University of Ontario
INSTITUTE OF TECHNOLOGY

Master of Applied Science and Master of Engineering

in Electrical and Computer Engineering

Submission to the Ontario Council on Graduate Studies June 2006

Appraisal Brief

UNIVERSITY OF ONTARIO

INSTITUTE OF TECHNOLOGY

Brief for the Appraisal
of the
MASc and MEng
in
Electrical and Computer Engineering

Submitted to the

Ontario Council on Graduate Studies

June 22, 2006

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VOLUME I: THE PROGRAM

1 INTRODUCTION

1.1 Brief listing of programs

The master's programs lead to the degrees of Master of Applied Science (MASc) or Master of Engineering (MEng) in Electrical and Computer Engineering. The MASc program will consist of courses and a thesis. The MEng program will however have two options: MEng-Project which will consist of a combination of courses and a project and MEng-Course which will consist of only courses.

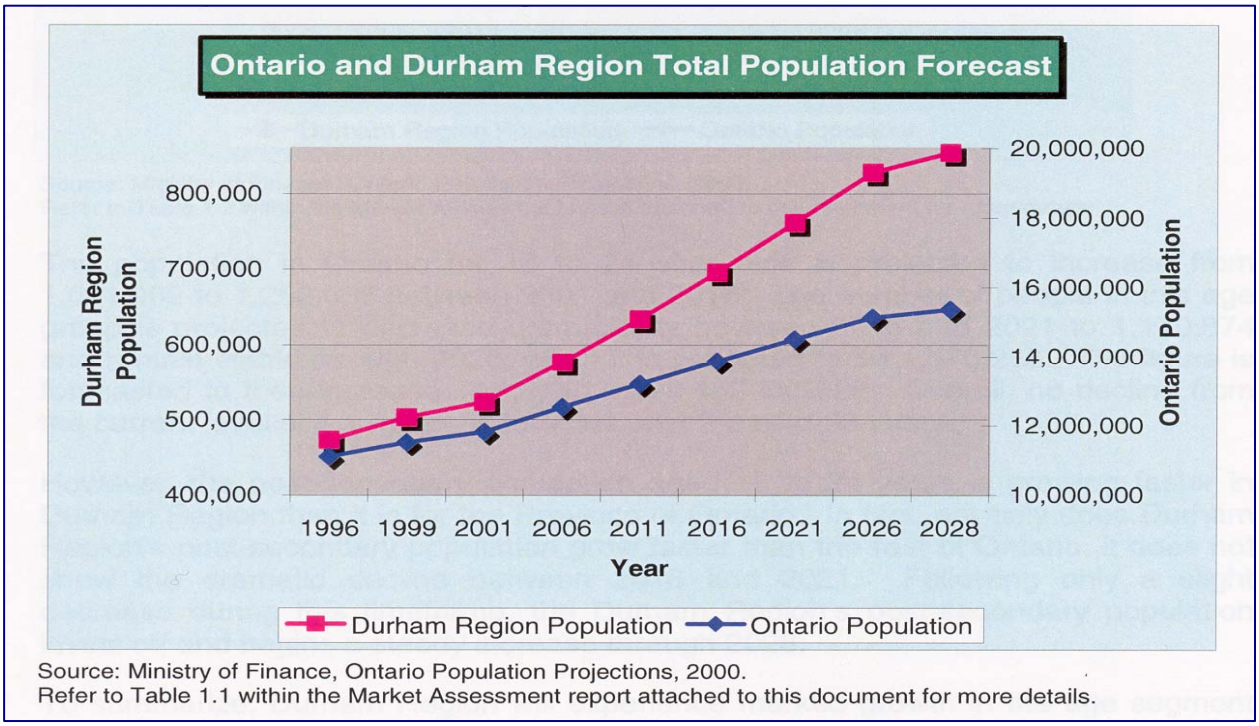
The master's programs are new programs to be offered at the University of Ontario Institute of Technology (UOIT). The programs are planned to be launched in September 2007, following all necessary approvals obtained by the Faculty of Engineering and Applied Science and its affiliated School of Energy Systems and Nuclear Science.

Brief History of UOIT

The Bill 109, an Act to establish the University of Ontario Institute of Technology, was passed by the Ontario Legislature on June 27, 2002, and the University of Ontario Institute of Technology became Canada's newest university, when it took in its first undergraduate engineering students in the fall of 2003.

The underlying reasons why a university was created in the Durham region are highlighted in Figure 1.1, which presents the significant growth in the Durham region population, and in Table 1.1, which shows the significant lack of university graduates in the Durham region, vis-à-vis the other regions of Ontario.

Figure 1.1 – Ontario and Durham Region Total Population Forecast



Source: Ministry of Finance, Ontario Population Projections, 2000.
Refer to Table 1.1 within the Market Assessment report attached to this document for more details.

Table 1.1 – Statistics on University Participation in Various Regions of Ontario

Municipality	University Participation (%)	College Participation (%)	Combined (%)
Provincial high : Ottawa-Carleton	46.5	7.4	53.9
Regional Mun. of Toronto	42.1	7.3	49.4
York Region	37.3	6.0	43.4
Peel Region	26.8	7.1	33.9
Halton Region	26.7	7.2	33.9
Durham Region	21.6	9.2	30.8

Engineering and graduate programs at UOIT

Undergraduate engineering degrees at UOIT are offered by both the Faculty of Engineering and Applied Science and its affiliated School of Energy Systems and Nuclear Science. The Faculty of Engineering and Applied Science first offered an undergraduate program in Manufacturing Engineering and the School of Energy Systems and Nuclear Science first offered an undergraduate program in Nuclear Engineering, both in the fall of 2003.

In the fall of 2004, the Faculty of Engineering and Applied Science added an undergraduate program in Mechanical Engineering. In the fall of 2005, the Faculty of Engineering and Applied Science added undergraduate programs in Automotive, Electrical, and Software Engineering. UOIT offered its first master's program – Master of Information Technology Security (MITS) – in September 2005. UOIT's Master of Applied Science (MASc) and Master of Engineering (MEng) programs in Mechanical Engineering and its Master of Science (MSc) in Modelling and Computational Science have been approved to commence by the Ontario Council on Graduate Studies. The MASc and MEng programs are expected to begin in September 2006, while the MSc program is expected to start in January 2007. With the rapid growth and success of the undergraduate engineering programs and graduate programs at UOIT, the Faculty of Engineering and Applied Science are ready and able to expand their graduate programs by offering MASc and MEng programs in Electrical and Computer Engineering in September 2007. Table 1-2 summarizes the details of the graduate programs at UOIT.

Table 1-2 – UOIT Graduate Programs

Graduate Program	**Status**
Master of Information Technology Security	Was launched in September 2005
MASc and MEng in Mechanical Engineering	Planned for September 2006
MSc in Modelling and Computational Science	Planned for September 2006
MASc and MEng in Electrical and Computer Engineering	Planned for September 2007

Gradate engineering programs in Ontario

As of fall 2005, in Ontario there were 15 universities offering graduate programs in engineering. Table 1-3 lists the universities offering graduate programs in engineering.

Table 1-3 – Graduate Engineering Programs in Ontario as of 2005

University	Programs	Degrees
Brock University	Geological Engineering	MSc
Carleton University	Civil Engineering[1]	MASc/MEng/PhD
	Electrical Engineering[1]	MASc/MEng/PhD
	Environmental Engineering[1]	MASc/MEng/PhD
	Geological Engineering[1]	MSc/PhD
	Mechanical & Aerospace Engineering[1]	MASc/MEng/PhD
	Software Engineering ConGESE[2]	MEng
	Telecommunications Technology Management	MEng
University of Guelph	Engineering	MEng/MSc/PhD
Lakehead University	Environmental Engineering	MSc
	Engineering (Control)	MSc
	Geological Engineering	MSc
Laurentian University	Mineral Resources Engineering	MASc/MEng
	Geological Engineering	MSc/PhD
McMaster University	Chemical Engineering	MASc/MEng/PhD
	Civil Engineering	MASc/MEng/PhD
	Design & Manufacturing[3]	MEng
	Electrical & Computer Engineering	MASc/MEng/PhD
	Engineering Physics	MEng/PhD
	Geological Engineering	MSc/PhD
	Materials Science & Engineering	MASc/MSc/PhD
	Mechanical Engineering	MASc/MEng/PhD
	Software Engineering	MASc/MEng/PhD
University of Ontario Institute of Technology	Mechanical Engineering (planned for 2006)	MASc/MEng
University of Ottawa	Chemical Engineering	MASc/MEng/PhD
	Civil Engineering[1]	MASc/MEng/PhD
	Electrical Engineering[1]	MASc/MEng/PhD
	Engineering Management	MEng
	Environmental Engineering[1]	MASc/MEng/PhD
	Geological Engineering[1]	MSc/PhD
	Mechanical & Aerospace Engineering[1]	MASc/MEng/PhD
	Software Engineering ConGESE[2]	MEng
Queen's University	Chemical Engineering	MEng/MSc/PhD
	Civil Engineering	MEng/MSc/MSc(Eng)/PhD
	Design & Manufacturing[3]	MEng
	Electrical & Computer Engineering	MEng/MSc/MSc(Eng)/PhD
	Geoengineering[4]	MSc/MScE/PhD
	Materials & Metallurgical Engineering	MEng/MSc/MSc(Eng)/PhD
	Mechanical Engineering	MEng/MSc/MSc(Eng)/PhD
	Mining Engineering	MEng/MSc/MSc(Eng)/PhD
Royal Military College of Canada	Chemistry & Chemical Engineering	MSc/MEng/PhD
	Civil Engineering	MEng/PhD
	Defence Engineering & Management	MDEM
	Electrical & Computer Engineering	MEng/PhD
	Mechanical Engineering	MASc/MEng/PhD

Ryerson University	Chemical Engineering	MASc/MEng
	Civil Engineering	MASc/MEng/PhD
	Electrical & Computer Engineering	MASc/MEng/PhD
	Elect. & Comp. Eng. – Computer Networks	MASc/MEng
	Environmental Applied Science & Management	MASc
	Mechanical Engineering	MASc/MEng/PhD
University of Toronto	Aerospace Science & Engineering	MASc/MEng/PhD
	Biomedical Engineering	MASc/PhD
	Chemical Engineering & Applied Chemistry	MASc/MEng/PhD
	Civil Engineering	MASc/MEng/PhD
	Clinical Biomedical Engineering	MHSc
	Design & Manufacturing[3]	MEngDM
	Electrical & Computer Engineering	MASc/MEng/PhD
	Engineering & Management	BASc/MBA
	Environmental Engineering[5]	MASc/MEng/PhD
	Environmental Studies[5]	MASc/MEng/PhD
	Geological Engineering	MASc/MSc/PhD
	Integrated Manufacturing[5]	MEng
	Knowledge Media Design[5]	MASc/PhD
	Materials Science & Engineering	MASc/MEng/PhD
	Mechanical & Industrial Engineering	MASc/MEng/PhD
	Software Engineering ConGESE[2]	MEng
	Telecommunications	MEng
	Wood Engineering[5]	MASc
University of Waterloo	Chemical Engineering	MASc/PhD
	Civil Engineering	MASc/MEng/PhD
	Design & Manufacturing[3]	MEng
	Electrical & Computer Engineering	MASc/MEng/PhD
	Geological Engineering	MSc/PhD
	Management of Technology	MASc
	Management Sciences	MASc/MMSc/PhD
	Mechanical Engineering	MASc/MEng/PhD
	Software Engineering ConGESE[2]	MASc
	Systems Design Engineering	MASc/MEng/PhD
University of Western Ontario	Biomedical Engineering	MESc/PhD
	Design & Manufacturing[3]	MEng
	Geological Engineering	MSc/PhD
	Engineering Science	MESc/MEng/PhD
University of Windsor	Civil Engineering	MASc/MEng/PhD
	Electrical Engineering	MASc/MEng/PhD
	Engineering Materials	MASc/MEng/PhD
	Environmental Engineering	MASc/MEng/PhD
	Geological Engineering	MSc/PhD
	Industrial Engineering	MASc/MEng
	Manufacturing Systems	PhD
	Mechanical Engineering	MASc/MEng/PhD

Sources: Advanced Design and Manufacturing Institute (ADMI), Canadian Council of Professional Engineers (CCPE), Consortium for Graduate Education in Software Engineering (ConGESE), and Ontario Council on Graduate Studies (OCGS).

[1] *Joint program between Carleton University and the University of Ottawa (The Ottawa-Carleton Institute for Electrical and Computer Engineering (OCIECE))*
[2] *ConGESE: Consortium for Graduate Education in Software Engineering – Joint program between Carleton University, University of Ottawa, Queen's University, University of Toronto, University of Waterloo, University of Western Ontario, and York University. Note that only schools that offer ConGESE master's degrees through engineering departments are noted in the table.*
[3] *ADMI: Advanced Design and Manufacturing Institute - Joint program between McMaster University, Queen's University, University of Toronto, University of Waterloo, and University of Western Ontario.*
[4] *Joint program between Queen's University and Royal Military College of Canada.*
[5] *Collaborative program between two or more graduate units at the University of Toronto.*

Referring to Table 1-3, the universities in Ontario that currently offer graduate programs specifically in Electrical and Computer Engineering are Carleton University, University of Ottawa, McMaster University, Queen's University, Royal Military College of Canada, Ryerson University, University of Toronto, University of Waterloo, and University of Windsor. The University of Western Ontario also offers graduate studies in Electrical and Computer Engineering, but its program is listed under the general title of Engineering Science. There are therefore a total of ten institutions offering graduate programs in Electrical and Computer Engineering in Ontario.

Figure 1-2 indicates the cities in Ontario offering graduate programs in Electrical and Computer Engineering. Note that Kingston, Toronto, and Ottawa each have two universities offering graduate engineering programs.

Figure 1-2: Map of cities offering graduate programs in Electrical and Computer Engineering in Ontario (Large Circles ●) as well as the Location of the University of Ontario Institute of Technology in Oshawa
Source: Yahoo! Maps (http://maps.yahoo.com/)

Graduate program demand

The demand for Electrical and Computer Engineering graduate studies is evident based on the increasing student enrolment in full-time Electrical and Computer Engineering graduate programs across Ontario. Table 1-4 shows the total enrolment for Electrical and Computer Engineering programs in Ontario in terms of the number of full-time and part-time doctoral and master's students. The table shows that since the academic year 2000-2001, there has been a very slight reduction in enrolments in part-time master's and doctoral programs. However, there has been a significant year-to-year increase in enrolment in both full-time master's and doctoral programs. In fact, there has been a massive increase in the number of full-time students in both master's and doctoral programs over the past five years. Growths of 205% and 173% for doctoral and master's program clearly indicate a significant and consistent demand for graduate studies in Electrical and Computer Engineering in Ontario.

Table 1-4- Enrolment in Electrical and Computer Engineering Graduate Programs in Ontario: 2000-2005

Program	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	Growth: 2000-2005
Doctoral Full-Time	322	353	437	572	662	205%
Doctoral Part-Time	55	44	44	42	46	-16%
Master's Full-Time	527	688	750	790	814	154%
Master's Part-Time	278	295	341	295	277	~0%
Doctoral & Master's Full-Time	849	1041	1187	1362	1476	173%
Doctoral & Master's Part-Time	333	339	385	337	323	-3%

Source: Ontario Council on Graduate Studies (OCGS) Macroindicator Data 2004-2005 (data includes Carleton/Ottawa, McMaster, Queens, Ryerson, Toronto, Waterloo, Windsor universities)

Due to recent events in the United States, there has been a shift in international graduate student applications from the United States to Canada. Noting Canada is the highest per capita immigrant-receiving nation in the world, many immigrants are very interested in upgrading their technical skills and pursuing higher education in order to obtain high-paying employment and have a high standard of living. These trends are adding to the demand for increased graduate student spaces in Ontario, where about half of the new immigrants to Canada decide to reside.

Government policies are also increasing the demand for graduate programs in Electrical and Computer Engineering. The Government of Canada has outlined a number of goals and targets in its Innovation Strategy, as reported by Industry Canada in 2002, including:

Goals – Addressing the knowledge performance challenge

- Vastly increase public and private investments in knowledge infrastructure to improve Canada's R&D performance.

Targets

- By 2010, rank among the top five countries in the world in terms of R&D performance.
- By 2010, at least double the federal government's current investments in R&D.

Goals – Addressing the skills challenge

- Develop the most skilled and talented labour force in the world.

Targets

- Through to 2010, increase the admission of master's and doctorate students at Canadian universities by an average of 5 percent per year.
- By 2004, significantly improve Canada's performance in the recruitment of foreign talent, including foreign students, by means of both the permanent immigrant and the temporary foreign workers programs.
- Over the next five years, increase the number of adults pursuing learning opportunities by 1 million.

Goals – Addressing the innovation environment challenge

- Governments at all levels work together to stimulate the creation of more clusters of innovation at the community level.
- Federal, provincial/territorial and municipal governments cooperate and supplement their current efforts to unleash the full innovation potential of communities across Canada, guided by community-based assessments of local strengths, weaknesses and opportunities.

Targets

- By 2010, develop at least 10 internationally recognized technology clusters.
- By 2010, significantly improve the innovation performance of communities across Canada.

The proposed graduate programs in Electrical and Computer Engineering at UOIT are poised to help meet the above goals and targets.

The Council of Ontario Universities (COU) formed a Task Force on Future Requirements for Graduate Education in Ontario in 2003. The Task Force determined that the Government of Ontario should establish a 10-year goal of doubling graduate enrolment in Ontario's universities to meet the demand for increased graduates. The programs proposed by UOIT and the location of the university make it a logical choice for expanding Electrical and Computer Engineering graduate school capacity in Ontario. Within the Greater Toronto Area (GTA), there are currently only two universities offering graduate programs in Electrical and Computer Engineering: Ryerson University and the University of Toronto (see Figure 1-3).

