cutting Conditions" Transactions of the SME, North American Manufacturing Research Conference, **2010.**
7- Deiab, I., Kishawy, H. A, "Artificial Neural Networks Based Prediction of Friction Coefficient" Transactions of the SME, North American Manufacturing Research Conference, **2010.**

8- Pang, L., and Kishawy, H. A., "A Numerical Analysis of the Machining Process when Using Honed Cutting Tools" 12th CIRP Conference on Modeling of Machining Operations, May 7-8, San Sebastian (Spain), **2009.**

9- Pang, L., Deiab, I. M., and Kishawy, H. A.,"On Tool Performance During Machining Using Different Coolant Strategies" Proceedings of the 22nd Canadian Congress of Applied Mechanics, may 31st -June 4th, Halifax, Nova Scotia, Canada**, 2009.**

10- L. Pang, I. M. Deiab and H. A. Kishawy, "Oxley Based Force Model for End Milling" Proceedings of the 22nd Canadian Congress of Applied Mechanics, may 31st -June 4th, Halifax, Nova Scotia, Canada**, 2009.**

11- Deiab, I. M. and Kishawy, H. A., "A Comparative Study on Predictive Modeling of Tool Wear Using Experimental, Analytical And Numerical Schemes" Proceedings of the 19 the IASTED International Conf, Modelling and Simulation, (MS2008) May 26-28, Quebec city, Quebec, Canada, **2008**.

12- Kannan, S., Kishawy, H. A. and Balazinski, M. "Analysis of Abrasive Wear During Machining Metal Matrix Composites" in Jahazi M., Elboudjaini M. and Patnaik, P., Aerospace Materials and Manufacturing Processes: Emerging Materials, manufacturing and Repair Techniques, proc. Of the 3rd Int. Symp. Of CIM, COM2006, Montréal, Canada, 1-4 Oct., pp.227-236, **2006**.

13- Kishawy, H. A., Haglund, A. J., and Deiab, I. M. "An Analysis of Machining With Honed Tools Using ALE Finite Element Model: Ploughing Force and Minimum Chip Thickness," North American Manufacturing Research Conference, pp. 277-284, **2006.**

14- Deiab, I., Kishawy, H. A., Khattab, A. and El Assadi, M. "On the Machinability of Particulate reinforced MMCs" Proceedings of the Second International Conference on Applications of Traditional and High-Performance Materials in Harsh Environments, March 18-20, **2006**

15- Kannan, S., Kishawy, H. A., Deiab, I. M., and Surappa, M. K., "Analytical Modeling Of Cutting Tool Wear In Machining Metal Matrix Composites," Fifteenth International Conference on Composite Materials, Durban, South Africa**,** 27 June to 01 July, p. 523, CDROM, **2005.**

16- Kannan, S., Kishawy, H. A., Deiab, I. M., and Surappa, M. K., "Modeling of Tool Flank Wear Progression During Orthogonal Machining of Metal Matrix Composites," Transactions of the SME, North American Manufacturing Research Conference, Volume 33, 605-612, **2005.**

17- Haglund , A., Kishawy H A., and Rogers, R.J. "On Friction Modeling In Orthogonal Machining: An Arbitrary Lagrangian Eulerian Finite Element Model," Transactions of the SME, North American Manufacturing Research Conference, Volume 33, pp. 589-596, **2005.**

18- Li, L., Maridort, J., Kishawy, H. A., EL-Wahab, A. I., and Becze, C. E., "Machining of Titanium Alloy With Self-Propelled Rotary Tools" Proceedings of the 2nd IIEC-2004, December 19-21, **2004**.

19- Zhu, Y., Kannan, S., Kishawy, H. A., "A Model For Orthogonal Machining of Metal Matrix Composite Using Finite Element Method," ASME, International Mechanical Engineering Congress and Exposition, Proceedings of IMECE 2004, November 11-19, 2004, Anaheim, California, **2004**.

20- Kishawy, H. A., El-Mounayari, H., El-Wahab, A. I, Li, L., Kannan, S., "Characteristics of High Speed Machining of Difficult–To-Cut Materials With Self-Propelled Rotary Tools," Proceeding of the MDP, ASME/CSME, January 4-6, Cairo Egypt, **2004**.

21- Zhang, Y., Wilcox, J., and Kishawy, H. A. "An Assessment Of Carbide Self-Propelled Rotary Tools During Machining Hardened Steel" Transactions of the SME, North American Manufacturing Research Conference, Volume 31, pp.185-192, **2003**.

