

Fanshawe College

FIRST: Fanshawe Innovation, Research, Scholarship, Teaching

Documentation (Approvals etc...)

Applied Mechanical Design

2016

FANS-04012-Applied Mechanical Design CVS Application - non-funded

Fanshawe College

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G. PROGRAM DESCRIPTION (APPENDIX B)

Program Description

Provide a brief description of the program, similar to what might be used as, or found in, advertising or a calendar description.

This graduate certificate program provides engineering students with expertise in the design of machines and products, production planning and quality control in the advanced engineering sector with special consideration towards sustainable design. Graduates gain the necessary experience and knowledge to conduct the analysis and design of mechanical systems within an advanced manufacturing environment.

The program includes two terms of course work, the second of which involves a capstone project. The curriculum includes courses on Mechanical Design, Manufacturing processes, Material Sciences and Advanced Quality Systems management. Topics concerning the business and economics of manufacturing will be explored to provide a framework for the design of safe and sustainable mechanical components, devices and systems.

Laddering Opportunities

Provide a brief description of known laddering into and from the proposed program, e.g. certificate to diploma, diploma to degree, apprenticeship to college, diploma to apprenticeship, college to college, diploma to college degree, etc.

Graduates from a diploma or degree related to Mechanical Engineering or Mechanical Design would be eligible to apply the proposed "Advanced Mechanical Design" program. Students who have successfully completed first, second or third Year of Mechanical Engineering at a Canadian Engineering Accreditation Board approved Canadian University or equivalent international credentials may also apply.

Occupational Areas

Provide a brief description of where it is anticipated graduates will find employment.

Graduates are prepared for employment in the field of mechanical design, research and development, CAD operations, equipment installation and testing, production-related areas in roles such as:

- Mechanical designer
- Tool designer
- Product development and testing
- Process planner/co-ordinator
- Quality assurance/control specialist
- Technical sales and support representative
- CAD specialist
- Co-ordinate measuring machine (CMM) programmer/operator



Proposed Program Vocational Learning Outcomes

Provide the list of the proposed program vocational learning outcomes. These outcomes should be listed, verbatim as they appear in Appendix A- Form 1.

The graduate has reliably demonstrated the ability to:

1. Develop design solutions for mechanical problems utilizing complex engineering principles and practices.
2. Analyze and synthesize technical data to develop graphics and related technical documents conforming to engineering standards.
3. Select and manage appropriate hardware and software used in the creation of engineering designs.
4. Develop engineering designs utilizing a combination of principles and knowledge of manufacturing processes and engineering methods.
5. Determine reliability and quality control measures and procedures to evaluate and manage advanced manufacturing and mechanical design processes and systems.
6. Incorporate sustainable, economic, ergonomic, safe and ethical approaches into design projects.
7. Plan, implement and manage mechanical engineering design projects in response to stakeholder and industry needs and requirements.
8. Design experiments that evaluate fit, form and function of critical components utilizing principles of statistical process control and finite element analysis.
9. Communicate clearly and concisely in written, graphic and spoken form using appropriate vocabulary and formats for professional engineering projects.

Admission Requirements

Identify the Admission Requirements for the program.

A two- or three-year diploma or a degree in mechanical or manufacturing engineering from a recognized college or university or equivalent work experience in a related field. Or an equivalent qualification from another institution as judged by the College. Or a combination of relevant education and work experience in a related field as judged by the College to be equivalent to the above

English Language Requirements

Applicants whose first language is not English will be required to demonstrate proficiency in English by one of the following methods:

- A Grade 12 College Stream or University Stream English credit from an Ontario Secondary School, or equivalent, depending on the program's Admission Requirements
- Test of English as a Foreign Language (TOEFL) test with a minimum score of 570 for the paper-based test (PBT), or 88 for the Internet-based test (iBT), with test results within the last two years
- International English Language Testing System (IELTS) test with an overall score of 6.5 with no score less than 6.0 in any of the four bands, with test results within the last two years OR an IELTS test with an overall score of 6.0 with no score less than 5.5 in any of the four bands, with test results within the last two years, may be considered when the applicant has an overall average of 60% or above in the qualifying diploma or degree



- Canadian Academic English Language (CAEL) test with an overall score of 70 with no score less than 60 in any of the four bands, with test results within the last two years
- An English Language Evaluation (ELE) at Fanshawe College with a minimum score of 75% in all sections of the test, with test results within the last two years