According to Statistics Canada, the population of the GTA as of the 2001 census was 4,682,897 and that of greater Montréal area was 3,426,350. However, Montreal has four universities that offer graduate programs in Electrical and Computer Engineering: Concordia University, École de Technologie Supérieure, École Polytechnique, and McGill University. Comparing the GTA to greater Montréal area on the basis of population, the GTA lacks Electrical and Computer Engineering graduate school capacity. The addition of a graduate program in Electrical and Computer Engineering at UOIT will help increase the graduate school capacity in Electrical and Computer Engineering within the GTA.

According to Statistics Canada, Oshawa is the fastest growing city in the country and the Conference Board of Canada predicts Oshawa will lead Canada in economic growth through to 2009. In addition, the location of UOIT within the GTA is also ideal. Figure 1-4 shows the location of graduate engineering programs in the GTA and neighboring cities. Figure 1-4 shows that there are no engineering graduate schools in the eastern half of the GTA or in any neighboring cities east of the GTA. All of the graduate schools in the region are located in the centre of the GTA or in neighboring cities west of the GTA. The location of UOIT makes it an excellent choice for bringing increased engineering graduate school capacity to the eastern half of the GTA and neighbouring cities and towns, and municipalities.

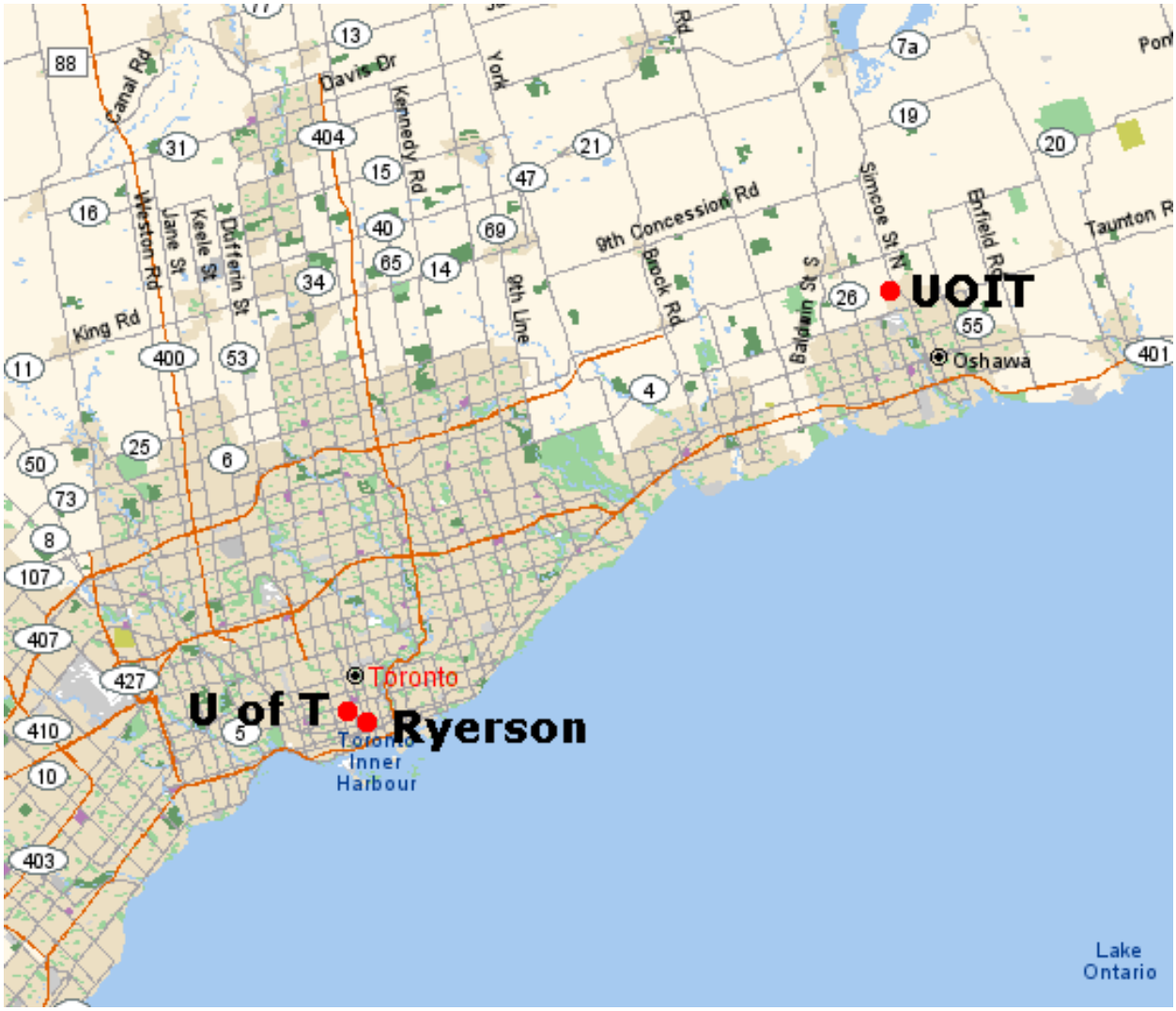


Figure 1-3: Map of the central and eastern portions of the Greater Toronto Area (GTA) showing the locations of Ryerson University, the University of Toronto, and the University of Ontario Institute of Technology (UOIT)
Source: Yahoo! Maps (http://maps.yahoo.com/)

In addition to being in a strategic location based on the population of the GTA, the location of UOIT is also ideal for taking advantage of a number of major industrial companies in the eastern half of the GTA whose areas are very relevant to the Electrical and Computer Engineering programs being proposed by UOIT. They include General Motors of Canada, Siemens, and Ontario Power Generation, including two major nuclear power plants in Darlington and Pickering. Also, there are

many large companies, such as Nortel Networks, Research in Motion, in addition to numerous small and medium size firms across southern Ontario, with the sole focus on Information and Communications Technology (ICT), a very major thrust in Electrical and Computer Engineering.

Figure 1-4: A map of universities offering graduate engineering programs within the GTA and neighboring cities and the location of the UOIT (note that the University of Guelph does not offer a graduate program in Electrical and Computer Engineering). *Source: Yahoo! Maps (http://maps.yahoo.com/)*

According to Industry Canada, between 1997 and October 2005, the ICT sector grew by 8.4% per year, more than twice as fast as the Canadian economy (3.6%). This faster growth of the sector also means that the ICT industries have accounted for 10.8% of the national growth since 1997. Also, according to Industry Canada, employment in the ICT sector is characterized by a high level of education. In fact, in 2004, 38% of all workers had a university degree, compared to a national average of 21%. Noting that Ontario accounted for about 48% of all ICT sector revenues in Canada in 2003, there exists a very strong need for graduate programs in Electrical and Computer Engineering in the GTA to educate highly qualified personnel in the ICT arena.

According to 2006 Government of Ontario Budget, by 2020, Ontario will need to refurbish, rebuild, replace or conserve approximately 25,000 MW of generation, representing approximately 80% of Ontario's current capacity, to meet the province's demand. The government has initiated one of the most ambitious building programs in North America for new electricity generation. It is based on a comprehensive energy plan focused on long-term, stability and sustainability. The government's aggressive move and comprehensive energy plan is in line with the fact that energy has been a key research area to be pursued by UOIT from its inception in 2003. At the Faculty of Engineering and Applied Science, faculty members with strong research record are being hired to build a strong research nucleolus in this important field, as well as to purse the creation of Research chairs in this area using empowerment from Industry and individuals, CRC allocation, and NSERC industrial Chairs.

Mission

The mission of the Faculty of Engineering and Applied Science is to contribute to society through excellence in education, scholarship, and service. We will provide for our graduate students a rigorous education and endeavor to instill in them the attitudes, values, and vision that will prepare them for a lifetime of continued learning and leadership in their chosen careers. We engage in scholarship of discovery, application, and integration.

1.2 Objectives of the Programs

There are four objectives common to the graduate programs:

- Depth – To provide students with an understanding of the fundamental knowledge prerequisites for the practice of, or for advanced study in communications and signal processing, computer systems and software engineering, control systems and robotics, electronics and mechatronics, and electric, power and transmission systems.
- Breadth – To provide students with the broad and advanced education necessary for productive careers in the public or private sectors and in academia.
- Professionalism – To develop skills necessary for clear communication and responsible teamwork, and to inspire professional attitudes and ethics, so that students are prepared for modern work environments with diverse needs and for lifelong learning and enrichment.
- Learning Environment – To provide an environment that will enable students to pursue their goals through innovative graduate programs that are rigorous, challenging, and supportive.

The objective of the MASc program is to prepare students for a career as an R&D engineer. It is expected that graduates of the program will be able to work as R&D engineers in advanced technology companies or government agencies or continue in their education and pursue a doctorate degree at renowned world-wide institutions of higher learning. The objective of the MASc program is achieved through a combination of course work, supervised research, a research seminar, and a research thesis.

The objective of the MEng program 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. Note that all MEng students will be involved in research through research projects included in most of the courses.

1.3 Method used for the self-study

This appraisal was prepared by the Graduate Committee of the Faculty of Engineering and Applied Science in collaboration with its affiliated School of Energy Systems and Nuclear Science. Virtually all faculty members made contributions to the preparation of this brief. Input from industry professionals and academics at other institutions has been sought. The appraisal has gone through thorough reviews by the Curriculum Committee and the Faculty Council of the Faculty of Engineering and Applied Science and School of Energy Systems and Nuclear Science as well as by the Associate Provost for Research, the Dean of Graduate Studies, the Curriculum and Program Review Committee, and the Academic Council of UOIT.

1.4 Fields in the programs

As this is an application for only a master's program, it is not required by OCGS to list areas of specialization; there are no declared fields in these programs.

1.5 Review concerns expressed in previous appraisal and actions taken

As this is an application for a new program, this section is not applicable.

1.6 Special matters and innovative features

The University of Ontario Institute of Technology, as the only laptop-based university in Ontario, provides students access to its Mobile Learning Environment. Every graduate student at UOIT will have access to library resources, email, and the Internet, and to other online services.

2 THE FACULTY

2.1 List of faculty members by field

Table 2-1 lists the faculty members involved in the graduate program and identifies their research field, gender, home unit, and supervisory privileges. Expected retirements within the next seven years are also noted in Table 2-1.

Currently there are 15 core faculty members involved in the programs. There are 4 Category-1 core faculty members, 9 Category-3 core faculty members, 1 Category-4 core faculty member, and 1 Category-5 core faculty member. It is anticipated that upon OCGS approval of these programs some of the cross-appointed faculty members will make FEAS their sole home Faculty (i.e. from Category-3 to Category-1).

Table 2-1: Faculty Members by Field

					Fields[3]
Faculty Name & Rank	**M/F**	**Ret. Date**	**Home Unit [2]**	**Supervisory Privileges**	
Category [1]					
Ramiro Liscano – Associate Professor	M		FEAS	Full	**X**
Richard Marceau – Full Professor	M		UOIT	Full	**X**
Jing Ren – Assistant Professor	F		FEAS	Full	**X**
Shahram Shahbazpanahi – Assistant Professor	M		FEAS	Full	**X**
Category [3]					
George Bereznai – Full Professor	M	2007	SESNS	Full	**X**
Ebrahim Esmailzadeh – Full Professor	M		FEAS	Full	**X**
Ali Grami – Associate Professor	M		FBIT/FEAS	Full	**X**
Mark Green – Full Professor	M		FS	Full	**X**
Patrick Hung – Assistant Professor	M		FBIT	Full	**X**
Lixuan Lu – Assistant Professor	F		FEAS/SESNS	Full	**X**
Clemens Martin – Assistant Professor	M		FBIT/FEAS	Full	**X**
Scott Nokleby – Assistant Professor	M		FEAS	Full	**X**
Miguel Vargas Martin – Assistant Professor	M		FBIT/FEAS	Full	**X**
Category [4]					
Michael Bennett	M		FEAS	Full	**X**
Category [5]					
R. Gorantla – Adjunct Associate Professor	M		FEAS	Full	**X**

[1] Category 1: tenured or tenure-track core faculty members whose graduate involvement is exclusively in the graduate program under review. For this purpose the master's and doctoral streams of a program are considered as a single program. Membership in the graduate program, not the home unit, is the defining issue.
Category 2: non-tenure-track core faculty members whose graduate involvement is exclusively in the graduate program under review.
Category 3: tenured or tenure-track core faculty members who are involved in teaching and/or supervision in other graduate program(s) in addition to being a core member of the graduate program under review.
Category 4: non-tenure track core faculty members who are involved in teaching and/or supervision in other graduate program(s) in addition to being a core member of the graduate program under review.
Category 5: other core faculty: this category may include emeritus professors with supervisory privileges and persons appointed from government laboratories or industry as adjunct professors.
Category 6: non-core faculty members who participate in the teaching of graduate courses.

[2] FEAS: Faculty of Engineering and Applied Science
SESNS: School of Energy Systems and Nuclear Engineering
FBIT: Faculty of Business and Information Technology
FS: Faculty of Science

[3] There are no declared fields in the programs.

It must be noted that UOIT is a new university, and began to offer undergraduate programs in Electrical Engineering and Software Engineering in the fall 2005, with the first graduating class in the spring 2009. The university recognizes that it is imperative for the Faculty of Engineering and Applied Science to increase the number of faculty members involved in these programs rapidly over the next few years so as to be able to fully meet Canadian Engineering Accreditation Board (CEAB) requirements, in terms of faculty to student ratio. Also, having master's programs in ECE can significantly help our undergraduate programs in Electrical and Software Engineering, for almost all of the students in our master's programs will be hired to be teaching assistants in our undergraduate programs.

Table 2-2 shows the plan for new faculty hires. The faculty hired will be at all levels to ensure a healthy balance between full professors, associate professors, and assistant professors across all areas of interests. It is anticipated that with graduate programs in Electrical and Computer Engineering in place, more senior faculty members can be hired. It is expected that, in the steady state, the areas of expertise of the Electrical and Computer Engineering faculty members will include Communications and Signal Processing, Control Systems, Electronics and Mechatronics, Photonics, Computer and Software Engineering, Applied Electromagnetics and Power Systems.

Table 2-2: Planned Faculty Members Hiring in ECE for the years 2006 to 2010

Year	Number of faculty members hires
2006-2007	6
2007-2008	6
2008-2009	3
2009-2010	3

UOIT is open to offering adjunct professorships both to well-qualified external academics and to professionals with industrials ties, who would contribute to the program in terms of student supervision and teaching of the graduate courses. It is also expected that members of other Faculties at UOIT will participate in the proposed programs as they evolve.

2.2 External operating research funding

Table 2-3 presents the external research funding that faculty members have received to date since 1999. Note that the funding listed represents only confirmed funding and shall increase as the faculty members successfully secure additional funding. Since the first faculty members started at UOIT in 2003, the funding in Table 2-3 for the years 1999 to 2003 represents funding secured by UOIT faculty members while at other institutions.

Table 2-3: Operating Research Funding by Source and Year

	Source		
Year[1]	**Granting Councils [2]**	**Other Peer Adjudicated [3]**	**Others [4]**
1999	$105,440	$14,000	$21,500
2000	$84,300	$4,178,006	$2,360
2001	$73,840	$9,377,000	$1,200
2002	$83,000	$29,000	$51,000
2003	$83,000	$31,250	$45,000
2004	$139,000	$30,422	$107,800
2005	$236,515	$199,208	0
2006	$127,700	0	0
Totals	$932,795	$13,858,886	$228,860

[1] *Calendar year.*
[2] *NSERC, Mitacs-NCE, AUTO21-NCE, OCE-CITO.*
[3] *DRDC, CFI, ASRA CERG, RGC, FCAR, University of Victoria, Sharif University of Technology, Government of Iran, Government of Brunei.*
[4] *Alcatel, CDEN, Microsoft, IFToMM, ISE limited, Bell University Laboratories.*

Table 2-4 presents the total external research funding for 2003-2006. As with Table 2-3, the amounts in Table 2-4 represent only the confirmed funding and shall increase as the faculty members successfully secure funding from the various source listed above and from industry. As the number of faculty members increases over the next few years, it is fully expected that the funding presented in Tables 2-3 and 2-4 will increase substantially.

Table 2-4: Total External Operating Research Funding 2003 - 2006

	Source		
Year	**Granting Councils**	**Other Peer Adjudicated**	**Others**
Totals	$586,215	$260,880	$152,800

2.3 Graduate supervision

Table 2-5 lists the completed and current numbers of thesis supervisions by faculty member. The Table shows that there is a good balance of senior professors, who have successfully graduated students, and new professors, who have not yet graduated students. Table 2-5 also shows that

although UOIT does not yet have a graduate program in Electrical and Computer Engineering, the faculty members are active in co-supervising students with professors at other institutions within Ontario and Canada. A number of the faculty members involved in the proposed program currently hold adjunct appointments at other universities. Table 2-6 outlines these adjunct appointments.

2.4 Current teaching assignments

Table 2.7 shows the anticipated teaching loads for the 2006-2007, academic year. Table 2.8 and Table- 2.9 show the teaching assignments for the 2005-2006 and 2004-2005 academic years. Note that UOIT took in its first undergraduate students in the 2003-2004 academic year. The teaching loads are in table 2.10. In all these four tables, the numbers in the brackets following the course number correspond to weekly Lecture/Laboratory/Tutorial hours, respectively. Also note the Graduate courses in these tables are not part of the program being reviewed, and in fact MITS courses are part of the Faculty of Business and Information Technology's Master of Information Technology Security program.