22- Kishawy, H. A., Dumitrescu, M., El-Wardany, T.I., E-G. Ng And Elbestawi, M.A., "Ultra High Speed Machining Of Aluminum Alloys: Machinability Aspects And Attainable Accuracy" Transactions of the SME, North American Manufacturing Research Conference, pp. 129-136, **2003**.

23- El-Mounayri, H., Kishawy, H. A., and Deng., H. "An Integrate Approach for Optimized CNC End Milling," Proceedings of the Third Mechanical Engineering Advanced Technology for Industrial Production, METATIP3, pp. 468-476, **2002**.

24- Kishawy, H. A. and El-Wahab, A. I., "New NC routines for quality in pocket machining," Proceedings of the Third Mechanical Engineering Advanced Technology for Industrial Production, METATIP3, pp. 477-484, **2002**.

25- Balihodzic, N., Kishawy, H.A., and Rogers, R.J. "An Analysis of the Machining Process Using a Thermo-Elasto-Viscoplastic Finite Element Model," International Mechanical Engineering Congress and Exposition, IMECE2002/MED, Volume 3, Symposium on Advances to Further the Automation of Metal Cutting, November 17-22, New Orleans, Louisiana, USA, **2002**.

26- Kishawy, H.A., Rogers, R.J., and Balihodzic, N., "A Numerical Investigation of the Chip Tool Interface in Orthogonal Machining," Proc. 5th CIRP International Workshop on Modeling of Machining Operations, pp. 97-107, **2002**. This paper is one of the papers selected by the journal editor to appear in a special issue of the International Journal of Machining Science and Technology.

27- Kishawy, H. A., and Becze, C. E. " Morphology Of Chips Formed During High Speed Milling Of Die And Mold Tool Steel Using Ball End Mills," Transactions of the NAMRI/SME, Volume XXX, pp. 183-190, **2002**.

28- Kishawy and El-Wahab, "An Analysis of the Chip Segmentation Under Adiabatic Shear During High Speed Machining of Difficult-To-Cut Materials," 6th International Conference on Production Engineering and Design for Development, pp. 213-221, **2002**.

29- Kishawy, H. A., and Gerber, A. G., "A Model for the Tool Temperature During Machining With a Rotary Tool," International Mechanical Engineering Congress and Exposition Symposium on Fundamental Issues in Machining, Volume 3, ECE2001/MED-23312, pp. 1-10, **2001.**

30- Kishawy, H. A., Shawky, A. M., and Elbestawi, M. A. "Assessment of Self-Propelled Rotary Tools During High Speed Face Milling," Proceedings of the 4th International Machining and Grinding Conference, SME, Troy, Michigan, May 7-10, **2001**. **"Best Paper" Finalist Award**

31- Kishawy, H. A., EL-Wahab, A. I, and El-Mounayri, H. "On The Effect of Rake Angle and Edge Preparation During Machining: A Finite Element Modeling and Analysis," 7th International Conference on Production Engineering, Design and Control, ASME/CSME, PEDAC-2001. pp. 1045-1055, **2001.**

32- Kishawy, H. A., "On the cutting Temperatures Generated During High Speed Machining," Proceedings of the 18th Canadian Congress of Applied Mechanics, June 3-7, St. John's, Newfoundland, pp. 143-144, **2001**.

33- Kishawy, M. A., and Elbestawi, M. A., "On the Characteristics of Chip Formation in Hard Turning", Seven Int. Symp. On plasticity and its Applications, Cancun, Mexico, pp. 361-365, Jan. 5-13, **1999**.

34- Kishawy, H. A., and Elbestawi, M. A., "Effect of Edge Preparation and Cutting Speed on Surface Integrity of Die Material in High Speed Machining," Int. Mech. Eng. Congress and Exposition, ASME- Winter Annual Meeting, California, pp. 269-276, Nov.14-19, **1998**.

35- Kishawy, H. A., and Elbestawi, M. A., "Effect of Process Parameters on Chip Morphology when Machining Hardened Steel," Int. Mech. Eng. Congress and Exposition, Manufacturing Science and Technology, ASME-MED 6-2, Dallas, Texas, pp. 13-20, Nov. 17-21, **1997**. ***Nominated for the best paper award for 1997 by the ASME***

36- Kishawy, H. A., and Elbestawi, M. A., "On the Mechanics and Properties of Chip Formation During Machining of Hardened Steel," Proceeding of the Int. MATADOR Conference, Manchester, England, pp. 253-258, July 9-10, **1997**.