H. PROGRAM CURRICULUM (APPENDIX C)

Semester	Course Code/ Course Title <i>(As indicated in Appendix A)</i>	General Education Course <i>(indicate with an X)</i>	Total Course Hours	Course Description
1	COMM-6027 Industrial Communications		45	This course focuses on written and verbal communication skills. Students learn to prepare a variety of professional documents. In addition, students learn about research methods and documentation formats. The principles of effective writing – organization, grammar, style, clarity, and tone – are reinforced throughout the course. Students will also practice oral communication skills in a variety of situations. The goal of the course is to prepare students for the communication tasks and considerations they will encounter in the workplace and/or future education in order to meet the needs of employers and/or the communities they will serve.
1	MECH-XXXX SPC, Metrology &GD&T		90	This course concentrates on advanced Statistical Quality Control, the collection of data using advance technologies through metrology for reverse engineering and advance application of geometric dimensioning and tolerances (GD&T) on engineering drawings. Non-Destructive Testing methods will be examined in theory and implemented through practical experiments.
1	MATH-XXXX Mathematics		45	This course introduces the student to the concepts and methods of design of experiments. Statistical methods applicable to the engineering analysis of process control are taught. This course also provides the foundation for Finite Element Analysis and advanced quality systems courses in the later



				semester.
1	MECH-XXXX Design 1		60	The analysis of physical properties of components including Machine Components (pulleys, belts, gears, bearings, bushings), bolts, fasteners, and fits & clearances used in Manufacturing. Students will make design decisions with considerations of engineering economics, ergonomics, ethics, sustainability, construction and safety.
1	MECH-XXXX Advanced Modeling		60	An advanced modeling course using state-of-the-art parametric modeling software. Students will develop and troubleshoot complex 3D solid and surface models, assemblies and drawings. Students will be introduced to surface modeling and design sheet metal and parts development with real life designs. Advance parametric modeling, configuration management, troubleshooting model history, parent/child relationships, parametric constraints & relations, use of modeling, surfacing and assembly tools.
2	MECH-XXXX Finite Element Analysis		45	The course introduces the fundamentals of finite element method for the analysis of engineering problems with emphasis on solid mechanics and stress analysis. Finite element methods and solution procedures for linear (static) finite element analysis are presented with emphasis on real life problems. The importance of proper mathematical model, discretization techniques, derivation of stiffness matrix, and element selection criteria is emphasized. Students will learn how to apply and understand boundary conditions, applied loads and proper interpretation of the results. Commercial finite element software is used to perform stress analyses on two and three dimensional structures or components.



2	MECH-XXXX Design 2		90	Continuing from Design 1 students will create advance CAD models and assemblies incorporating surface modeling, solids, drawings and assembly animation including safety requirements. Students will utilize 3D scanning/printing, library components and reverse engineering practices as it relates to system design. (Lecture 2 hr. + 4 Lab)
	MECH-XXXX Advanced Theory of Mechanical Design		45	This course covers mechanical design of members that are subjected to a variety of load types (axial, torsional and bending) using appropriate failure theories. Static and dynamic loads (fatigue) are considered. Welded and threaded fasteners are included. In addition, there is a descriptive introduction to finite element analysis. Design projects are included.
2	COMM-6028 Project Communications		45	Students will prepare interim reports, submit final project documentation and present the results of their practical field project to peers using effective written and oral communication strategies. Students will examine the values, customs and communication styles of cultural groups, with an emphasis on implications for business. An understanding of different cultures and cross-cultural challenges will provide students with a framework for professional conduct and international business communications.
2	MECH-XXXX Advanced Quality Systems		45	This course provides advanced coverage of quality control concepts. Reliability of both cycle-dependant and time-dependent operations are introduced and the parameters such as failure-rate, mean time to failure, mean downtime, availability etc. used in reliability evaluation are defined.



				Reliability for systems of components in both active in both active and redundant configuration is determined. Availability is determined for restorable systems. Techniques of risk assessment such as FMEA, Fault-Tree Analysis, Ishikawa Diagrams, and Minimum-cut Sets are introduced.
2	MGMT-XXXX Capstone Project		30	In this course, students will work in teams to plan, implement and evaluate industry related projects that integrate key concepts of mechanical design development. Working collaboratively, students will conduct background research and explore engineering concepts to develop a fully detailed functional design. The project will include documentation of results according to industry accepted standards and ethical principles. Problem solving, communication and time management skills will be emphasized.

Add additional rows as required to complete the curriculum chart.