Table 2-5: Completed and Current Numbers of Thesis Supervisions by Faculty Member

	Completed			Current		
Member	**Master's**	**PhD**	**PDF**	**Master's**	**PhD**	**PDF**
Category 1						
Ramiro Liscano	8	0	0	6	1	0
Richard Marceau	13	4	0	0	0	0
Jing Ren	0	0	0	0	0	0
Shahram Shahbazpanahi	2	2	0	0	0	0
Category 3						
George Bereznai	2	0	0	0	0	0
Ebrahim Esmailzadeh	31	8	7	4	4	3
Ali Grami	0	0	0	0	0	0
Mark Green	13	9	0	0	1	0
Patrick Hung	0	0	0	1	0	0
Lixuan Lu	0	0	0	0	0	0
Clemens Martin	11	0	0	1	0	0
Scott Nokleby	0	0	0	2	0	0
Miguel Vargas Martin	0	0	0	1	0	0
***Category* 4**						
Michael Bennett	27	2	0	0	0	0
***Category* 5**						
R. Gorantla - Adjunct	2	0	0	0	0	0

2.5 Commitment of faculty members from other graduate programs and/or from other institutions

Professors Grami, Martin, and Vargas Martin hold cross appointments between the Faculty of Engineering and Applied Science and the Faculty of Business and Information Technology. They are involved in teaching courses in the Faculty of Business and Information Technology's Master of Information Technology program. As cross-appointed faculty, all three faculty members will divide their time accordingly between the two faculties.

Professors Green and Hung are involved in proposed graduate programs within the Faculty of Science and the Faculty of Business and Information Technology, respectively, in addition to being involved in the proposed graduate program of the Faculty of Engineering and Applied Science. It is expected that as UOIT expands, additional members from the Faculty of Science and the Faculty of Business and Information Technology whose expertise complement the specializations listed will become involved in the proposed programs.

Table 2-6: Adjunct Appointments

Member	**University**
Ramiro Liscano	University of Ottawa Dalhousie University
Shahram Shahbazpanahi	McMaster University
Ebrahim Esmailzadeh	Concordia University Sharif University of Technology, Iran University of Toronto
Ali Grami	Ryerson University
Lixuan Lu	University of Western Ontario
Scott Nokleby	University of Victoria
Miguel Vargas Martin	Universidad Autonoma de Aguascalientes, Mexico
Michael Bennett	University of Western Ontario

Table-2.7: Proposed Teaching Assignments for 2006-07

Category [1]	Rank	Undergraduate	Graduate	Comments
Ramiro Liscano	Associate Professor	ENGR 1200 ENGR 2710 ENGR 2720		
Richard Marceau	Full Professor			UOIT Provost
Ren Jing	Assistant Professor			
Shahram Shahbazpanahi	Assistant Professor	ENGR 2790 (3/1/1) ENGR 2200 (3/1.5/1)		
Category [3]				
George Bereznai	Full Professor	ENGR 3860 (3/0/1) ENGR 4640 (3/0/1)	UN08013 McMaster	Dean, SESNC
Ebrahim Esmailzadeh	Full Professor	ENGR 3350 (3/1.5/0) ENGR 3210 (3/1.5/1) ENGR 4010 (3/0/1)		
Ali Grami	Associate Professor	BUSI 1500 (3,0,0) BUSI 1900 (3,0,1) ENGR 1400 (3,0,0)		
Mark Green	Full Professor			
Patrick Hung	Assistant Professor	BUSI 1650 (3/0/0)		
Lixuan Lu	Assistant Professor	ENGR 3740 (3/1.5/1) ENGR 4730 (3/0/0) ENGR4015 (3/0/1) ENGR 4994 (1/4/1)		
Clemens Martin	Assistant Professor	ENGR 1200 (3/0/2)	MITS 5200G (co-teaching) MITS 5300G	
Scott Nokleby	Assistant Professor	ENGR 4280 (3/1/1) ENGR 3390 (3/1/1)	ENGR 5260	
Miguel Vargas Martin	Assistant Professor	BUSI 1830 (3/0/3) INFR 1010 (3/0/3) INFR 2820 (3/3/3) ENGR 1200 (3/0/2)	MITS 5500G	
Category [4]				
Michael Bennett				
Category [5]				
Rao Gorantla	Adjunct Associate Professor			

Table-2.8: Teaching Assignments for 2005-2006

Category [1]	Rank	Undergraduate	Graduate	Comments
Ramiro Liscano	Associate Professor	CSI 1102 CEG 4185 CEG 4395 ENGR 1200 (3/3/2)	ELG 7178	University of Ottawa UOIT
Richard Marceau	Full Professor			UOIT Provost
Shahram Shahbazpanahi	Assistant Professor	ENGR 2790 (3/1/1)		
Category [3]				
George Bereznai	Full Professor	ENGR 3860 (3/0/1) ENGR 4640 (3/0/1)	UN08013 Mc Master	Dean, School of Energy Systems and Nuclear Science
Ebrahim Esmailzadeh	Full Professor	ENGR 2020 (4/0/2) ENGR 2420 (3/1/1)		
Ali Grami	Associate Professor	BUSI 1500 (3,0,0) BUSI 1900 (3,0,1) ENGR 1400 (3,0,0)	MITS 5200G (co-teaching)	
Mark Green	Full Professor	CSCI 1010 (3/0/2) CSCI 1020 (3/0/2) MATH 2080 (3/0/2) SCIE 1910 (3/0/0)		
Patrick Hung	Assistant Professor	BUSI 1830 (3/0/2) BUSI 2502 (3/0/0) BUSI 1650 (3/0/0) BUSI 2501 (3/0/0)		
Lixuan Lu	Assistant Professor	ENGR 3200U (3/1.5/1.5) ENGR 3460 (3/1.5/1.5)		
Clemens Martin	Assistant Professor	ENGR 1200 (3/0/2)	MITS 5200G (co-teaching) MITS 5300G	
Scott Nokleby	Assistant Professor	ENGR 3200 (3/1.5/1.5) ENGR 3270 (3/1/1) ENGR 3390 (3/2/1)		
Miguel Vargas Martin	Assistant Professor	BUSI 1830 (3/0/3) INFR 1010 (3/0/3)	MITS 5500G (3/0/0)	
Category [4]				
Michael Bennett		SE312 (3/2) SE313 (3/2)		University of Western Ontario
Category [5]				
R. Gorantla	Adjunct Associate Professor			

Table-2.9: Teaching Assignments for 2004-2005

Category [1]	Rank	Undergraduate	Graduate	Comments
Ramiro Liscano	Associate Professor	CSI 1102 CEG 4185 CEG 4395		University of Ottawa
Richard Marceau	Full Professor			Provost, UOIT
Shahram Shahbazpanahi	Assistant Professor	COE4TL4 (3/1.5/1) ECE761 (3/0/0)		McMaster University
Category [3]				
George Bereznai	Full Professor			Dean, School of Energy Systems and Nuclear Science
Ebrahim Esmailzadeh	Full Professor	ENGR 2020 (4/0/2)		Programs Director, FEAS
Ali Grami	Associate Professor	BUSI 1900 (3/0/0) ENGR 2790 (3/2/1)		
Mark Green	Full Professor	SM2215 (2/0/1) SM 3121 (2/0/1) SM 4130 (2/0/1)		City University of Hong Kong
Patrick Hung	Assistant Professor	BUSI1830 (3/0/2) BUSI 1650 (3/0/0)		
Clemens Martin	Assistant Professor	BUSI 2604 (3/0/0)		
Scott Nokleby	Assistant Professor	ENGR 3200 (3/1.5/1.5)		
Miguel Vargas Martin	Assistant Professor	BUSI 1830 (3/0/3) ENGR 1200 (3/0/2)		
Category [4]				
Michael Bennett		SE312 (3/2) SE313 (3/2) SE 454 (3/0) SE310 (3/0)		U. of Western Ontario and U. of Ottawa Knowledge Institute for Gov. Professionals
Category [5]				
Rao Gorantla	Adjunct Associate Professor			

Table-2.10: Teaching Assignments for 2003-2004

Category [1]	Rank	Undergraduate	Graduate	Comments
Ramiro Liscano	Associate Professor	CSI 1102 (3/2/0) CSI 1101 (3/2/0) CEG 4185 (3/1.5/1.5) CEG 4395 (3/1.5/1.5)		University of Ottawa
Category [3]				
George Bereznai	Full Professor		UN08013- Mc Master University	Dean, School of Energy Systems and Nuclear Science
Ebrahim Esmailzadeh	Full Professor	ENGR 3200U (3/1.5/1.5)		
Ali Grami	Associate Professor	BUSI 1520 (3/0/0) BUSI 1900 (3/0/0)		
Mark Green	Full Professor	SM1001 (2/0/2) SM2215 (2/0/1) SM 3120 (2/0/1) SM 3121 (2/0/1) SM4130 (2/0/1)		City University of Hong Kong
Clemens Martin	Assistant Professor	BUSI 1500 (3/0/0) BUSI 1830 (3/0/2) ENGR 1200 (3/0/2)		
Category [4]				
Michael Bennett		SE312 (3/2) SE313 (3/2) SE 454 (3/0 SE 310 (3/2) SEG 3310(4/2) SEG 4100(3/3) GNG 2100(3/0)	EMP5117 (3/0)	University of Western Ontario University of Ottawa Knowledge Institute for Government Professionals
Category [5]				
Rao Gorantla	Adjunct Associate Professor			

3 PHYSICAL AND FINANCIAL RESOURCES

3.1 Library resources

The goal of the University of Ontario Institute of Technology library is to enrich the research, and teaching carried out by the university through exceptional library and information services and facilities to support all academic programs.

The construction of a new, state-of-the-art library for the University of Ontario Institute of Technology was completed in the fall of 2004. Designed by internationally renowned Diamond and Schmitt Architects Incorporated, the 73,000-square-foot library serves students, faculty, and staff. The four-storey, $20.7-million library houses individual and collaborative learning spaces, research workstations, electronic classrooms, a round pavilion with a reading room and periodicals collection, and other facilities. It offers a variety of learning spaces to suit individual learning styles and user needs. Its design also allows for future enlargement, up to double the original size.

It is of great importance to highlight that the library resources include IEEE *Xplore*. IEEE *Xplore* is an online delivery system providing full text access to the world's highest quality technical literature in electrical engineering, computer science, and electronics. IEEE *Xplore* contains full text documents from IEEE journals, transactions, magazines, letters, conference proceedings, standards, and IEE (Institution of Electrical Engineers) publications. IEEE *Xplore* offers more than 1,300,000 documents, which can all be accessed online in an advanced search fashion.

The University's Mobile Learning environment provides students with access to library resources using their wireless laptop anytime, from anywhere. Students are able to work individually or collaboratively anywhere in the building. Digital resources and complementary print collections are provided for students in both a physical and virtual environment. Librarians are available to provide students with the skills to navigate effectively through the information environment.

In addition to interlibrary loans, students can search the catalogues of all Ontario university libraries and place immediate online requests for any available item.

To keep faculty members and students informed of the library's continued growth and to provide easy access to resources, the UOIT Library staff have been constructing and revising its web site: www.uoit.ca/library on an ongoing basis.

A more detailed presentation on the library resources is listed in Appendix A: Library Submission.

3.2 Laboratory facilities

Students in the MASc and MEng programs will have access to major equipment and common facilities, which have been or will be financially supported by the University of Ontario Institute of Technology, by a wide range of grants and significant donations from the Industry (both product manufacturers and service providers), and by various Government funding agencies, such as CFI, NSERC, and OCE. The facilities will be enhanced through major equipment acquisitions to maintain and upgrade laboratory equipment and to reflect state-of-the-art technology and industry-focused research, as the number of faculty members in ECE is significantly increased and the research expertise is thus broadened over the next few years.

Active Vibration Control Laboratory — This lab is primary used for research into the areas of adaptive, active and passive vibration control, and dynamic modeling and vibrations of nonlinear machines and flexible structures. The experimental work to be carried out is aimed to verify the vibration suppression of time-varying and parametrically excited dynamic structures through adapting a two-tier alternative, system identification to determine the deviations in the structural parameters, and a semi-active optimal re-tuning of the absorber elements. In order to show the vibration suppression improvement, initially the primary will be excited by a simple harmonic excitation.

Communication Networks Laboratory – This lab will focus on the research and development of leading associated networking technologies for the non-real and real time delivery of multimedia information, through theoretical design and simulation of innovative networking concepts. The facilities in this lab include SUN workstations and many PCs, protocol analyzers, hardware and software ATM switches, routers, and bridges to assess Voice over IP and Mobile IP performance, and to characterize the multimedia traffic in wired and wireless communications networks, with a wide range of traffic attributes and network pricing and resource management, monitoring and tomography, and protocol modeling mechanisms.

Communications and Signal Processing Laboratory – This lab will supply the infrastructure for research in signal processing and telecommunications including wireless systems, MIMO communications, spectral analysis and array signal processing, mobile ad hoc and sensor networks, and also satellite communications and interference analyses for a variety of system payloads and frequency bands. This lab provides an environment for the development of new information- and signal-processing algorithms from conception to implementation in software or hardware, including new coding and modulation schemes and access techniques for wire-line (twisted-pair and co-axial cable) and wireless systems using communication and signal-processing tool-sets for information processing applications in dynamically changing environments. The research encompasses theoretical analyses and modeling, computer simulation and hardware prototyping. This will provide state-of-the-art test, measurement, and proof-of-concept prototyping facilities which include radio transmission and test equipment (up to EHF frequencies), co-processor boards, audio and video equipment, data acquisition hardware, DSP development boards with test and evaluation boards. There will also be several, standalone or networked, SUN workstations and several dozen of high-speed Pentium-IV PCs with large RAMs. Software includes all of the standard programming and AI languages, symbolic algebra systems, word-processors, and various packages specific to telecommunications and signal processing.

Hacker Research Lab (HR-Lab) – This lab is not only used to train students through a hands-on research-based approach, but more importantly enable the faculty members and graduate students to lead research programs in their respective fields of IT security. The lab provides a physical and logical infrastructure to allow for a secured and isolated environment in which security related research can be safely performed. As the lab's configuration is designed to be flexible, it can also be linked to external networks if required. Housed in a room of 100 square meters, the lab consists of four main Unix/Linux/Windows2003 servers including two SUN V20Z and two V240 servers plus CISCO routers, switches and tape backup units. These servers act as the gateway to the HR-Lab form the outside world. Other than controlling user access and supporting applications, these servers also serve the purpose of Firewall and virus/content scanning. Behind these servers are eight groups of equipment. Each group has two servers, one switch, one desktop workstation PC and one laptop workstation PC. The Pentium based server is configured to allow multi-boot from any of the Windows 2003, Unix or Linux OS for different combinations. The second server is a SUN SPARC V100 server with Solaris on it. The CISCO 2950 switch is configured for multiple VLANs. Each group can work isolated or linked. When all eight groups are linked together, it provides a

large network with 16 servers and more than 32 VLAN. That is a very good environment for research on real time performance with proper network loadings. The HR-Lab is also equipped with four CISCO wireless access points and four PDAs for conducting research in the wireless networking area.

Integrated Manufacturing Centre (IMC) - The IMC is a 925 m^2, fully automated, industrial-grade, flexible manufacturing facility capable of fabricating and assembling a wide range of products. The IMC provides a facility to conduct research in advanced manufacturing and mechatronics engineering. The main components of the IMC are divided into two areas: the manufacturing zone and the assembly zone. Manufacturing zone includes Inverted, Rail-Mounted, 6-Axis Robot, Parts Washer, CNC Electrical Discharge Machine (EDM), CNC Milling Machine, CNC Lathe, Injection Moulding Machine, CNC Coordinate Measuring Machine (CMM), 3-D Printer, and assembly zone includes Automatic Storage and Retrieval System (ASRS), Conveyor System, and Eight 6-Axis Robots.

Intelligent Robotics and Manufacturing Laboratory – The Intelligent Robotics and Manufacturing Lab, within the Centre for Engineering Design, Automation, and Robotics (CEDAR) at UOIT, has two core research directions: Reconfigurable Manufacturing and Distributed Control. The two core research areas of the lab focus on developing complementary new technologies for flexible manufacturing systems. The objectives of the Distributed Control research are to develop new Internet/Web based distributed intelligent systems to monitor, manage and control production systems. The systems developed will allow manufacturers to reorganize production and process plans dynamically within a shop floor or within a group of shop floors. The objectives of the Reconfigurable Manufacturing direction are to develop new production systems that can be reconfigured to optimize utilization of resources. Three themes within the Reconfigurable Manufacturing research are the design of new modular reconfigurable machine systems (Reconfigurable Parallel Kinematic Machines), virtual reconfigurable manufacturing systems and modular reconfigurable control.

Mechatronic and Robotic Systems Laboratory – The lab conducts research into the kinematics and control of complex systems such as joint-redundant manipulators, mobile-manipulator systems, and redundantly-actuated parallel manipulators. Redundant manipulators and mobile-manipulator systems offer numerous advantages over traditional non-redundant systems. Effective utilization of the redundancy inherent in these systems is instrumental in moving the systems from the laboratory and applying them to real-world applications.

Microfabrication Lab – A micro-fabrication facility, pending CFI approval, will enable complete microsystems to be fabricated at UOIT. It will include a wet-bench, lithography setup, mask aligner and a small cleanroom. Cleanroom processes will use silicon substrates and future developments will allow silicon on sapphire, quartz, compound semiconductors and other types of materials. The wafer thickness will vary from 200 microns to 1 mm substrates, while the wafer size is 4 inches. Micro-devices will be fabricated, assembled and tested on these wafers. Unique capabilities in the Microsystems Laboratory will fabricate micro engines that produce electricity from a heat source. The micro engine is a cyclical device that uses liquid pumping within a micro-channel to convert heat losses to electricity through a flexible piezoelectric membrane at the right end of the micro-channel. Many such micro-channels would be fabricated in parallel to produce larger amounts of electricity. The liquid pumping within micro-channels is generated by thermo-capillary forces, which induce fluid motion by temperature-dependent variations of surface tension across an enclosed droplet. During assembly of each micro engine, the piezoelectric membrane converts fluid motion to an electrical signal through a flexing membrane. The piezoelectrics will be fabricated onto wafers with equipment in the UOIT Microsystems Laboratory.