37- Seif, M. A., Kishawy, H. A., and Hassan, M. A., "An Empirical Formula for Determining Residual Stresses in pipes", SEM Spring conference on Experimental and Applied Mechanics. Bellevue, Washington, Jun. 2-4, **1997**.

Industrial and Research Reports Etc.:

Thakare, S., , Pang, L., and Kishawy, H. A., "Assessment of Self-propelled Rotary Tool During Machining Titanium," Final Machining Study Pratt & Whitney Inc., March, **2006**.

Li, L, Zhang, Y., and Kishawy, H. A., "Assessment of Self-propelled Rotary Tool During Machining Waspaloy and Titanium," Machining Pilot Study Pratt & Whitney Inc., April, **2004**.

Balihodzic, N., Zhu, Y., and Kishawy, H. A., "High Speed Machining of Aluminum Alloys For Automotive Application," AUTO21-Second year first progress report: Chip Morphology Analysis, August, **2002.**

Balihodzic, N., Zhu, Y., and Kishawy, H. A., "High Speed Machining of Aluminum Alloys For Automotive Application: Finite Element Modeling and Chip Morphology Analysis," AUTO21-first year report: Phase 1: Preliminary investigation, April, **2002.**

Invited Lecture at Conferences:

"New Manufacturing Horizons: High Speed Machining and Process Modeling," Presented at ADS-TEXPO, New Opportunities for Aerospace, Defense, and Security in Atlantic Canada, Fredericton, New Brunswick, October 26-28, 2003.

DATE: May 17, 2010

CURRICULUM VITAE

a) NAME:

Barari, Ahmad, assistant professor, untenured
Member of the Graduate Faculty: yes

b) DEGREES: designation, institution, department, year

PhD, The University Of Western Ontario, Dep. of Mech.l & Materials Engineering, 2006
MESc, Sharif University of Technology, Dep. of Mechanical Engineering, 1997
BESc (Hons), Amirkabir University of Technology, Dep. of Mechanical Engineering,1995

c) EMPLOYMENT HISTORY:

July 2010- , Assistant Professor, Faculty of Engineering. & Applied Science / UOIT
May 2010- , Adjunct Professor, Dep. of Mech. & Materials Engineering / UWO
Feb 2010 – July2010, Tenured Lecturer, Faculty of Engineering & Applied Science / UOIT
Jun 2006-Feb 2010, Lecturer , Faculty of Engineering & Applied Science / UOIT
Sep 2006-Dec 2007,Visitor Researcher, Integrated Manuf Technology Institute (IMTI)/NRC
Sep 2002-Dec 2006,Visitor Research, Intelligent Manuf. Systems Centre / U Windsor
Sep 2002-Aug 2006, Research Assistant, Integ. Manuf. Technology Institute (IMTI)/NRC
Sep 2001-Aug 2005, Research Assistant, Dep. of Mech. & Materials Engineering / UWO
Mar 1999-Aug 2001, Manager, Metrology Research Center/ Sharif Univ. of Technology
Jun 1995-Aug 2001, Research Engineer, R&D Dep./ Tehran Scientific & Indus. Services

d) HONOURS:

• First Place Winner, Capstone Project's Academic Advisor, 2010 Ontario Center of Excellence-OCE Connection Competition.
• Second Place Winner, Formula SAE Racing Car's Academic Advisor, 2010 Student Competition, University of Toronto.
• Teaching Excellent Award 2008-2009, Faculty of Engineering & Applied Science, University of Ontario Institute of Technology.
• The Western Engineering Graduate Thesis Research Awards, London, Ontario, Canada, March 2006.
• The best project in HQP competition, Design of Automobile of 2020,AUTO21 third annual scientific conference, Oshawa, Ontario, Canada, June 2005.
• First round winner in the HQP Poster Competition, AUTO21 national project, 2005 HQP conference, Oshawa, Ontario, Canada, May 2005.
• First round winner in the HQP Poster Competition, AUTO21 national project, 2004 HQP conference, sponsored by Daimler-Chrysler Canada, Windsor, Ontario, Canada, May 2004.
• The best Project Display, AUTO21 third annual scientific conference, Montréal, Quebec, Canada, , June 2004.