Additional Facilities — Construction of a 3,835 m^2 Engineering Laboratory Building on the UOIT campus was commenced in the spring of 2005, with completion expected in the fall of 2006. Upon completion, graduate students will have access to the following shared laboratories: Computer Aided Design (CAD) Laboratory, Control Systems Laboratory, Electronics Laboratory, Mechatronics Laboratory, Microprocessors/Digital Systems Laboratory, and Power Systems Laboratory.

Automotive Centre of Excellence (ACE)

In 2005, General Motors of Canada announced a $2.5 billion investment in GM's Canadian operations. This represents the largest and most comprehensive automotive investment in Canadian history. Together with the Ontario and Federal Governments, this "Beacon Project" aims to strengthen automotive engineering, R&D and manufacturing capabilities in Canada. As part of the Beacon Project, an Automotive Centre of Excellence (ACE) will be created at UOIT. Launched with support from GMCL and the Province of Ontario, ACE will link participating automotive companies, suppliers, automotive engineers, universities, colleges, researchers and students in a new building equipped with state-of-the-art automotive design, engineering and research facilities. ACE will anchor a new Canadian Automotive Innovation Network, which will be comprised of selected universities in Ontario, Quebec and British Columbia, led by GM's Canadian Engineering Centre in Oshawa. GM Canada will invest in the Innovation Network to enhance the competitiveness of the Canadian automotive industry through leading edge R&D. This will include investments in new research projects, Design and Research Chairs at Canadian universities and in-kind donations of computer-based design tools by GM and partners.

The Centre will be owned and operated by UOIT. It will provide approximately 90,000 (gross) ft^2, which translates to approximately 45,000 (net) ft^2. It will be located in a new building at UOIT. ACE will comprise two main functional divisions: (i) Core Research Facility (CRF) containing a state-of-the-art climatic wind tunnel and (ii) other equipment designed to respond to automotive manufacturing issues, as well as enable research and involvement of graduate students in industry-based projects. The Integrated Research and Training Facilities (IRTF) will provide educational, lab, research, and project space for use by UOIT faculty, students and colleagues from other institutions. Also, it will serve collaborations with the automotive industry and suppliers, including graduate student research projects. The Centre will be connected to UOIT engineering labs, and it will share university services in the performance of its mandate. The Automotive Centre of Excellence will prepare the graduate students to take the automotive industry to a new level of competitiveness and future success. It will stimulate the development of new advanced technologies focused on future-based applications for the automotive industry in Canada. The $58 million grant provided by the Government of Ontario as part of its Ontario Automotive Investment Strategy program supports the ACE project costs for CRF and IRTF. ACE will be provide the following exceptional opportunities for graduate students at UOIT: a multi-faceted centre with world-class experimental facilities to conduct automotive related research; a way to share learning, best practices, pedagogical tools, and curriculum development with the goals of enhancing graduate studies and research opportunities; an opportunity for graduate students to work and learn alongside top professionals in the automotive industry; and a stimulating environment for research collaboration among university and industry-based researchers, ranging from the exploration of 'what if' research ideas and their implications, to the pursuit of new product design, development, and commercialization.

It is imperative to note that many areas of research in automotive engineering are ECE based, such as Automotive Software and Electronics, and Automotive Control and Robotics. To this effect, ACE facilities are expected to be extensively used also by the ECE faculty members and graduate students whose focus on their research and applications lie in the automotive engineering.

3.3 Computer facilities

Individual supervisors will provide computer facilities, including appropriate computer systems and software packages, for their MASc and MEng-Project students. These facilities will enable them to carry out their research, for their computational, modeling and simulation needs, as well as to enable them access to the internet, email and library resources (such as online journals and conference proceedings). Also, graduate students will have the option to subscribe to UOIT's laptop program. UOIT's laptop program provides students with a current model IBM laptop that is equipped with a suite of program specific software. UOIT has additional shared computer facilities of several hundred PCs available to all students in the Learning Commons and library.

UOIT has joined the PACE Program – Partners for the Advancement of Collaborative Engineering Education[1]. PACE is a program between General Motors, Sun Microsystems, and UGS, that provides state-of-the-art hardware and software for engineering schools. The value of the PACE contribution to UOIT will be $35 million. Dedicated engineering computer labs featuring state-of-the-art workstations and software will be established at UOIT through PACE. Both MASc and MEng graduate students will have full access to the PACE hardware and software located in these labs for their studies.

UOIT is a member of SHARCNET (Shared Hierarchical Academic Research Computer Network (http://www.sharcnet.ca), a high-performance computing consortium of 9 universities and 2 colleges based in South-Central Ontario. A high-speed optical network connects the computing facilities located at each institution. At present, the majority of the computational facilities are located at McMaster University, the University of Western Ontario and the University of Guelph; however, UOIT faculty members and their research groups have access to any part of this state-of-the-art computing facility. SHARCNET was successful in a recent 2004 CFI Innovation Fund competition ($48.3M), which will result in a significant expansion of the facility. With the new funding, it is projected that SHARCNET will become one of the top 100 High-Performance Computing facilities in the world. As part of this expansion, UOIT will acquire a small 'development cluster' of approximately 32 processors that will be located on-site. This, combined with other local equipment, will give students involved in the Master's programs in ECE the ability to work on cutting-edge research in their respective fields. AccessGrid facilities will also be installed as part of the local SHARCNET installation; AccessGrid is an ensemble of resources including multimedia large-format displays, presentation and interactive environments, and interfaces to Grid middleware and to visualization environments, to support group-to-group interactions across SHARCNET. These facilities will facilitate collaboration by faculty members and students across SHARCNET.

3.4 Space

The Faculty of Engineering and Applied Science and the School of Energy Systems and Nuclear Science are located in UOIT's Engineering and Science Building. This is a brand new building that features office space for faculty members and graduate students in addition to research lab space. The current total research space allocated to engineering is 1,496 m^2.

All offices and research spaces are wired for access to UOIT's network. In addition, wireless and wired access is available throughout the Engineering and Science Building as well as the library and other spaces on campus. Faculty members have private offices with telephone lines. Faculty office space averages 13 m^2 and faculty member research space averages ~25 m^2.

1 Source: PACE web site: http://www.pacepartners.org/

Graduate students will have access to shared office facilities and/or research labs. There will be shared office space available for both MASc and MEng students who are Teaching Assistants. In addition there will be shared computer facilities along with a limited number of shared spaces for both MASc and MEng students to work. The various shared spaces will provide the opportunity for MASc and MEng students to interact with one another. The amount of space allocated to graduate students will increase as the programs come online. It is expected that the majority of graduate students will have their office space within the research laboratory of their respective supervisors.

In addition to the ACE (as described in detail earlier) and the above-mentioned new Engineering building—with offices, classrooms, and large lab spaces for teaching and research—ready for summer 2006, UOIT has a detailed plan for two more large buildings with the construction start date of late 2006, pending government's approval. ECE offices, research and teaching labs, and classrooms will be housed in one of these two new buildings. Electrical and Computer Engineering, with a heavy focus on research and graduate programs, form a critical aspect of the University of Ontario Institute of Technology's mandate in the advancement of higher education.

3.5 Financial support of graduate students

MASc Students

Every MASc student offered admission to a graduate program at the Faculty of Engineering and Applied Science and its affiliate School of Energy Systems and Nuclear Science at the University of Ontario Institute of Technology should be able to complete their program regardless of their financial status.

It is expected that the average support for MASc students will be approximately $16,000 per year with funding coming from a variety of sources, including:

- UOIT Scholarships/Bursaries[2] – ten Engineering Research Excellence Awards of $7,500 per year and five Engineering Research Awards of $5,000 per year will be available once the program is running full scale. These two sets of awards will be merit based. Another $41,000 in funding per year will be distributed on a needs basis in the form of bursaries. The amounts for both the scholarships and bursaries will be distributed over a two-year period to eligible students.
- External Awards – These include NSERC postgraduate awards and provincial awards.
- Teaching Assistantships – MASc students will be eligible to earn up to approximately $8,000 per year through teaching assistantships.
- Research Assistantships – Additional support from individual supervisors will be available to students.
- Work-Study and Other Forms of Employment-Based Learning.
- Provincial Loan Programs.

It is expected that the majority of funding for MASc students will come from Research and Teaching Assistantships. Normally, funding will not be provided to part-time students.

2 Note that the amounts listed are based on a financial analysis of the proposed programs. Exact amounts of the proposed awards may change depending on University policies and market demands.

MEng Students

MEng students will have access to financial support through provincial loan programs, teaching assistantships, and work-study placements. Normally, additional funding will not be provided to MEng students.

Financial Counseling

The University and its student support services shall make financial counseling available to students.

Annual Reporting

The Office of Graduate Programs, with the assistance of Student Services, shall issue an annual report on Student Financial Support to include the following:

- levels of student financial need;
- student financial assistance provided, broken down by category and source (external/Faculty) of assistance; and
- the debt levels carried by students upon graduation.

This report shall be submitted for information to the Academic Council.

4. PROGRAM REGULATIONS AND COURSES

4.1 The intellectual development and the educational experience of the student

There are four objectives common to the graduate programs:

- Depth – To provide students with an understanding of the fundamental knowledge prerequisites for the practice of, or for advanced study in communications and signal processing, software engineering, control systems, electronics, and power systems.

- Breadth – To provide students with the broad and advanced education necessary for productive careers in the public or private sectors and in academia.

- Professionalism – To develop skills necessary for clear communication and responsible teamwork, and to inspire professional attitudes and ethics, so that students are prepared for modern work environments with diverse needs and for lifelong learning and enrichment.

- Learning Environment – To provide an environment that will enable students to pursue their goals through innovative graduate programs that are rigorous, challenging, and supportive.

The vision, mission and values of the university provide the foundation for all activities and are reflected in the plans for the intellectual development and educational experience of graduate students in the Faculty of Engineering and Applied Science.

VISION

The University of Ontario Institute of Technology is an innovative and market-oriented institution, pursuing inquiry, discovery and application through excellence in teaching and learning, value-added research and vibrant student life.

MISSION

- Provide career-oriented undergraduate and graduate university programs with a primary focus on those programs that are innovative and responsive to the needs of students and employers
- Advance the highest quality of research
- Advance the highest quality of learning, teaching, and professional practice in a technologically enabled environment
- Contribute to the advancement of Ontario and Canada in the global context with particular focus on Durham Region and Northumberland County
- Foster a fulfilling student experience and a rewarding educational (work) environment
- Offer programs with a view to creating opportunities for college graduates to complete a university degree

VALUES

- Integrity and Respect: We will treat each other with dignity, including those with challenges.
- Honesty and Accountability: Our actions reflect our values, and we are accountable for both.
- Intellectual Rigor: We strive for excellence and challenge convention.

The Academic Unit

In keeping with this part of its mission to foster a fulfilling student experience and a rewarding educational (work) environment, UOIT has developed operational and support processes and services to enhance the learning environment for students. UOIT will continue to provide a fulfilling experience and a rewarding educational environment for graduate students.

The mission of the Faculty of Engineering and Applied Science is to contribute to society through excellence in education, scholarship, and service. We will provide for our graduate students a rigorous education and endeavour to instill in them the attitudes, values, and vision that will prepare them for a lifetime of continued learning and leadership in their chosen careers. We engage in scholarship of discovery, application, and integration.

In order for our students and faculty members to engage in scholarship of discovery, application, and integration, UOIT has made every effort to provide state-of-the-art learning resources, including the library, learning technologies, and laboratories. In addition, academic support staff, and student support services, also contribute to the operation of the department and provide service, guidance and support for graduate students.

As highlighted earlier, a team of well-qualified faculty members is already available or yet to be hired for the development of the students and for the ongoing monitoring of program quality and student progress.

Program Learning Outcomes

Graduates of the engineering graduate programs shall be able to:

1. Demonstrate specialized knowledge and understanding of essential facts, concepts, principles, and theories in a specific area of advanced study
2. Recognize and be guided by social, professional, and ethical expectations and concerns involved in advanced education and research
3. Effectively use advanced tools for research
4. Apply the principles of effective data management, information organization, and information-retrieval skills to data of various types
5. Utilize analytical, methodological, interpretive and expository skills in conducting research
6. Expand and enhance the application of specific and well-concentrated research to engineering problems and practice
7. Critically evaluate advanced information and knowledge and examine their application in engineering practice
8. Identify problems and opportunities for system analysis, design, improvement, and optimization
9. Understand, explain, and solve problems using quantitative and qualitative methods
10. Appreciate the importance of, and develop the strategies for, further education and lifelong learning

11. Design and conduct experiments, and analyze and interpret experimental data and computational results

12. Demonstrate effective oral and written communication skills

The learning outcomes for the MASc program are achieved through a combination of course work, supervised research, a research seminar, and a research thesis.

The objectives for the MEng program are achieved through either a combination of course work and a project, or solely course work depending on which option the student selects. Note that all MEng students will be involved in research through research projects included in most of the courses. Students will be exposed to both quantitative and qualitative research methodologies through these course-based research projects.

The combination of courses and/or projects and research, will be designed collaboratively between the student and an assigned faculty advisor/mentor. Each learner will have the opportunity to develop the prerequisites for specialized practice of, or for advanced study in, various areas of Electrical and Computer Engineering, such as Communications and Signal Processing; Software Engineering; Electronics, Control, and Mechatronics; and Electromagnetics and Power Systems. Learning activities and materials in graduate courses will be carefully designed to ensure that learners are deliberately exposed to study, the majority of which is at, or informed by, the forefront of engineering theory and practice.

The courses have been designed to give students in-depth learning in a specialized area of engineering, opportunity for advanced development of generic skills such as communication and teamwork, as well as participation in the scholarly activities of research, seminars, and presentations.

Throughout the curriculum, learning activities are planned, and student progress will be monitored to ensure that safety, professional guidelines, and ethical responsibilities relevant to engineering and for specific areas of advanced study are modelled, developed, and evaluated.

Learning Community

UOIT is committed to providing innovative programs through excellence in teaching and learning, value-added research and “vibrant student life.” The MASc and the MEng exemplify this commitment. The physical design of the university environment provides many places and spaces for groups to meet and interact, for academic and social purposes. The technological links available to students ensure that a network of communication and support among students and between students and university resources is established and strengthened during their years at UOIT. Facilities and personnel are available to support learning and development in all areas – academic, physical, social and emotional.

The student-centered philosophy of UOIT is designed to develop and continually enhance a strong sense of academic community, in which students, faculty, support staff and administrators share ideas and experiences. Students in the MASc and MEng will benefit from the relationship with faculty members in a learning partnership.

Regularly scheduled scientific presentations, guest speakers, and research colloquia which are open to the university community, are already a part of academic life at UOIT. With the development of graduate programs in Electrical and Computer Engineering the number of seminars

in the Faculty of Engineering and Applied Science will be increased. In addition, the Faculty of Engineering and Applied Science will plan to invite recognized experts and leading-edge researchers to present seminars and advise on student and faculty research. Unit's rich network of industry and academic contacts, as exemplified by ACE (Automotive Centre of Excellence), will provide access to exceptional researchers and professionals.

Scholarly Activities

As can be seen in the course outlines, students are required to undertake significant independent work, and to organize and provide reports and seminars. This provides for development of leadership, organization, communication, and professional presentation skills. These sessions will be conducted in an environment which supports intellectual debate, allows for critique and constructive feedback, and encourages reflective practice.

All students in the engineering graduate programs will be encouraged to attend professional conferences and educational sessions, which may take place at UOIT or outside the university. MASc students will be encouraged to attend and participate in conferences and workshops relevant for their specialized area of interest. Financial support will be made available by their faculty supervisor. Students will be encouraged and mentored to present their thesis and project work at professional conferences and to other audiences through industry and academic networks.

The learning activities and academic culture of UOIT is guided by its mission and values. The graduate programs being developed by the Faculty of Engineering and Applied Science will be a model of our university values.

4.2 Program regulations

Part-time studies

To facilitate access to all potential students, part-time studies will be permitted. It is especially important to allow engineers in local industries access to the MEng program. The MASc program has a minimum residence requirement where the student must be enrolled full-time and attending the University of Ontario Institute of Technology. For the MASc program, students must spend a minimum of one year of full-time study in residence at UOIT.

Admission requirements

The minimum admission requirements for the MEng and MASc programs are as follows:

- Completion of an undergraduate engineering degree 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. Submission of one certified copy of each previous undergraduate and graduate transcript directly from the granting institute is required. It is the student's responsibility to provide a certified English translation of the transcript if the original is in another language. Applicants may be required to submit a brief description of the courses listed on their official transcripts or provide a copy of the relevant calendar where they are listed.

- A minimum of two letters of reference from persons having direct knowledge of the applicant's academic competence. Academic references are preferred; however professional references will be accepted. Letters of reference should come from individuals under whom the applicant has worked closely or studied. The quality of the letters will be assessed by the Graduate Committee of the Faculty of Engineering and Applied Science to make sure relevant requirements have been met.

- Proof of English proficiency is needed from those applicants whose first language is not English.

- Since close technical contact with a faculty member is an essential part of graduate education in engineering, MASc students must find a professor, who specializes in the applicant's desired area of research, willing to act as a supervisor, prior to being accepted into the program. MEng students who wish to do the MEng-Project option must 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 must transfer into the MEng-Course option.

Degree requirements

Table 4-1 summarizes the degree requirements for the MASc, MEng-Project, and MEng-Course programs. For any one of these programs, a student must complete 30 credits.

For the MASc program, a student must complete five courses worth a total of 15 credits and a thesis worth 15 credits. In addition to the five courses, the student must successfully complete ENGR 5003G – Seminar. MASc students must spend a minimum of one academic year of full-time study in residence at the University of Ontario Institute of Technology. The maximum time for completion of a MASc degree is three years, or five years for students who switch to part-time status, measured from the date the student entered the program. No financial support will be available from the Faculty after two years.

For the MEng-Project option, a student must complete seven courses worth a total of 21 credits and a project worth nine credits. For the MEng-Course option, a student must complete 10 courses worth a total of 30 credits. The maximum time for completion of a MEng degree is three years, or five years for part-time students, measured from the date the student entered the program.

Section 4.4 provides a list of available courses and Section 4.5 provides detailed course descriptions and outlines.

Table 4-1: Degree Requirements

Program	Required - Credits	Options - Credits	Total Credits
MASc	Thesis plus ENGR 5003G – Seminar - 15 Credits	5 Courses - 15 Credits	30
MEng-Project	Project - 9 Credits	7 courses - 21 Credits	30
MEng-Course		10 courses - 30 Credits	30

Progress reports

After completing the first year of their program and in each year thereafter, MASc students must complete a progress report that outlines what they have done in the previous year and what are their objectives for the following year. This progress report must be submitted to the student's supervisory committee. Permission to continue in the program will be based on a satisfactory report as determined by the student's supervisory committee.

Thesis evaluation procedures

Within six months of starting a MASc program, a supervisory committee for the student must be formed. The supervisory committee for a MASc student will consist of the student's supervisor or supervisors plus two faculty members from UOIT. The FEAS Graduate Programs Director will be an ex-officio member of all supervisory committees.

The supervisory committee is chaired by a member of the committee other than the student's supervisor. The supervisory committee is responsible for monitoring and evaluating the student's progress through their program.

All MASc students must successfully defend their thesis in front of an examination committee. The examination committee for a MASc student will be comprised of the student's supervisory committee, plus an external examiner who may or may not be a faculty member of UOIT. All external examiners must be approved by the Associate Provost, Research and the Dean of Graduate Studies.

Language requirements

All applicants are required to give evidence of their oral and written proficiency in English. This requirement can be satisfied with one of the following criteria:

i) The student's mother tongue or first language is English.

ii) The student has studied full-time for at least three years (or equivalent in part-time studies) in a secondary school or university where the language of instruction and examination was English.

iii) The student has achieved the required proficiency on one of the tests in English language acceptable to the University of Ontario Institute of Technology: TOEFL (computer based) 220 or TOEFL (paper based) 560 or IELTS 7 or MELAB 85 or CAEL 60.

Distance delivery

The programs will not be delivered in a distance delivery manner at the present time. In the future, it is expected that distance/hybrid delivery of parts of the programs will be used where the subject matter permits. Distance delivery of courses will comply fully with Section 31 of the OCGS By-Laws governing distance delivery.

A WebCT course website will play a role in the delivery of resources for all courses: syllabus, schedule, assignments, solutions to homework assignments and tests, and past exams, handouts, and supplementary notes. Also, all UOIT and labs are equipped with VCR, DVD, data projectors, and wired and wireless Internet access.

4.3 Part-time studies

Part-time studies are primarily offered for the MEng program. To facilitate engineers from industry taking the MEng program, graduate courses are planned to be offered in the late afternoon or early evening. In general, all courses will be taught by regular faculty members. Part-time students may have course load restrictions.

The MASc program has a minimum residence requirement where the student must be enrolled full-time and attending the University of Ontario Institute of Technology. For the MASc program, students must spend a minimum of one year of full-time study in residence at UOIT.

4.4 Total graduate courses listed and level

Table 4-2 lists the proposed graduate courses to be offered, followed by detailed outlines for the proposed courses. Courses related to the Communications and Signal Processing areas are numbered as ENGR 56xxG. Courses related to the Software and Computer Systems areas are numbered as ENGR 57xxG. Courses related to Electronics and Mechatronics areas are numbered as ENGR 58xxG. Courses related to Control Systems and Power Systems areas are numbered as ENGR 59xxG.

MASc and MEng-Project students may take one ENGR 4xxxU level undergraduate course in lieu of a graduate level course, provided they have not already taken a similar course during their undergraduate degree and the course is approved by both the student's supervisor and the FEAS Graduate Programs Director. MEng-Course students may take up to two ENGR 4xxxU level undergraduate courses in lieu of up to two graduate level courses, again, provided they have not taken similar courses during their undergraduate degree and the courses are approved by the FEAS Graduate Programs Director.

Students will be allowed to take one graduate course (if they are in the MASc program) or two graduate courses (if they are in the MEng program) offered by other faculties at the UOIT or other universities, provided they are first approved by the FEAS Graduate Programs Director.

Courses will be offered on the basis of demand with the expectation that courses will be offered at a minimum of once every two years.

4.5 Collateral and supporting departments

The School of Energy Systems and Nuclear Science is affiliated with the Faculty of Engineering and Applied Science, and it is an integral component of these programs. Both the Faculty of Business and Information Technology and the Faculty of Science at the University of Ontario Institute of Technology are supporting the proposed programs, in part by providing faculty members who contribute their expertise and time to the proposed programs and by sharing resources where mutually beneficial.

Table 4.2 – List of the Proposed Graduate Courses

Course Number	Course Title
ENGR 5001G	MASc Thesis
ENGR 5002G	MEng Project
ENGR 5003G	Seminar
ENGR 5004G	Directed Studies
ENGR 5005G	Special Topics
ENGR 5010G	Advanced Optimization
ENGR 5610G	Stochastic Processes
ENGR 5620G	Digital Communications
ENGR 5630G	Statistical Signal Processing
ENGR 5640G	Advanced Wireless Communications
ENGR 5650G	Adaptive Systems and Applications
ENGR 5660G	Communication Networks
ENGR 5670G	Cryptography and Secure Communications
ENGR 5710G	Network Computing
ENGR 5720G	Pervasive and Mobile Computing
ENGR 5730G	Algorithms and Data Structures
ENGR 5740G	User Interface Design
ENGR 5750G	Software Quality Management
ENGR 5760G	Software Metrics
ENGR 5770G	Service Computing
ENGR 5780G	Advanced Computer Architecture
ENGR 5850G	Analog Integrated Circuit Design
ENGR 5860G	Digital Integrated Circuit Design
ENGR 5360G	Automotive Software and Electronics
ENGR 5910G	Embedded Real-Time Control Systems
ENGR 5920G	Analysis and Control of Nonlinear Systems
ENGR 5930G	Adaptive Control
ENGR 5940G	Intelligent Control Systems
ENGR 5950G	Computational Electromagnetics
ENGR 5960G	Power System Operations, Analysis and Planning
ENGR 5970G	Power Electronics
ENGR 5980G	Advances in Nuclear Power Plant Systems

Course Title: ENGR 5001G – MASc Thesis

- **Course Description and Content Outline:** The thesis is the major component of the MASc program and is carried out under the direction of the student's supervisor. The thesis may involve an investigation which is fundamental in nature, or may be applied, incorporating creative design. Through the thesis, candidates are expected to give evidence of competence in research and a sound understanding of the area of specialization involved.
- **Delivery Mode and Teaching Method:** N/A
- **Student Evaluation:** The student is required to write a research thesis. Upon completion, the student must defend the thesis in front of an examination committee comprised of his or her supervisory committee plus an external examiner.
- **Suggested Textbook:** None
- **Learning Outcomes:** Students who successfully complete the MASc thesis have reliably demonstrated the ability to:
  Outcome 1: understand and explain the essential facts, concepts, principles, and theories relating to their research topic.
  Outcome 2: effectively use advanced tools for research.
  Outcome 3: apply the principles of effective data management, information organization, and information-retrieval skills to data of various types.
  Outcome 4: critically evaluate advanced information and knowledge and their implementation.
  Outcome 5: understand, explain, and solve problems using quantitative and qualitative methods.
  Outcome 6: design and conduct experiments, analyze and interpret experimental data, and/or computational results.
  Outcome 7: prepare and present, orally and in writing, to peers and experts, a systematic report on a significant research topic.

- **Information About Course Designer/Developer:**
  Course designed by S. Nokleby, PhD, Faculty of Engineering and Applied Science

- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  All Faculty Members

- **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 Professional Engineers.

Course Title: ENGR 5002G – MEng Project

- **Course Description and Content Outline:** The MEng Project provides students with the opportunity, under the supervision of a faculty member, to integrate and synthesize knowledge gained throughout their program of study. The chosen topic will be dependent on the area of specialization of the student.
- **Delivery Mode and Teaching Method:** N/A
- **Student Evaluation:** Students are required to write a report and give a presentation on their completed project. Upon completion, the student must defend the project in front of an examination committee.
- **Suggested Textbook:** None
- **Learning Outcomes:** Students who successfully complete the MEng project have reliably demonstrated the ability to:
  Outcome 1: understand and explain the essential facts, concepts, principles, and theories relating to their research topic.
  Outcome 2: identify problems and opportunities for system analysis, design, improvement, and optimization.
  Outcome 3: understand, explain, and solve problems using quantitative and qualitative methods.
  Outcome 4. organize and complete a significant project in a timely manner.
  Outcome 5: synthesize significant information from the project and prepare well organized and complete technical reports.
  Outcome 6: prepare and present, orally and in writing, to peers and experts, a final report on a significant project.

- **Information About Course Designer/Developer:**
  Course designed by S. Nokleby, PhD, Faculty of Engineering and Applied Science

- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  All Faculty Members

- **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 Professional Engineers.

Course Title: ENGR 5003G – Seminar

- **Course Description and Content Outline:** Participation in a program of seminars by internal and external speakers on current research topics. All MASc students will be required to give a seminar on their thesis research during the second year of their program.
- **Delivery Mode and Teaching Method:** Mandatory attendance in a series of seminars by internal and external speakers.
- **Student Evaluation:** Pass/Fail
- **Suggested Textbook:** None
- **Learning Outcomes:** Students who successfully complete the course have reliably demonstrated the ability to:
  Outcome 1: comply with the social, professional, and ethical requirements involved in advanced education and research.
  Outcome 2: examine and reflect on contemporary issues and professional and ethical responsibilities which impact both engineering, and their specific area of interest.
  Outcome 3: appreciate the need, and have the knowledge and skills required to further their education through lifelong learning.
  Outcome 4: prepare and present a research seminar on a significant topic, to an audience of peers and experts.
  Outcome 5: receive and respond to questions, critique and other feedback from peers and experts.

- **Information About Course Designer/Developer:**
  Course designed by S. Nokleby, PhD, Faculty of Engineering and Applied Science

- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  N/A

- **Faculty qualifications required to teach/supervise the course:**
  N/A

Course Title: ENGR 5004G – Directed Studies

- **Course Description and Content Outline:** Faculty permission may be given for supervised research projects, individual study, or directed readings. Students wishing to pursue a course of directed studies must, with a faculty member who is willing to supervise such a course, formulate a proposal accurately describing the course content, the learning goals, the intended method and extent of supervision, and the method by which work will be evaluated. This course may only be taken once.
- **Delivery Mode and Teaching Method:** Dependent on the Topic
- **Student Evaluation:** Dependent on the Topic
- **Suggested Textbook:** Dependent on the Topic
- **Learning Outcomes:** Dependent on the Topic

- **Information About Course Designer/Developer:**
  Course designed by S. Nokleby, PhD, Faculty of Engineering and Applied Science

- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  All Faculty Members

- **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 Professional Engineers.

Course Title: ENGR 5005G – Special Topics

- **Course Description and Content Outline:** Presents material in an emerging area or one not covered in regular offerings. May be taken more than once, provided the subject matter is substantially different.
- **Delivery Mode and Teaching Method:** Dependent on the Topic
- **Student Evaluation:** Dependent on the Topic
- **Resources to be purchased by students:** Dependent on the Topic
- **Suggested Textbook:** Dependent on the Topic
- **Learning Outcomes:** Dependent on the Topic

- **Information About Course Designer/Developer:**
- Course designed by S. Nokleby, PhD, Faculty of Engineering and Applied Science

- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  All Faculty members

- **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 Professional Engineers.

Course Title: ENGR 5010G – Advanced Optimization

- **Course Description and Content Outline:** The objective of this course is to understand the principles of optimization and its application to engineering problems. Topics covered include: the steepest descent and Newton methods for unconstrained optimization; golden section, quadratic, cubic and inexact line searches; conjugate and quasi-Newton methods; the Fletcher-Reeves algorithm; fundamentals of constrained optimization theory; simplex methods for linear programming; modern interior-point methods; active-set methods and primal-dual interior-point methods for quadratic and convex programming; semi-definite programming algorithms; sequential quadratic programming and interior-point methods for non-convex optimization. In addition, implementation issues and current software packages/algorithms for optimization will be covered. Global optimization, including genetic algorithms and simulated annealing, will be introduced.
- **Delivery Mode and Teaching Method:** 3 hours of lectures per week.
- **Student Evaluation:** Two major research projects: 30% and 50%, assignments: 20%.
- **Suggested Textbook:** Antoniou, A. and Lu, W.-S., (In-Press), *Optimization: Methods, Algorithms, and Applications*, Kluwer Academic.
- **Learning Outcomes:** Students who successfully complete the course have reliably demonstrated the ability to:
  Outcome 1: formulate and solve unconstrained and constrained optimization problems.
  Outcome 2: understand how the major unconstrained, constrained, and global optimization techniques work.
  Outcome 3: use optimization as a tool for solving engineering design problems.

- **Information About Course Designer/Developer:**
  Course designed by S. Nokleby, PhD, Faculty of Engineering and Applied Science

- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  S. Nokleby, S. Shahbazpanahi

- **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 Professional Engineers.

Course Title: ENGR 5610G – Stochastic Processes

- **Course Description and Content Outline:** Review of probability theory including, random variables, probability distribution and density functions, characteristic functions, convergence of random sequences, and laws of large numbers. Random processes, stationarity and ergodicity, correlation and power spectral density, cross-spectral densities, response of linear systems to stochastic input, innovation and factorization, Fourier and K-L expansion, mean square estimation, Markov chains and processes, queuing theory. Applications in communications and signal processing, emphasis on problem solving using probabilistic approaches.
- **Delivery Mode and Teaching Method:** 3 hours of class lectures per week.
- **Student Evaluation:** assignments: 10%, mid-term test: 20%, research project: 20%, and final exam: 50%.
- **Suggested Textbook:** A. Papoulis and S.U. Pillai, *Probability, Random Variables and Stochastic Processes*, McGraw-Hill, 2003, ISBN 0-07-366011-6
- **Learning Outcomes:** Students who successfully complete the course have reliably demonstrated the ability to:
  Outcome-1: apply the fundamentals of probability theory and random variables.
  Outcome-2: understand the meaning and importance of the laws of large numbers.
  Outcome-3: distinguish between strict-sense and wide-sense stationary random processes
  Outcome-4: analyze systems with stochastic inputs.
  Outcome-5: obtain the correlation functions of practically important stochastic processes and analyze it.
  Outcome-6: derive power spectral density for stationary signals.
  Outcome-7: expand the stochastic process.
  Outcome-8: factorize stochastic processes and whiten them.
  Outcome-9: grasp the importance of Markov process and basic renewal processes.
  Outcome-10: analyze birth-death processes.
  Outcome-11: appreciate and benefit from applying their knowledge on stochastic processes to the applications in Communications and Signal Processing.

- **Information About Course Designer/Developer:**
  Course designed by Shahram Shahbazpanahi, PhD, Faculty of Engineering and Applied Science

- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  S. Shahbazpanahi, A. Grami

- **Faculty qualifications required to teach/supervise the course:**
  PhD degree in Electrical Engineering and relevant experience in teaching and research. Faculty members will normally be registered Professional Engineers.

Course Title: ENGR 5620G – Digital Communications

- **Course Description and Content Outline:** Optimum receiver principles: AWGN, geometric representation of signals, maximum likelihood criterion and optimum decision regions, correlation receivers and matched filters, probability of error and union bound; digital bandpass modulation (ASK, FSK, PSK, QAM, CPFSK, CPM), baseband systems (PAM, PRS), performance comparisons: bit error rate, bandwidth, power, complexity; fundamental limits in information theory: entropy and the source coding theorem; channel capacity and the channel coding theorem; information capacity theorem and design trade-offs
- **Delivery Mode and Teaching Method:** 3 hours of class lectures per week.
- **Student Evaluation:** assignments: 20%, mid-term test: 30%, and final exam: 50%.
- **Suggested Textbook:** J.G. Proakis, *Digital Communications*, McGraw-Hill, 2001, ISBN 0-07-232111-3.
- **Learning Outcomes:** Students who successfully complete the course have reliably demonstrated the ability to:
  Outcome-1: understand Gram-Schmidt orthogonalization procedure.
  Outcome-2: categorize classes of noise and characterize Additive White Noise Gaussian Noise and its impact on performance.
  Outcome-3: analyze coherent detection of signals in noise.
  Outcome-4: grasp the fundamentals of optimum receivers.
  Outcome-5: derive probability of error and assess bit error rate and symbol error rate.
  Outcome-6: find spectra for various modulation schemes and line codes.
  Outcome-7: identify trade-offs for coherent and non-coherent detection schemes.
  Outcome-8: know theoretical aspects design trade-offs for all M-PSK and M-QAM systems in use.
  Outcome-9: appreciate Shannon's theorems, their limits, roles, benefits, and design trade-offs.
  Outcome-10: obtain insights into rate distortion theory and its applications.

- **Information About Course Designer/Developer:**
  Course designed by Ali Grami, PhD, Faculty of Engineering and Applied Science and Faculty of Business and Information Technology.

- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  A. Grami, S. Shahbazpanahi.

- **Faculty qualifications required to teach/supervise the course:**
  PhD degree in Electrical Engineering and relevant experience in teaching and research. Faculty members will normally be registered Professional Engineers.

Course Title: ENGR 5630G – Statistical Signal Processing

- **Course Description and Content Outline:** Detection Theory: fundamentals of detection theory, Neyman-Pearson theorem, receiver operating characteristics, minimum probability of error, Bayes risk, binary multiple hypothesis testing, minimum Bayes risk detector, Maximum Likelihood detector, Chernoff bound, detection of deterministic and random signals. Estimation Theory: mathematics of estimation theory, minimum variance unbiased estimation, Cramer-Rao lower bund, linear models, general minimum variance unbiased estimation, best linear unbiased estimators, Maximum Likelihood estimation.
- **Delivery Mode and Teaching Method:** 3 hours of class lectures per week.
- **Student Evaluation:** mid-term test: 20%, research project: 40%, and final exam: 40%.
- **Suggested Textbook:** H.L. Van Trees, *Detection, Estimation, and Modulation Theory, Part I*, John Wiley, 2004, ISBN 0-471-09517-6.
- **Learning Outcomes:** Students who successfully complete the course have reliably demonstrated the ability to:
  Outcome-1: apply the fundamentals of detection and estimation.
  Outcome-2: characterize the operation of a detector.
  Outcome-3: understand the concepts of consistency and bias in estimation.
  Outcome-4: decide which criteria to use to estimate or to detect a parameter.
  Outcome-5: derive performance bounds for estimation or a detection problem.
  Outcome-6: analyze the performance of different estimation or detection techniques by comparing the performance of the estimator or detector with the corresponding bounds.
  Outcome-7: appreciate the Maximum Likelihood approach in detection and estimation.
  Outcome-8: apply the theory of estimation and detection to communication systems.
  Outcome-9: grasp the basic idea of linear estimators.
  Outcome-10: apply the theory of estimation to spectral analysis and array processing.
- **Information About Course Designer/Developer:** Course designed by S. Shahbazpanahi, PhD, Faculty of Engineering and Applied Science
- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  S. Shahbazpanahi, A. Grami
- **Faculty qualifications required to teach/supervise the course:**
  PhD degree in Electrical Engineering and relevant experience in teaching and research. Faculty members will normally be registered Professional Engineers.

Course Title: ENGR 5640G – Advanced Wireless Communications

- **Course Description and Content Outline:** Wireless communications systems, technologies, and standards; propagation environments (indoor/outdoor, fixed/mobile, cordless/wireless, voice/data/video/multimedia, radio/infra-red/optical, terrestrial/satellite); spread spectrum techniques; multiple access schemes (TDMA, OFDM, MC-CDMA), duplexing methods and diversity techniques; mobile cellular systems: frequency reuse, cell splitting, cellular traffic, call processing, hand-off, roaming, location determination; radio link analysis; multipath fading and fading models; wireless security and protocols, ad hoc mobile and sensor networks; link design aspects for emerging techniques (UWB, RFID)
- **Delivery Mode and Teaching Method:** 3 hours of class lectures per week.
- **Student Evaluation:** assignments: 10%, mid-term test: 20%, research project: 20%, and final exam: 50%.
- **Suggested Textbook:** S.G. Glisic, *Advanced Wireless Communications*, Wiley, 2004, ISBN 0-470-86776-0.
- **Learning Outcomes:** Students who successfully complete the course have reliably demonstrated the ability to:
  Outcome-1: understand and apply the fundamentals of IEEE wireless standards (WLAN, WPAN, WMAN).
  Outcome-2: describe the principles of operations of cellular mobile systems (IS-95, I-136, GSM, 3G-WCDMA).
  Outcome-3: assess diversity techniques (time, space, polarization, frequency, angle, multipath).
  Outcome-4: characterize various fading channels and appreciate various fading models and parameters.
  Outcome-5: explain how equalization and synchronization methods are employed in wireless environments.
  Outcome-6: analyze Orthogonal Frequency Division Multiplexing and Multi-Carrier CDMA.
  Outcome-7: carry out network modeling, analysis, and simulation.
  Outcome-8: research major issues in mobile ad hoc and sensor networks and provide potential solutions.
  Outcome-9: conduct thorough link budgets for emerging wireless systems.
  Outcome-10: grasp the basics of space-time coding and their benefits and applications.
- **Information About Course Designer/Developer:**
  Course designed by A. Grami, PhD, Faculty of Engineering and Applied Science and Faculty of Business and Information Technology.
- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  A. Grami, S. Shahbazpanahi.
- **Faculty qualifications required to teach/supervise the course:**
  PhD degree in Electrical Engineering and relevant experience in teaching and research. Faculty members will normally be registered Professional Engineers.

Course Title: ENGR 5650G – Adaptive Systems and Applications

- **Course Description and Content Outline:** This course covers algorithms, filter structures, and applications in adaptive systems. Basic information-processing operations and recursive algorithms are discussed. Also, distinct methods for deriving recursive algorithms for the operation of adaptive filters are identified. Lastly, applications of adaptive filters, mainly to digital communication systems, are explored in details.
- **Content Outline by Topic:**
  - o Linear filtering problem and their types
  - o Recursive algorithms and their parameters
  - o Methods for deriving algorithms
  - o Applications of adaptive filters to communications
- **Delivery Mode and Teaching Method:** 3 hours of lectures per week.
- **Student Evaluation:** Mid-term exam: 20%, research project and presentation: 40%, assignments: 20%, and final exam: 20%.
- **Suggested Textbook:** S. Haykin, *Adaptive Filter Theory*, Pearson Education, 2001, ISBN 0130901261.
- **Learning Outcomes:** Students who successfully complete the course have reliably demonstrated the ability to:
  Outcome 1: model filtering, smoothing, and prediction problems.
  Outcome 2: analyze algorithms based on various performance measures, such as rate of convergence, mis-adjustment, robustness, computational requirements, structure, and numerical properties.
  Outcome 3: understand methods for deriving recursive algorithms, namely Wiener filter theory, Kalman filter theory, and least squares.
  Outcome 4: assess performance of transversal and lattice structures in adaptive systems.
  Outcome 5: apply adaptive filters to communications, namely to system identification, adaptive equalization, spectrum estimation, noise and echo cancellation, adaptive beam forming, and carrier and symbol synchronization.
  Outcome 6: carry out numerical analysis and computer simulations for various adaptive systems and a variety of scenarios.

- **Information about Course Designer/Developer:**
  Course designed by A. Grami, PhD, Faculty of Engineering and Applied Science and Faculty of Business and Information Technology

- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  S. Shahbazpanahi, A. Grami

- **Faculty qualifications required to teach/supervise the course:**
  PhD degree in electrical engineering, and relevant experience in teaching and research. Faculty members will normally be registered Professional Engineers.

Course Title: ENGR 5660G – Communication Networks

- **Course Description and Content Outline:** Transmission media: guided (twisted-pair/coaxial/fibre) and non-guided (infra-red/radio/optical); network types and topologies; multiplexing (FDM, TDM, WDM), circuit switching and telephone network; the Internet and communications layers; broadband systems (T1, xDSL, cable modems); error detection schemes (parity, CRC, checksum); Automatic Repeat Request mechanisms; random access techniques (ALOHA, CSMA); controlled access techniques (reservation, polling); wired/wireless LANs; congestion control and quality of service; delay and loss performance in basic queuing models
- **Delivery Mode and Teaching Method:** 3 hours of class lectures per week.
- **Student Evaluation:** assignments: 20%, mid-term test: 30%, and final exam: 50%.
- **Suggested Textbook:** A. Leon-Garcia and I. Widjaja, *Communication Networks*, McGraw-Hill, 2004, ISBN 0-07-246352-X
- **Learning Outcomes:** Students who successfully complete the course have reliably demonstrated the ability to:
  Outcome-1: understand PSTN and digital telephony, including signalling and switching.
  Outcome-2: describe the fundamentals of broadband transmission systems and networking and multimedia applications requirements.
  Outcome-3: assess circuit switching and packet switching (virtual-circuit and datagram).
  Outcome-4: explain essential elements of stack protocols, including full appreciation of MAC, TCP/IP layers.
  Outcome-5: illustrate how the routing and traffic management in packet networks are done.
  Outcome-6: compare (Stop-and-Wait, Go-back-N, Selective-Repeat) ARQ techniques in terms of complexity and throughput.
  Outcome-7: analyze various types of wired/wireless LAN access methods, topologies and standards.
  Outcome-8: grasp how error detection and correction work in the data link layer
  Outcome-9: perform basic delay analysis, including Little's formula and identify performance measures.
  Outcome-10: derive results for M/G/1 queue, Erlang-B and Erlang-C formulas, carry out performance modeling and queuing analysis.

- **Information About Course Designer/Developer:**
  Course designed by faculty eligible to teach this course: A. Grami, PhD, Faculty of Engineering and Applied Science and Faculty of Business and Information Technology

- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  A. Grami

- **Faculty qualifications required to teach/supervise the course:**
  PhD degree in Electrical Engineering and relevant experience in teaching and research. Faculty members will normally be registered Professional Engineers.

Course Title: ENGR 5670G – Cryptography and Secure Communications

- **Course Description and Content Outline:** This course covers diverse topics on cryptography and security including classical encryption, symmetric and public-key cryptography, key management, message authentication, digital signatures, denial-of-service (DoS), distributed DoS, malicious software, and intrusion detection systems.
- **Content Outline by Topic:**
  - o Introduction to security and cryptography
  - o Classical cryptography and block ciphers and Data Encryption Standard
  - o Advanced Encryption Standard
  - o Confidentiality using symmetric encryption
  - o Public-key cryptography and RSA, and key management
  - o Message authentication and hash functions and authentication applications
  - o Web security, malicious software & denial-of-service attacks
  - o Firewalls & intrusion detection systems
- **Delivery Mode and Teaching Method:** 3 hours of lectures per week.
- **Student Evaluation:** mid-term test: 20%, research project and presentation: 30%, assignments: 25%, and final exam: 25%.
- **Suggested Textbook:** W. Stallings. *Cryptography and Network Security: Principles and Practices (4th edition)*. Prentice Hall, 2006. ISBN: 0131873164.
- **Learning Outcomes:** Students who successfully complete the course have reliably demonstrated the ability to:
  - Outcome 1: apply fundamentals of security, and symmetric and public-key cryptography, including block ciphers, RSA, key management, hash functions, detection of and reaction to mal-code attacks, mitigation of denial-of-service attacks, and network disruptions.
  - Outcome 2: articulate the basic fundamentals of number theory applied to cryptography in order to provide confidentiality, integrity and availability in information systems.
  - Outcome 3: assess the security of information systems based on the quality of cryptographic algorithms and protocols, authentication systems, firewalls, and intrusion detection systems.
  - Outcome 4: design secure information systems using symmetric and public-key cryptography applied to Web services and transactions.
  - Outcome 5: determine the suitability of a security system based on its cryptographic strengths and vulnerabilities, and the value and significance of the protected information.
  - Outcome 6: evaluate the security of commercial applications by understanding the fundamentals of their underlying cryptographic algorithms.

- **Information about Course Designer/Developer:**
  Course designed by M. Vargas Martin, PhD, Faculty of Engineering and Applied Science and Faculty of Business and Information Technology

- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  M. Vargas Martin, R. Liscano

- **Faculty qualifications required to teach/supervise the course:**
  PhD degree in engineering/computer science, & relevant experience in teaching & research. Faculty members will normally be registered Professional Engineers.

Course Title: ENGR 5710G – Network Computing

- **Course Description and Content Outline:** This course will introduce the students to topics in Internet Programming, Distributed Software Components, Network Computing Paradigms, and Service Oriented Architectures.
- **Content outline by topic:**
  - o Internet Programming: Socket Programming, Remote Procedure Calls (RPCs and XML-RPCs), Remote Method Invocation (RMI), CORBA, and IIOP.
  - o Distributed Software Components: Java Beans, DCOM/COM, Active X, and Enterprise Java Beans (EJBs).
  - o Network Computing Paradigms: client/server, publish-subscribe, blackboard and tuple-space, and peer-to-peer computing.
  - o Service Oriented Architectures (SOA): Web Services Modelling, Web Services Description Language (WSDL), Simple Access Object Protocol (SOAP), WS-Eventing and Universal Description Discovery and Integration (UDDI).
- **Delivery Mode and Teaching Method:** 3 hours of lectures per week.
- **Student Evaluation:** Mid-term exam: 20%, research project: 30%, assignments: 15%, and final exam: 25%, paper review: 10%.
- **Suggested Textbook:** A. S. Tanenbaum and M. van Steen, *Distributed, Systems: Principles and Paradigms*, Prentice Hall, ISBN 0130888931, 2001
  Erl, T., *Service-Oriented Architecture: A Field Guide to Integrating XML and Web Services*, Prentice Hall. ISBN: 0131428985, 2004.
- **Learning Outcomes:** Students who successfully complete the course have reliably demonstrated the ability to:
  Outcome 1: communicate among distributed objects using Sockets, RPC, and RMI.
  Outcome 2: develop distributed software systems by leveraging Java Beans, DCOM/COM, Active X, and Enterprise Java Beans.
  Outcome 3: understand fundamental networking computing paradigms like client/server, publish-subscribe, blackboard and tuple spaces, and peer-to-peer computing.
  Outcome 4: understand how distributed systems are built using the Service Oriented Architecture model and leveraging web services.

- **Information About Course Designer/Developer:**
  Course designed by faculty eligible to teach this course: R. Liscano, PhD, Faculty of Engineering and Applied Science and P. Hung, Faculty of Business and Information Technology.

- **Identify faculty to teach the course and/or statement "faculty to be hired":** R. Liscano, Faculty of Engineering and Applied Science, P. Hung, Faculty of Business and IT

- **Faculty qualifications required to teach/supervise the course:**
  PhD degree in Engineering or Computer Science with relevant experience in teaching and research. Faculty members will normally be registered Professional Engineers.

Course Title: ENGR 5720 – Pervasive and Mobile Computing

- **Course Description and Content Outline:** An introduction and comprehensive view into technologies relevant to pervasive and mobile computing. An overview of cellular and personal wireless area networks, service discovery protocols, context-aware computing, and middleware platforms and software to support pervasive and mobile computing.
- **Content outline by topic:**
  - Mobility Management in Wireless Networks.
  - Wireless Personal Area Networks (802.11, Bluetooth, 802.15)
  - Service Discovery Models and Protocols (JINI, Bluetooth SDP, SLP, UPnP)
  - Content Adaptation models
  - Context aware computing and contextual modeling
  - Middleware Software for Pervasive Computing: Agent Models, HAVi, OSGI.
  - Middleware Communication Protocols, SIP, and Tuple Spaces
  - Mobile Security and Privacy
- **Delivery Mode and Teaching Method:** 3 hours of lectures per week
- **Student Evaluation:** Mid-term exam (20%), research project (30%), assignments (15%), and final exam (25%), paper review (10%).
- **Suggested Textbook:** F. Adelstein, S.K.S. Gupta, G.G. Richard III, and L. Schwiebert, *Fundamentals of Mobile and Pervasive Computing*, The McGraw-Hill Companies, ISBN 0-07-141237-9, 2005.
- **Learning Outcomes.** Students who successfully complete the course have reliably demonstrated the ability to:
  Outcome 1: understand mobility management in cellular networks.
  Outcome 2: articulate the basic protocols required for personal wireless area networks.
  Outcome 3: describe, explain, and model the mechanisms required for service discovery.
  Outcome 4: model contextual information and understand its use on mobile applications.
  Outcome 5: understand the basic components required for the design of mobile middleware platforms.
  Outcome 6: understand how the most recent communication models are used in pervasive and mobile computing.
  Outcome 7: describe how media content can be adapted based on mobile constraints and contextual information.
  Outcome 8: understand the fundamental components required to support mobile security and privacy.

Information About Course Designer/Developer:
Course designed by R. Liscano, PhD, Faculty of Engineering and Applied Science

Identify faculty to teach the course and/or statement "faculty to be hired":
R. Liscano

Faculty qualifications required to teach/supervise the course:
PhD degree in engineering and/or computer science. Relevant experience in teaching and research. Faculty members will normally be registered Professional Engineers.

Course Title: ENGR5730G – Algorithms and Data Structures

- **Course Description and Content Outline:** This course studies the mathematical foundations of algorithms and data structures, covering sorting and searching algorithms, stacks, queues, lists, trees, hash tables, search trees, binomial heaps, minimum spanning trees, shortest paths, the theory of NP-completeness, and approximation algorithms.
- **Content Outline by Topic:**
  - o Functions, summations, recurrences, set theory, counting
  - o The heap sort algorithm and the quick sort algorithm
  - o Lower bounds for sorting
  - o Stacks and queues
  - o Linked lists, trees
  - o Hash tables and functions
  - o Insertion and deletion in binary search trees
  - o Message authentication and hash functions
  - o Binomial trees and breadth-first and depth-first search, minimum spanning trees
  - o Dijkstra's algorithm and the Bellman-Ford algorithm
  - o Theory of NP-completeness proofs and problems
  - o Approximation algorithms to NP problems
- **Delivery Mode and Teaching Method:** 3 hours of lectures per week
- **Student Evaluation:** mid-term exam: 20%, research project and presentation: 25%, homework assignments: 15%, and final exam: 40%.
- **Suggested Textbook:** T.H. Cormen, *et al. Introduction to Algorithms (2nd ed.)*. MIT Press, McGraw-Hill, New York, USA, 2006.
- **Learning Outcomes:** Students who successfully complete the course have reliably demonstrated the ability to:
  Outcome 1: apply the fundamentals of algorithms analysis and design, and data structures.
  Outcome 2: articulate the fundamentals of sorting and searching algorithms for data structures.
  Outcome 3: analyze problems from the perspective of computational efficiency.
  Outcome 4: design solutions that involve efficient algorithms to perform fundamental computation tasks that operate on appropriate and efficient data structures.
  Outcome 4: analyze the algorithmic complexity of problems and be able to design approximation algorithms for NP problems.