• First round winner in the HQP Poster Competition, AUTO21 national project, 2003 HQP conference, Oakville, Ontario, Canada, June 2003.
• International Graduate Students Scholarship (IGSS), University of Western Ontario, London, Ontario, Canada, (9/2001 – 9/2005).
• Special University Scholarship (SUS), University of Western Ontario, London Ontario, Canada, (9/2001 – 9/2005).
• Academic Education Scholarship, National Bursary, Masters Program at Sharif University of Technology, Iran, (9/1995-1/1998).
•Academic Education Scholarship, National Bursary, Bachelor Program at Amirkabir University, Iran, (9/1990 – 9/1995).

e) SCHOLARLY AND PROFESSIONAL ACTIVITIES:

• Judging Automotive Engineering Section in Canada-Wide Science Fair 2010, Peterborough (http://www.cwsf2010.ca).
• Organizer of special track in the 2nd CIRP Conference on Assembly Technologies & Systems (CATS 2008), Toronto, Canada, 21-23 September, 2008.
•Organizer of special track in CATS2008 (http://www.uwindsor.ca/cats2008), Toronto, Canada, 21-23 September, 2008.
•Organizer of special session in CARV2007 (http://www.uwindsor.ca/carv2007), Toronto, Canada, 22-24 July, 2007.
• Organizer of special session in FAIM2007 (http://www.ssglobal.org/faim2007), Philadelphia, USA, 18-20 June, 2007.
•Research Project, Integrated Manufacturing Technology Institute (IMTI), National Research Council Canada (June 2006), “Closed-loop inspection & machining for fabrication of dies and tools”.
• Research Project, Intelligent Manufacturing Systems (IMS), University of Windsor (August 2004), “Hybrid Measurement Systems”.
•Reviewer for International Journal of Vehicle Design.
•Reviewer for International Journal of Engineering with Computers.
•Reviewer for Journal of Machine Tools and Manufacture.
•Reviewer for Journal of Machining Science and Technology.
•Invited Lecture, Intelligent Manufacturing Systems (IMS), University of Windsor (July 2001), “Optimum Slicing of Solid Models Rapid Prototyping”.
• Invited Lecture, Intelligent Manufacturing Systems (IMS), University of Windsor (August 2004), “Hybrid Measurement Systems”.
• Invited Lecture, Integrated Manufacturing Technology Institute (IMTI), National Research Council Canada (June 2006), “Closed-loop inspection & machining for fabrication of dies and tools”.
• Industrial Consulting in design, prototyping, test and production planning of reconfigurable manufacturing cells (1996-2000), for TAC-CUT Co. Ltd., Tehran, Iran. Industrial Machining stations including Drilling, Tapping and indexing units were developed in this group of projects based on the ISO standard to be utilized in Reconfigurable Manufacturing Systems.
• Design and manufacturing consulting for auto-industry sectors (1995-2001), for Tehran Scientific & Industrial Services, Tehran, Iran. Projects in quality enhancement of Automotive industries and suppliers, reverse engineering of automotive parts and assemblies, research & development of design and manufacturing methodologies for auto-industries, strategic planning for tire one auto-industries, developing and presenting workshops & training courses.

f) GRADUATE SUPERVISIONS:

In progress: 2 MA

g) GRADUATE COURSES:

2009 Advanced Engineering Design

Directed Studies:

h) 1. EXTERNAL RESEARCH FUNDING: past 7 years only, by year, indicating source (granting councils, industry, government, foundations, other); amount; principal investigator; purpose (research, travel, publications, etc...)

Year	Source	Type*	Amount per year	Purpose**
2009	Ontario Center of Excellence (Design Optimization of a Stirling Engine)	G	$3,000	Research
2009	Ontario Center of Excellence (Design of Formula SAE Racing Car Employing Automated-Adjustable Aerodynamic System)	G	$3,500	Research
2009	Ontario Center of Excellence (Enhancing the Mechanical Properties of Composite Automotive Body and Structure)	G	$6,000	Research

*Type: C-Granting councils; G-Government; F-Foundations; O-Other
** Purpose: research, travel, publication, etc.