- **Information About Course Designer/Developer:**
  Course designed by M. Vargas Martin, PhD, Faculty of Engineering and Applied Science and Faculty of Business and Information Technology

- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  M. Vargas Martin, R. Liscano

- **Faculty qualifications required to teach/supervise the course:**
  PhD degree in electrical/software engineering or computer science, and relevant experience in teaching & research.

Course Title: ENGR 5740G – User Interface Design

- **Course Description:** This course is an introduction to user interface design and implementation on a wide range of hardware platforms. It covers the basic techniques used in user interface design, how users behave, implementation tools and techniques and the evaluation of user interface designs. It covers both desktop and mobile environments, including the design of user interfaces for cell phones, PDAs and mobile games.
- **Course Outline by Topic:**
  - o User behaviour: Basic cognitive psychology, Types of users, Usage patterns
  - o Design methodologies
  - o Prototyping
  - o Design and implementation tools: Prototyping systems, Software libraries, GUI builders
  - o Evaluation of user interface designs: Mathematical models, User studies, Experimental techniques
  - o User interfaces for mobile and embedded devices: Design challenges with limited devices: Mobile devices: cell phones, PDAs, and mobile entertainment, Appliances and consumer devices
- **Delivery Mode and Teaching Method:** 3 hours of lectures per week.
- **Student Evaluation:** assignments: 30%, final project: 25% and final examination: 45%.
- **Suggested Textbook:** Alan Cooper and Robert Reimann, *About Face 2.0: The Essentials of Interaction Design*, Wiley, 2003, 0764526413.
- **Learning Outcomes:** Students who successfully complete the course have reliably demonstrated the ability to:
  - Outcome 1: apply in-depth knowledge of the important properties of users and how they impact user interface design.
  - Outcome 2: design and implement user interfaces for desktop, mobile and embedded environments.
  - Outcome 3: illustrate the importance of evaluating user interface designs both before and after they are implemented.
  - Outcome 4: follow a formal user interface design and implementation methodology.
  - Outcome 5: select the appropriate tools for the design and implementation of a user interface and be able to use them in a competent manner.
  - Outcome 6: apply in-depth understanding of the important difference between user interfaces for a desktop environment and user interfaces for mobile and embedded environments.

- **Information About Course Designer/Developer:**
  Course designed by M. Green, PhD, Faculty of Science

- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  M. Green and additional faculty will be hired.

- **Faculty qualifications required to teach/supervise the course:**
  PhD degree in Engineering or Computer Science with relevant experience in teaching and research. Faculty members may normally be registered Professional Engineers.

Course Title: ENGR 5750G – Software Quality Management

- **Course Description and Content Outline**: An intensive investigation into software quality engineering issues, including testing techniques, defect detection and prevention, reliability engineering, examination of maintenance issues and configuration management. Software evolution issues, including planning for evolution, round out the course. Students will do a major team project examining issues in defect reduction. The course will have a strong industrial flavour.
- **Content outline by topic:**
  - Introduction to software quality engineering
  - Software Quality Standards
  - Testing: concepts, issues and techniques
  - Life cycle testing
  - Coverage and usage testing
  - Software quality metrics
  - Defect reduction, defect classification
  - Software inspection
  - Developing a software quality plan
  - Safety and quality Issues
  - Software reliability engineering
  - Software evolution
  - Maintenance issues
- **Delivery Mode and Teaching Method:** 3 hours of lectures per week.
- **Student Evaluation:** Mid-term exam: 10%, research project and presentation: 20%, assignments: 30%, and final exam: 40%.
- **Suggested Textbook:** J. Tien, *Software Quality Engineering,* John Wiley 2005
- **Learning Outcomes:** Students who successfully complete the course have reliably demonstrated the ability to:
  Outcome 1: apply in-depth understanding of the importance of good quality in software.
  Outcome 2: explain and use the basic Quality Life Cycle.
  Outcome 3: use the 7 basic tools of quality control.
  Outcome 4: write a software quality management plan.
  Outcome 5: use software quality metrics.
  Outcome 6: implement defect reduction programs.
  Outcome 7: manage safety-software issues.
  Outcome 8: plan for the evolution of software.
  Outcome 9: manage software maintenance.
  Outcome 10: analysis case studies in software quality.

- **Information About Course Designer/Developer:**
  Course designed by J.M. Bennett, PhD, Faculty of Engineering and Applied Science

- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  J.M. Bennett, R. Liscano, C. Martin

- **Faculty qualifications required to teach/supervise the course:**
  PhD degree in engineering/computer science & relevant experience in teaching & research. Faculty members may be registered Professional Engineers.

Course Title: ENGR 5760G – Software Metrics

- **Course Description and Content Outline**: Analysis of software metrics. Introduction to the techniques of measurement. Syntax and semantics of software metrics. Planning a metrics program. Using metrics for prediction (quality, project time estimations). Case studies.
- **Content outline by topic:**
  - Fundamentals of Measurement and Experimentation.
  - Visualizing Metrics
  - Software Metrics
  - Estimation Metrics
  - Process Control with Software Metrics
  - Project Control with Software Metrics
  - Implementing and Managing a Metrics Program
  - Case Studies
- **Delivery Mode and Teaching Method:** 3 hours of lectures per week.
- **Student Evaluation:** Mid-term exam: 10%, research project and presentation: 20%, homework assignments: 30%, and final exam: 40%.
- **Suggested Textbook:** *Software Metrics, 2nd ed.* Fenton, N.E. & Pfleeger, S.L.
- **Learning Outcomes.** Students who successfully complete the course have reliably demonstrated the ability to
  Outcome 1: measure in an engineering way.
  Outcome 2: use the Goal-Question-Metric paradigm.
  Outcome 3: capture meaningful metrics.
  Outcome 4: display the reduced data in a meaningful way.
  Outcome 5: apply control theory to software metrics.
  Outcome 6: handle metrics related to product and process, internally and externally.
  Outcome 7: plan and execute a measurement program.
  Outcome 8: predict the outcome of software activities using appropriate metrics.
  Outcome 9: control and predict software project management.
  Outcome 10: analyze case studies.

- **Information About Course Designer/Developer:**
  Course designed by J.M. Bennett, PhD, Faculty of Engineering and Applied Science

- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  J.M. Bennett, R. Liscano, C. Martin

- **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 Professional Engineers.

Course Title: ENGR 5770G – Service Computing

- **Course Description and Content Outline:** This course introduces the fundamental concepts and applications of service computing. Service computing, as a new cross discipline, addresses how to enable IT technology to help people perform business processes more efficiently and effectively. One of the fundamental components in service computing is Web service. Web services are Internet-based application components published using standard interface description languages and universally available via uniform communication protocols. Web services let individuals and organizations do business over the Internet using standardized protocols to facilitate application-to-application interaction.
- **Content outline by topic:**
  - eXtensible Markup Language (XML)
  - Document Type Definitions (DTD)
  - XML Style Sheets (XSLT)
  - XML Path Language (XPath)
  - XML Schemas
  - Service Oriented Architecture (SOA)
  - Web Services Modelling
  - Web Services Description Language (WSDL)
  - Simple Access Object Protocol (SOAP)
  - Universal Description, Discovery and Integration (UDDI)
- **Delivery Mode and Teaching Method:** 3 hours of lectures per week.
- **Student Evaluation:** Mid-term exam (20%), research project and presentation (30%), programming homework assignments (20%), and final exam (30%).
- **Suggested Textbook:** Erl, T. 2004, *Service-Oriented Architecture: A Field Guide to Integrating XML and Web Services*, Prentice Hall. ISBN: 0131428985
- **Learning Outcomes.** Students who successfully complete the course have reliably demonstrated the ability to:

  Outcome 1: To provide a conceptual overview on contemporary XML and Web Services technologies.

  Outcome 2: To provide hands-on and programming opportunities on selected features of the technologies.

  Outcome 3: To provide basic skills of writing research reports.

  Outcome 4: To provide a basis for undertaking further courses or self-learning in related and/or more specific areas.

- **Information About Course Designer/Developer:**
  Course designed by P. Hung, Faculty of Business and IT
- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  P. Hung and additional faculty to be hired
- **Faculty qualifications required to teach/supervise the course:**
  PhD degree in computer science/information systems and relevant experience in teaching and research.

Course Title: ENGR 5780G – Advanced Computer Architecture

- **Course Description and Content Outline:** This course covers evolution of computer architecture and factors influencing the design of hardware and software elements of computer systems. Topics include processor micro-architecture and pipelining, performance measures, instruction set design, cache and virtual memory organizations; protection and sharing; I/O architectures, hazards and exceptions, dependencies, branch prediction, instruction-level parallelism, memory hierarchies, cache organization, buses, rotating storage and I/O subsystem design.
- **Content Outline by Topic:**
  - Quantitative principles of computer architecture
  - Instruction set principles and examples
  - Pipelining and instruction-level parallelism
  - Vector and novel processors
  - Memory-hierarchy design
  - Storage systems
  - Interconnection networks
  - Multiprocessors
- **Delivery Mode and Teaching Method:** 3 hours of lectures per week.
- **Student Evaluation:** Mid-term exam: 20%, research project and presentation: 20%, assignments: 20%, and final exam: 40%.
- **Suggested Textbook:** John L. Hennessy and David A. Patterson, *Computer Architecture: A Quantitative Approach*, 3rd Edition, 2002, ISBN 1-55860-596-7
- **Learning Outcomes:** Students who successfully complete the course have reliably demonstrated the ability to:
  Outcome 1: distinguish between various types of computer architectures.
  Outcome 2: apply in-depth understanding of the impact of different architectures on performance.
  Outcome 3: derive first-order equivalent electrical circuit for interconnection in the packaging with the help of computer aided design tools.
  Outcome 4: analyze different microprocessors and their usability in various architectures.
  Outcome 5: suggest ways to enhance performance of microprocessors and related architectures.
  Outcome 6: explain various storage systems, interconnection networks, principles of instruction sets.

- **Information about Course Designer/Developer:**
  Course designed by A. Grami, PhD, Faculty of Engineering and Applied Science and Faculty of Business and Information Technology

- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  J.M. Bennett and additional faculty to be hired

- **Faculty qualifications required to teach/supervise the course:**
  PhD degree in electrical engineering, and relevant experience in teaching & research. Faculty members will normally be registered Professional Engineers.

Course Title: ENGR 5850G – Analog Integrated Circuit Design

- **Course Description and Content Outline:** This course covers modeling of IC devices, current sources and mirrors, gain stages, level shifters, analysis and design of BJT and MOS operational amplifiers, current-feedback amplifiers, wideband amplifiers and comparators. Frequency response of amplifiers, feedback techniques, analysis and design, stability and compensation of amplifiers, high slew-rate topologies, noise in IC circuits, fully differential circuits, analog multipliers and modulators, CAD tools for circuit design and testing.
- **Content Outline by Topic:**
  - o Operational amplifiers modeling, applications and topologies
  - o CAD simulation tools, IC fabrication technology and device models
  - o Gain stages, current sources and active loads
  - o Frequency response: single-stage frequency response; multistage frequency response; frequency/time response relationship
  - o Feedback: gain sensitivity; effect on distortion; feedback configurations; effect of loading
  - o Frequency response and stability of feedback amplifiers
  - o Noise in integrated circuits: noise sources; noise models; circuit noise calculations; equivalent input noise generators; noise bandwidth; noise figure and noise temperature.
  - o Translinear and current-mode circuits
  - o Analog multipliers: Gilbert multiplier; multiplier specifications; multiplier applications
- **Delivery Mode and Teaching Method:** 3 hours of lectures per week.
- **Student Evaluation:** mid-term exam: 20%, research project and presentation: 20%, homework assignments: 20%, and final exam: 40%.
- **Suggested Textbook:** P.R. Gray, P.J. Hurst, S.H. Lewis, R.G. Meyer, J., *Analysis and Design of Analog Integrated Circuits*, Wiley & Sons, 2001, ISBN 0-471-32168-0, 4th Ed.
- **Learning Outcomes:** Students who successfully complete the course have reliably demonstrated the ability to:
  Outcome 1: analyze and design transistor-based op amp filter and oscillator topologies.
  Outcome 2: analyze and design multi-device gain stages in bipolar and MOS technologies.
  Outcome 3: analyze and design bandgap reference circuits.
  Outcome 4: analyze the frequency response of transistor-based amplifier topologies.
  Outcome 5: analyze and design feedback circuits & establish stability in feedback amplifiers.
  Outcome 6: analyze the noise performance of analog circuits.
  Outcome 7: analyze and design translinear circuits.
  Outcome 8: design an analog circuit of the students choosing to meet desired specifications.

- **Information about Course Designer/Developer:**
  Course designed by A. Grami, PhD, Faculty of Engineering and Applied Science and Faculty of Business and Information Technology

- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  Additional faculty o be hired

- **Faculty qualifications required to teach/supervise the course:**
  PhD degree in electrical engineering, and relevant experience in teaching & research. Faculty members will normally be registered Professional Engineers.

Course Title: ENGR 5860G – Digital Integrated Circuit Design

- **Course Description and Content Outline:** This course covers the analysis and design of digital integrated circuits. Students are instructed in methods and the use of computer-aided design tools for the design and testing of large-scale integrated digital circuits.
- **Content Outline by Topic:**
  - o CMOS devices and manufacturing
  - o Integrated circuit inter-connect
  - o CMOS combinational and sequential logic design
  - o CMOS design implementation and timing
  - o Static and dynamic characteristics
  - o DC and transient modeling
  - o CMOS datapath and control subsystems
  - o CMOS memory subsystems
  - o CMOS testing
- **Delivery Mode and Teaching Method:** 3 hours of lectures per week.
- **Student Evaluation:** mid-term exam: 20%, research project and presentation: 20%, homework assignments: 20%, and final exam: 40%.
- **Suggested Textbook:** Rabaey, Chandrakasan & Nikolic, *Digital Integrated Circuits: Design*, Prentice Hall, 2003., ISBN 01309009963
- **Learning Outcomes:** Students who successfully complete the course have reliably demonstrated the ability to:
  - Outcome 1: apply in depth understanding of CMOS inverter, CMOS combinational and CMOS sequential circuits.
  - Outcome 2: study and design the arithmetic building blocks, memory and array structures.
  - Outcome 3: explore and explain about the effect of interconnect on the performance of the circuits.
  - Outcome 4: consider the timing issues in high speed digital circuits and implement methods to overcome the issues.
  - Outcome 5: understand and apply the concepts of design methodologies and VLSI implementations.
  - Outcome 6: use CAD tools to design and verify typical digital circuits.

- **Information about Course Designer/Developer:**
  Course designed by A. Grami PhD, Faculty of Engineering and Applied Science and Faculty of Business and Information Technology

- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  M. Green and additional faculty to be hired

- **Faculty qualifications required to teach/supervise the course:**
  PhD degree in electrical engineering, and relevant experience in teaching and research. Faculty members will normally be registered Professional Engineers.

Course Title: ENGR 5360G – Automotive Software and Electronics

- **Course Description and Content Outline:** Automotive design software tools, including FEA, CFD, Unigraphics and other packages. Software development and integration for design and manufacturing of automobiles. Electrical systems in automobiles, including power supplies, junction transistors, sensors and rectifiers. Signal amplifiers, gain-bandwidth limitations and circuit models. Motor drive control, inverters, actuators, PWM controllers, active filters, signal conditioners, power electronics and regulators. Battery chargers and solar cells. Automotive applications and case studies.
- **Delivery Mode and Teaching Method:** 3 hours of lectures per week.
- **Student Evaluation:** assignments: 20%, course project: 30%, final examination: 50%
- **Suggested Textbook:** R. Bosch, *Automotive Electrics and Automotive Electronics*, John Wiley & Sons, New York, 2004 (ISBN 1-86058-436-5)
- **Learning Outcomes.** Students who successfully complete the course have reliably demonstrated the ability to:
  Outcome 1: have detailed understanding of electronics with applications to automotive systems, including microelectronics, sensors and control systems
  Outcome 2: design automotive electrical systems, including effects of electromagnetic compatibility and interference suppression
  Outcome 3: carry out analysis of alternators, batteries, starter motors and lighting systems
  Outcome 4: understand sensor technologies for speed, rpm, acceleration, temperature, vibrations and force sensors
  Outcome 5: design and operation of automotive software packages
  Outcome 6: understand data processing, software and data transfer between automotive electronic systems
  Outcome 7: gain detailed knowledge necessary to comprehend journal publications and other archival literature relevant to automotive software and electronics

- **Information About Course Designer/Developer:**
  Course designed by G. F. Naterer, PhD, Faculty of Engineering and Applied Science

- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  Additional faculty to be hired

- **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 Professional Engineers.