2. INTERNAL RESEARCH FUNDING:

2010-2012 University start up research fund $40,000

i) PUBLICATIONS:

1) Life-time summary (count) according to the following categories:

Books authored .....
Books edited.....1
Chapters in books.....2
Papers in refereed journal 8
Papers in refereed conference proceedings.....12
Technical reports.....2
Abstracts and/or papers read 4
Others (workshops presented) 2

Details:

Books edited:

1. Ahmad Barari, Concurrent Engineering and Design, McGraw Hill, 2008, ISBN: 9780070262187, 480 pp.

Chapters in Books:

1. Barari A., and ElMaraghy H. A, 2006, “Manufacturing driven design of sculptured surfaces”, Advances in Design, Springer-Verlag, Edited by: W.A. ElMaraghy, Germany ISBN 1-84628-004-4, pp. 523-534.
2. Barari A., ElMaraghy H. A., Knopf G. K., “Evaluation of geometric deviations in sculptured surfaces using probability density estimation”, Models for Computer Aided Tolerancing in Design and Manufacturing, Edited by: J. Davidson, Springer Netherlands, ISBN 978-1-4020-5437-2, pp.135-146.

Papers in Refereed Journals:

1. Barari, A., Pop-Iliev R., “Reducing Rigidity by Implementing Closed-Loop Engineering in Adaptable Design and Manufacturing Systems”, Journal of Manufacturing Systems, 28 (2009), pp. 47-54, DOI information: 10.1016/j.jmsy.2009.04.003.
2. Barari, A., ElMaraghy H. A., ElMaraghy W. A., “Design For Machining of Sculptured Surfaces - A Computational platform”, ASME Transaction- Journal of Computing and Information Science in Engineering , Volume 9, Issue 3, June 2009 , 13 pages.
3. Barari, A., ElMaraghy H. A., P. Orban, “NURBS Representation of Actual Machined Surfaces”, International Journal of Computer Integrated Manufacturing, Volume 22, Issue 5, May 2009, pp 395 - 410.
4. Barari, A., ElMaraghy H. A., Knopf G. K. 2007, “Search - Guided sampling to reduce uncertainty of minimum zone estimation”, ASME Transaction- Journal of Computing and Information Science in Engineering, Volume 7, Issue 4, pp .360-371.
5. ElMaraghy H. A., Barari, A., Knopf G. K., 2004, “Integrated inspection and machining for maximum conformance to design tolerances”, CIRP Annals-Manufacturing Technology, vol. 53, no 1, pp 411-416.
6. Barari, A., “Automotive- Body Inspection Uncertainty Due to Computational Complexity”, International Journal of Vehicle Design, (submitted, November 2009), IJVD-12001.
7. Eberle, G., Barari, A., “Design and Optimization of an Auto-Body Door Using a Structurally Reinforced SMC Composite Based on Finite Element Analyses”, International Journal of Vehicle Design, (submitted, October 2009), IJVD-11583.
8. Barari, A., “Inspection of the Machined Surfaces Using Manufacturing Data”, Journal of Engineering Manufacture, (submitted, July 2010).

Papers in Refereed Conference Proceedings:

1. Platanitis, G., Pop-Iliev, R., Barari, A., 2010, “Comprehensive Use of a DSM-Based Methodology in an Academic Setting” , International Design Conference - DESIGN 2010, May 17 - 20, Dubrovnik - Croatia.
2. Platanitis, G., Barari, A., Pop-Iliev, R., 2010, “Introducing Design Rigidity to Model Unexpected Disturbances In a DSM-Based Design Process”, ASME 2010 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference- IDETC/CIE 2010, August 15-18, Montreal, Quebec - Canada.
3. Barari, A., 2010, “CAM-Based Inspection of Machined Surfaces”, 5th International Conference on Advances in Production Engineering- APE2010, 17 – 19 June 2010, Warsaw, Poland.

4. Platanitis, G., Pop-Iliev, R., Barari, A., 2009, “A DSM-based Method for Investigating the Impact of Random Disturbances on the Outcome of a Design Project”, Proceeding of 11th International Design Structure Matrix Conference (DSM 09), 12 – 13 OCTOBER 2009, Greenville, South Carolina, USA.
5. Barari, A., 2009, “Misinterpretation of Geometric Dimensioning and Tolerancing in Coordinate Metrology”, Electronic proceeding of 11th International CIRP Conference on Computer Aided Tolerancing - Geometric Variations within Product Life Cycle Management (CAT2009), March 2009, Annecy, France.
6. Barari, A., Pop-Iliev R., 2009, “Integration of Design Tolerance Analysis and Statistical Production Control in the Product Lifecycle Management”, Electronic proceeding of 11th International CIRP Conference on Computer Aided Tolerancing - Geometric Variations within Product Life Cycle Management (CAT2009), March 2009, Annecy, France.
7. Barari, A., 2008, “Sources of Uncertainty in Coordinate Metrology of Automotive Body”, CD Proc. of 2nd CIRP International Conference on Assembly Technologies and Systems (CATS 2008), Toronto, Canada.
8. Barari, A., Pop-Iliev R., 2007, “Closed-Loop Engineering in Adaptable Design and Manufacturing Systems”, CD Proc. of 2nd International Conference on Changeable, Agile, Reconfigurable and Virtual Production (CARV 2007), Toronto, Canada.
9. Barari A., and ElMaraghy H. A., 2005, “Manufacturing driven design of sculptured surfaces”, 15th CIRP International Conference in Design, Egypt, pp. 523-534.
10. Barari A., ElMaraghy. H. A., and Knopf G. K., 2005, “Evaluation of geometric deviations in sculptured surfaces using probability density estimation”, CD Proc. of 9th CIRP International Seminar on Computer Aided Tolerancing (CAT2005), Tempe, Arizona, USA.
11. Barari A., ElMaraghy H. A., Knopf G. K., and Orban P., 2004, “Integrated inspection and machining approach to machining error compensation; Advantages and limitations”, The 14th International Conference on Flexible Automation & Intelligent Manufacturing, Toronto, Canada, pp. 563-572.
12. ElMaraghy H. A., Barari, A., Knopf G. K., 2004, “Integrated inspection and machining for maximum conformance to design tolerances” 54th CIRP General Assembly, Krakow, Poland.

DATE: 14-July-2010

Curricula Vitae

Program: Electrical and Computer Engineering July 2008

CURRICULUM VITAE

a) NAME:

BENNETT, James Michael (former) Associate Dean of Engineering, Professor Emeritus (Computer Science, UWO)
Member of the Graduate Faculty: yes

b) DEGREES:

PhD, Mathematics (pure), University of Western Ontario	1972
MA, Mathematics and Computing, University of Western Ontario	1965
BS, Engineering Physics, Queen's University	1962

c) EMPLOYMENT HISTORY:

2008-VII-01	Associate Dean, FEAS
2005-IX-01 to 2008-VI-30	Director of Programs; EE and SE, UOIT
2003-04	Visiting Professor, University of Ottawa
2003-VII to 2006-VI	Adjunct Professor, ECE, UWO
2001	Sessional Professor, IMPAC U (Punta Gorda FL)
2001 to 2005	Program Director, Software Engineering
2000-07 to date	Professional Engineer, Province of Ontario
1999-2001	Associate Chair, Software Engineering Department of Electrical and Computer Engineering The University of Western Ontario
1997-1998	Adjunct Professor, Department of Electrical Engineering, The University of Western Ontario
1996 to date	Professor Emeritus, Department of Computer Science The University of Western Ontario
1991 - 2003	Sessional Lecturer, The University of Ottawa
1975 - 1996	Associate Professor with Tenure, Department of Computer Science, The University of Western Ontario
1991	Visiting Scholar, Centre for Advanced Studies, IBM Toronto Research Laboratory
1987	Senior Industrial Scientist, GEAC Computers Ltd., Markham, Ontario
1979 - 1980	Visiting Research Scientist, RECAU, The University of Aarhus, Denmark
1976 - 1977	Invited Associate Professor, Department of Computer Science, The University of Aarhus, Denmark
1972 - 1975	Assistant Professor, Department of Computer Science, The University of Western Ontario

1970 - 1972	Lecturer, Department of Computer Science, The University of Western Ontario
1963 - 1970	Software Supervisor, Computing Centre, The University of Western Ontario
1965 - 1970	Lecturer (part-time), Department of Computer Science, The University of Western Ontario
1963 - 1965	Instructor, Department of Computer Science, The University of Western Ontario
1962 - 1963	Geophysicist, Shell Oil Company, Edmonton, Alberta

c) HONOURS:

PMP conferred, August, 2004
P. Eng. Conferred, July, 2000
Invited participant to the Microsoft Faculty Summit in Redmond WA, July 28-31, 2002
Invited participant to the Microsoft Faculty Summit in Redmond WA, July 22-25, 2001

e) SCHOLARLY AND PROFESSIONAL ACTIVITIES:

2008-2010 Associate Dean of Engineering
2006-2008 Director of Electrical and Software Engineering, UOIT
2006 Currently directing CEAB certification process for 7 programs at UOIT
2004 CEAB Pre-Program Evaluator (Software Engineering) Laval University
2003/4 Invited Lecturer, Motorola University, Project Management, Toronto
2003 Invited Participant, Microsoft Faculty Summit, Redmond WA
2002 Invited Participant, Microsoft Faculty Summit, Redmond WA
2001 Microsoft Research Collaboration Visit, March 2001, Redmond WA
2001 CEAB Program Evaluator (Software Engineering) McMaster University
2002 CEAB Pre-Program Evaluator (Software Engineering) Ottawa University,
2005 Trial Assessor for SE Program at Laval
1999 Designed Masters Certificate Program Curriculum for IT Professionals (University of Ottawa)
1998-2003 UWO Software Engineering Program Design and Development

f) GRADUATE SUPERVISIONS:

Completed: 27 M.A., 2 Ph.D.

g) GRADUATE COURSES:

ENGR 5005 Special Topics (Project Management for Engineers)
EP 704 – Project Management for Nuclear Engineers (UNENE Masters Programme for Nuclear Engineers)
ECE598 – Advanced Project Management (UWO)
ECE590 – Software Engineering for non-Software Engineers (UWO)
EMP5117 - Software Engineering for non-Software Engineers (UofO)

MIS600 - Management Information Systems (IMPAC U)
ECE553B - Software Quality (UWO)

h) 1. EXTERNAL RESEARCH FUNDING: p

Year	Source	Type*	Amount per year	Purpose**
2002	Microsoft Grant "C# and .NET Laboratories"	O	$51,000.00	

2. INTERNAL RESEARCH FUNDING:

1999-01	Start-up grant, Software Engineering	O	$20,000.0	

i) PUBLICATIONS:
1) Life-time summary

- Books authored 1
- Chapters in books 0
- Papers in refereed journal 5
- Papers in refereed conference proceedings. 32
- Technical reports 20
- Abstracts and/or papers read 0
- Others (standards contributions) 12

2) Details for past seven (7) years. None.

CURRICULUM VITAE

a) NAME:

George Platanitis, Ph.D, P.E.

b) DEGREES:

Ph.D, Aerospace Engineering, Texas A&M University, College Station, TX, 2003.

M.S., Aerospace Engineering and Mechanics, University of Minnesota, Minneapolis, MN, 1999.

B.S., Engineering Physics (Mechanical Option), Queen's University, Kingston, ON, 1997.

c) EMPLOYMENT HISTORY:

Design Lecturer/Engineer, Faculty of Engineering and Applied Science, University of Ontario Institute of Technology, Oshawa, ON.

- Prepared and delivered course material for Engineering Design core courses (first-year Engineering Graphics and Design and third-year Computer-Aided Design).
- Supervised and directed teaching assistants for associated laboratory and tutorial sessions in core Engineering Design courses of responsibility.
- Developed methodologies in Engineering Design, including delivery of teaching material, for improving Engineering Design curriculum. Includes creation of mini design projects for Unigraphics NX6 software and design evaluation methods.

2005-2006
Research Assistant Professor, Department of Aerospace and Mechanical Engineering, University of Arizona, Tucson, AZ.

1999-2003
Graduate Assistant, Research, Department of Aerospace Engineering, Texas A&M University, College Station, TX.

1998 (Summer)
Student Aide, Controls & Navigation Department, Honeywell Technological Center, Minneapolis, MN.

1997-1999
Teaching Assistant, Department of Aerospace Engineering and Mechanics, University of Minnesota, Minneapolis, MN.

1997 (Summer)
Summer Intern, Support Engineering Department, Menasco Aerospace, Ltd., Oakville, ON.

e) SCHOLARLY AND PROFESSIONAL ACTIVITIES:

Affiliations
American Institute of Aeronautics and Astronautics (AIAA)
Canadian Aeronautics and Space Institute (CASI)

PUBLICATIONS:

Krashanitsa, R., Platanitis, G., Silin, B., and Shkarayev, S., "Autopilot Integration into Micro Air Vehicles," Chapter 3 in *Introduction to the Design of Fixed-Wing Micro Air Vehicles, Including Three Case Studies (AIAA Education Series)*, 2007, pp. 109-149.

Platanitis, G. and Strganac, T.W., "Suppression of Control Reversal Using Leading and Trailing Edge Control Surfaces", *Journal of Guidance, Control and Dynamics***,** Vol. 28, No. 3, May-June 2005, pp. 452-460.

Platanitis, G. and Strganac, T., "Control of a Nonlinear Wing Section Using Leading- and Trailing-Edge Surfaces," *AIAA Journal of Guidance, Control, and Dynamics,* Vol. 27, No. 1, January-February 2004, pp. 52-58.

Conference Papers

Platanitis, G., Barari, A., and Pop-Iliev, R., "Introducing Design Rigidity to Model Unexpected Disturbances in a DSM-Based Design Process," *Proceedings of the ASME 2010 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE)*, Montreal, QC, August 15-18, 2010. Paper No.: IDETC/DTM2010-28218.

Platanitis, G. and Pop-Iliev, R., "Early Introduction of Robust Design into the Engineering Curriculum," *Proceedings of the ASME 2010 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE)*, Montreal, QC, August 15-18, 2010. Paper No.: IDETC/DEC2010-28221.

Platanitis G. and Pop-Iliev, R., "Implementing Closed-Loop Control in an Engineering Design Process in the Presence of Uncertainties," *Canadian Engineering Education Association (CEEA) – First Annual Conference,* Kingston, ON, June 7-9, 2010.

Platanitis G., Pop-Iliev, R., and Barari, A., "Comprehensive Use of a DSM-Based Methodology in an Academic Setting," *International Design Conference (Design 2010),* Dubrovnik, Croatia, May 17-20, 2010. Paper No.: 273.

Platanitis G., Pop-Iliev, R., and Barari, A., "A DSM-Based Method for Investigating the Impact of Random Disturbances on the Outcome of a Design Project," *11th International Design Structure Matrix Conference (DSM'09)*, Greenville, SC, October 12-13, 2009. Paper No.: 109.

Platanitis, G., Pop-Iliev, R., and Nokleby, S., "Implementation and Effect of Rubrics in Capstone Design Courses," *Proceedings of the ASME 2009 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE)*, San Diego, CA, August 30-September 2, 2009. Paper No.: DETC2009-86996.

Platanitis, G. and Pop-Iliev, R., "Design-Build Project Approach in a First Year Engineering Design Course," *The Sixth International Conference on Innovation and Practices in Engineering Design and Engineering Education (CDEN/C^{2}E^2)*, Hamilton, ON, July 27-29.

Platanitis, G. and Pop-Iliev, R., "Implementing Mini Design Projects to Maximize the Quality of Design-Build Term Project Student Work," *Proceedings of the ASME 2008 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE)*, New York, NY, August 3-6. Paper No.: DETC2008-49816.

Pop-Iliev, R., Nokleby, S., and Platanitis, G., "Evaluating the Impact of Tablet Computers on Design Engineering," *5th CDEN/RCCI International Design Engineering Conference*, Halifax, NS, July 27-29, 2008.

Platanitis, G. and Pop-Iliev, R., "Quantifying the Relative Difficulty of Design Engineering Term Projects," *5th CDEN/RCCI International Design Engineering Conference*, Halifax, NS, July 27-29, 2008.

Pop-Iliev, R. and Platanitis, G., "Training Well-Equipped Design-Ready Engineering Professionals," *9th International Conference on Engineering and Product Design Education*, Northumbria University, Newcastle Upon Tyne, UK, September 13-14, 2007. Paper No.: EPDE07/022.

Platanitis, G. and Pop-Iliev, R., "Assessment and Evaluation of Undergraduate Design Engineering Projects," *Proceedings of the ASME 2007 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE)*, Las Vegas, NV, September 4-7, 2007. Paper No.: DETC2007-35383.

Krashanitsa, R., Platanitis, G., Silin, B., and Shkarayev, S., "Aerodynamics and Controls Design for Autonomous Micro Air Vehicles," *AIAA Atmospheric Flight Mechanics Conference and Exhibit*, Keystone, Colorado, August 21-24, 2006. Paper No.: AIAA-2006-6639.

Platanitis, G. and Shkarayev, S., "Integration of an Autopilot for a Micro Air Vehicle," *Infotech@Aerospace*, Arlington, Virginia, September 26-29, 2005. Paper No.: AIAA-2005-7066.

Platanitis, G. and Strganac, T., "Analyses and Experiments of Suppression of Control Reversal Using a Wing Section with Multiple Control Surfaces," *44th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*, Norfolk, Virginia, April 7-10, 2003. Paper No.: AIAA-2003-1488.

Platanitis, G. and Strganac, T., "Control of a Wing Section With Structural Nonlinearities Using Leading and Trailing Edge Control Surfaces," *43rd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*, Denver, Colorado, April 22-25, 2002. Paper No.: AIAA-2002-1718.