Course Title: ENGR 5910G – Embedded Real-Time Control Systems

- **Course Description and Content Outline:** This course focuses on the design and implementation techniques for embedded real-time control systems. It covers embedded system design, instruction sets for microprocessor architecture, I/O, interrupts, hardware and software of embedded systems, program design and analysis, practical issues, multi-tasking operating systems, scheduling and system design techniques.
- **Content outline by topic:**
  - o Embedded system design process
  - o Instruction sets for microprocessor architecture
  - o Mechanisms for input, output, and interrupts
  - o Basic hardware and software platforms and Embedded computing
  - o Program design and analysis
  - o Practical issues related to computer based control systems
  - o Multi-tasking operating systems for embedded applications
  - o Real-time programming in high-level languages
  - o Priority scheduling and System design techniques
- **Delivery Mode and Teaching Method:** 3 hours of lectures per week.
- **Student Evaluation:** mid-term exam: 20%, research project and presentation: 25%, homework assignments: 15%, and final exam: 40%.
- **Suggested Textbook:** Wittenmark, K.J. 2000, *Principles of Embedded Computing System Design,* Wayne Wolf, Morgan Kaufmann Publishers. ISBN 1-55860-541-X
- **Learning Outcomes:** Students who successfully complete the course have reliably demonstrated the ability to:
  - Outcome 1: articulate the characteristics of embedded and real-time systems in terms of functionality, time constraints, power consumption, cost and development environment.
  - Outcome 2: become familiar with the design process in real-time applications; use UML modeling language to design real-time applications.
  - Outcome 3: describe architecture features of major embedded processors; understand the difference between the two processors; and use instruction sets of these processors to accomplish simple operations.
  - Outcome 4: understand and illustrate major challenges in embedded computing system design.
  - Outcome 5: apply knowledge of practical issues related to computer based control systems: PID tuning, anti-aliasing filters, integrator saturation and windup, switch de-bouncing, selection of sampling rates.
  - Outcome 6: write simple programs with multi-tasking operating systems.
  - Outcome 7: design, build and integrate hardware and software for simple real-time embedded applications.
  - Outcome 8: use industry-grade tools & development environment for embedded applications.
- **Information About Course Designer/Developer:**
  Course designed by J. Ren, PhD, Faculty of Engineering & Applied Science and L. Lu, PhD, School of Energy Systems & Nuclear Science and Faculty of Engineering & Applied Science
- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  J. Ren, L. Lu
- **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 Professional Engineers.

Course Title: ENGR 5920G – Analysis and Control of Nonlinear Systems

- **Course Description and Content Outline:** Introduction to nonlinear systems, phase plane analysis, stability determination by Lyapunov direct method, advanced stability theory, existence of Lyapunov functions, describing function analysis, nonlinear control system design by feedback linearization, sliding control, variable structure control, adaptive control of linear and nonlinear systems, control of multi-output systems, control of multi-input multi-output systems.
- **Content outline by topic:**
  - o Introduction to nonlinear systems
  - o Planar systems and their phase space
  - o Lyapunov stability theory
  - o Input-output stability
  - o Absolute stability
  - o Passivity
  - o Perturbed systems
  - o Feedback linearization
  - o Sliding mode control
  - o Back-stepping control
  - o Lyapunov based adaptive control
  - o Nonlinear observers
- **Delivery Mode and Teaching Method:** 3 hours of lectures per week.
- **Student Evaluation:** mid-term exam: 20%, research project and presentation: 25%, homework assignments: 15%, and final exam: 40%.
- **Suggested Textbook:** Khalil, H.K. *Nonlinear Systems – 3rd Edition*. Prentice Hall, 2002.
- **Learning Outcomes:** Students who successfully complete the course have reliably demonstrated the ability to:
  - Outcome 1: apply knowledge of the basic fundamentals of nonlinear phenomena: multiple equilibria, limit cycles, complex dynamics, bifurcations.
  - Outcome 2: identify second order nonlinear systems: phase plane techniques, limit cycles-Poincare-Bendixson theory, index theory.
  - Outcome 3: understand Input-output analysis and stability: small gain theorem, passivity, describing functions.
  - Outcome 4: understand and apply Lyapunov stability theory: basic stability and instability theorems, LaSalle's theorem, indirect method of Lyapunov.
  - Outcome 5: linearize a system by state feedback: input-output and full state linearization, zero dynamics, inversion, tracking, stabilization.
  - Outcome 6: apply basic software tools to the analysis of nonlinear systems.

- **Information About Course Designer/Developer:**
  Course designed by L. Lu, PhD, School of Energy Systems and Nuclear Science and Faculty of Engineering and Applied Science

- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  L. Lu and E. Esmailzadeh

- **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 Professional Engineers.

Course Title: ENGR 5930G – Adaptive Control

- **Course Description and Content Outline:** This is a course on the general principles of adaptive control and learning. This course will cover real-time parameter estimation, deterministic self-turning regulators, stochastic & predictive self-tuning regulators, model reference adaptive systems, gain-scheduling, properties of adaptive systems, robust adaptive control schemes, adaptive control of nonlinear systems, practical issues and implementation.
- **Content outline by topic:**
  - Real-time parameter estimation
  - Deterministic self-turning regulators
  - Stochastic & predictive self-tuning regulators
  - Model reference adaptive systems
  - Gain-scheduling
  - Properties of adaptive systems
  - Robust adaptive control schemes
  - Adaptive control of nonlinear systems
  - Practical issues and implementation
- **Delivery Mode and Teaching Method:** 3 hours of lectures per week.
- **Student Evaluation:** mid-term exam: 20%, research project and presentation: 25%, homework assignments: 15%, and final exam: 40%.
- **Suggested Textbook:** K. J. Astrom and B. Wittenmark, *Adaptive Control*, 2nd , Addison-Wesley, 1995
- **Learning Outcomes.** Students who successfully complete the course have reliably demonstrated the ability to

  Outcome 1: utilize the fundamental concepts of adaptive control and learning.
  Outcome 2: understand and apply the concepts of convergence, stability, and robustness to analyze control systems.
  Outcome 3: estimate parameters and learn models from empirical data.
  Outcome 4: understand and analyze the behavior of adaptive control schemes such as model reference, adaptive control and self tuning regulators.
  Outcome 5: articulate perturbation and averaging theory.
  Outcome 6: use advanced stability theory to analyze adaptation schemes.
  Outcome 7: design of gain-scheduling controllers.
  Outcome 8: be familiar with practical issues in implementation of adaptive controllers.

- **Information About Course Designer/Developer:**
  Course designed by J. Ren, PhD, Faculty of Engineering & Applied Science
- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  J. Ren, L. Lu
- **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 Professional Engineers.

Course Title: ENGR 5940G – Intelligent Control Systems

- **Course Description and Content Outline:** With the advance of increasingly faster computing hardware and cheaper memory chips, computational intelligence, also known as a part of "soft computation", is becoming more and more important in control engineering. This course will equip the student with the essential knowledge and useful resources to solve some of the systems control problems not easily solved using conventional control methods. This course will cover: fundamentals of fuzzy set theory, structures of fuzzy logic controllers, structures of neural networks, learning algorithms, genetic algorithms.
- **Content outline by topic:**
  - General characteristics of intelligent control systems.
  - Fundamentals of fuzzy set theory.
  - Application of fuzzy logic in control.
  - Basic and complex structures of fuzzy logic controllers.
  - Automated design and self-organization of fuzzy controllers.
  - Basic structures of neural nets.
  - Static and dynamic neural nets.
  - Learning algorithms.
  - Application of neural nets in modeling, identification and control of systems.
  - Optimization by using genetic algorithms.
  - Examples of intelligent control systems in industry.
- **Delivery Mode and Teaching Method:** One-term 3 hours of lectures per week.
- **Student Evaluation:** mid-term exam: 20%, research project and presentation: 25%, homework assignments: 15%, and final exam: 40%.
- **Suggested Textbook:** C.T.Lin and C.S.G.Lee (1996): *Neural Fuzzy systems - A Neuro-Fuzzy Synergysm to Intelligent Systems*, Prentice Hall, New York.
- **Learning Outcomes:** Students who successfully complete the course have reliably demonstrated the ability to:
  Outcome 1: understand fundamental concepts of fuzzy logic (FL), neural network (NN) and genetic algorithm (GA).
  Outcome 2: use NN/FL to model the complex static/dynamic systems.
  Outcome 3: use NN/FL as a tool to construct the complex nonlinear controller to better control the complex dynamics systems.
  Outcome 4: use GA to solve global optimization problem.
  Outcome 5. gain hands-on experience on MATLAB toolboxes for NN and FL to solve practical control design problems.
  Outcome 6: explore and utilize the Internet resources on computational intelligent related to control engineering.
- **Information About Course Designer/Developer:**
  Course designed by J. Ren, PhD, Faculty of Engineering & Applied Science
- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  J. Ren
- **Faculty qualifications required to teach/supervise the course:**
  PhD degree in electrical engineering and relevant experience in teaching & research. Faculty members will normally be registered Professional Engineers.

Course Title: ENGR 5950G – Computational Electromagnetics

- **Course Description and Content Outline:** This course covers the theory, development, implementation, and application of the finite element method and its hybrid versions to electromagnetics. It also makes efficient and accurate formulations for electromagnetics applications and their numerical treatment. It employs a unified coherent approach dealing with both integral and differential equations using the method of moments and finite-element procedures.
- **Content outline by topic:**
  - Two- and three-dimensional integral equation/method-of-moments formulations
  - Open-region finite-element formulations based on the scalar and vector equations
  - Finite difference time-domain methods
  - Direct and iterative algorithms for the solutions of linear systems
  - Error analysis and the convergence behavior of numerical results
  - Radiation boundary conditions
  - Acceleration methods for periodic Green's functions
  - Vector finite elements
- **Delivery Mode and Teaching Method:** One-term 3 hours of lectures per week.
- **Student Evaluation:** assignments: 20%, projects: 50, and final exam: 30%.
- **Suggested Textbook:** A. F. Peterson, S.L. Ray, and R. Mittra, *Computational Methods for Electromagnetics*, ISBN: 0-7803-1122-1, Wiley-IEEE Press, 1997.
- **Learning Outcomes:** Students who successfully complete the course have reliably demonstrated the ability to:

  Outcome 1: apply understanding of the basic problems in electromagnetic field theory associated with Maxwell's equations in the low frequency case (eddy current equations) and in the high frequency regime (time-harmonic approach; waveguides, scattering).

  Outcome 2: appreciate applications in the aerospace, defense, telecommunications, wireless, electromagnetic compatibility, and electronic packaging industries.

  Outcome 2: gain a thorough understanding of basic numerical solution procedure

  Outcome 3: formulate three-dimensional problems, such as closed domain, radiation and scattering.

  Outcome 4: know how to effectively use major commercial electromagnetic computer simulation packages.

  Outcome 5: workout the crucial treatment of local boundary conditions.

  Outcome 6: review of recent developments and advances in finite element methods for 2D and 3D electromagnetic field problems.

- **Information About Course Designer/Developer:**
  Course designed by A. Grami, PhD, Faculty of Engineering & Applied Science
- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  Faculty to be hired
- **Faculty qualifications required to teach/supervise the course:**
  PhD degree in electrical engineering and relevant experience in teaching & research. Faculty members will normally be registered Professional Engineers.

Course Title: ENGR 5960G – Power System Operations, Analysis and Planning

- **Course Description and Content Outline:** Transmission lines. Steady state transmission capacity; network compensation; voltage management; load flow simulation; transient stability simulation; system security; system planning; symmetric operation of power systems.
- **Content Outline by Topics**
  - o Introduction to single-phase, three-phase systems and the per unit system
  - o Transmission line models and steady-state transmission capacity
  - o Concepts of network compensation: impedance, voltage, angle and power
  - o Voltage management and effect on transmission capacity
  - o Load flow simulation: admittance matrix, problem structure, numerical simulation by the Newton-Raphson method
  - o Transient stability simulation: deriving the swing equation, complex generator models, complex component control models, numerical simulation techniques
  - o Reliability and security: criteria, deterministic concepts, transfer limits, security limits, contingencies, limit determination
  - o Power system planning: operations versus planning; planning processes and criteria
  - o Asymmetric operation of transmission systems
- **Delivery Mode and Teaching Method:** 3 hours of class lectures per week.
- **Student Evaluation:** Homework assignments: 50%; final exam: 50%.
- **Suggested Textbook:** Marceau, R.J., *Notes on Power System Operation, Analysis and Planning*
- **Learning Outcomes:** Students who successfully complete the course have reliably demonstrated the ability to:
  Outcome 1: determine steady-state transmission line capacity employing all the possible compensation strategies; choose an appropriate compensation strategy according to circumstances; explain the operation of the different compensation technologies.
  Outcome 2: derive the equations which describe steady-state network operation; explain how these equations can be solved. Develop load flow software; analyze the result of simulations describing different operating conditions; make recommendations concerning compensation strategies required to solve network operating problems.
  Outcome 3: explain how power systems react to unforeseen circumstances; derive the swing equation. Explain how transient conditions are represented and solved; develop appropriate software for transient stability simulation. Integrate complex generator models and network component control system models; determine whether a system is stable or unstable; determine a transient stability transfer limit.
  Outcome 4: explain the difference between reliability and security. explain such concepts as: i) operations and planning criteria; ii) transfer limit; iii) security limit; iv) steady-state security; v) dynamic security; determine a security limit; explain how security limits are employed in system operation.
  Outcome 5: plan a transmission corridor using traditional three-phase AC transmission concepts.
  Outcome 6: explain how asymmetric operation can increase: i) reliability, ii) security and iii) economics of power system operation and planning; plan a transmission corridor employing asymmetric operation and planning concepts.
- **Information About Course Designer/Developer:**
  Course designed by R. J. Marceau, PhD, Faculty of Engineering and Applied Science
- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  R. J. Marceau
- **Faculty qualifications required to teach/supervise the course:**
  PhD degree in Electrical Engineering and relevant experience in teaching and research. Faculty members will normally be registered Professional Engineers.

Course Title: ENGR 5970G – Power Electronics

- **Course Description and Content Outline:** This course covers fundamentals of lossless switching techniques: zero-voltage switching, zero-current switching; resonant converters: series, parallel and series-parallel topologies; soft-switching converters: natural and auxiliary commutation converter topologies control techniques: variable frequency phase-shift and hybrid control; applications to single-phase three-phase and multi-level converters; line- and force-commutated converters; high power ac/dc and dc/ac converter structures and switching techniques; principles of HVDC and HVAC systems.
- **Delivery Mode and Teaching Method:** 3 hours of class lectures per week.
- **Student Evaluation:** assignments: 25%, mid-term test: 25% and final exam: 50%.
  Suggested Textbook: R.W. Erickson, D. Maksimovic, *Fundamentals of Power Electronics*, Springer, 2001, ISBN: 0792372700
- **Learning Outcomes:** Students who successfully complete the course have reliably demonstrated the ability to:
  Outcome-1: derive averaged equivalent circuit models of converters operating in steady state
  Outcome-2: apply Middlebrook's Extra Element Theorem to the input filter design and the resonant inverter design.
  Outcome-3: understand the dynamics of discontinuous conduction mode converters and current-mode control.
  Outcome-4: present the basic magnetics theory necessary for informed design of magnetic components in switching power converters.
  Outcome-5: model various classes of converters and identify their technical requirements, applications and characteristics.
  Outcome-6: appreciate engineering design process and the need for design-oriented analysis.
  Outcome-7: develop design techniques for practical applications.
  Outcome-8: carry out computer simulation of power electronics systems.

- **Information About Course Designer/Developer:**
  Course designed by A. Grami, Ph.D., Faculty of Engineering and Applied Science and Faculty of Business and Information Technology.

- **Identify faculty to teach the course and/or statement "faculty to be hired":**
  R. Marceau, additional faculty to be hired

- **Faculty qualifications required to teach/supervise the course:**
  Ph.D. degree in Electrical Engineering and relevant experience in teaching and research. Faculty members will normally be registered Professional Engineers.

Course Title: ENGR 5980G – Advances in Nuclear Power Plant Systems

- **Course Description and Content Outline:** A combination of lectures, self-paced interactive CD-ROM study and the use of power plant simulators imparts to students the advances in the key design and operating features of the main nuclear power plan types, including reactors using pressure vessels and pressure tubes, pressurized water, boiling water and gas cooled reactors; the use of natural versus enriched fuel, converters and breeders; overall plant control systems, load following capabilities, islanding operations; safety systems, responses to abnormal and emergency events. Self-paced interactive CD-ROM and operation of power plant simulators will be used throughout the course.
- **Content Outline by Topics**
  - o Introduction to the key design and operating features of the main nuclear power plan types
  - o Advances in the design features of reactors using pressure vessels and pressure tubes
  - o Operating characteristics of pressurized water, boiling water and gas cooled reactors
  - o Use of natural versus enriched fuel – design and operating aspects
  - o Design of reactors that are fuel converters or breeders
  - o Overall plant control systems and load following capabilities of the various reactor types
  - o Frequency and voltage control under islanding operations
  - o Evolution of safety system design
  - o Simulated responses to abnormal and emergency events in real time
- **Delivery Mode and Teaching Method:** 3 hours of class lectures per week
- **Student Evaluation:** Homework assignments: 30%; final exam: 70%.
- **Suggested Textbook:** Bereznai, G.T., *Nuclear Power Plant Systems and Operation*
- **Learning Outcomes:** Students who successfully complete the course have reliably demonstrated the ability to:
  - Outcome 1: specify the desired operating characteristics of a nuclear-electric generating unit to meet electric power system requirements.
  - Outcome 2: define the key design parameters for pressurized or boiling water reactors, and the criteria for selecting light or heavy water as coolant and/or moderator.
  - Outcome 3: demonstrate, using real time simulators, the normal operation of nuclear-electric power plants using various types of reactors.
  - Outcome 4: explain the responses of various reactor types to malfunction conditions.
  - Outcome 5: identify the conditions under which fast breeder reactors would be cost effective to construct and operate, and define the key reactor design parameters.
  - Outcome 6: explain the improvements in the reliability of reactor safety systems, emphasizing the key characteristics of passive systems.
  - Outcome 7: demonstrate, using real time simulators, the responses of nuclear-electric power plants using various types of reactors to design-basis emergency events.

- **Information About Course Designer/Developer:**
  Course designed by G. T. Bereznai, Ph.D., School of Energy Systems and Nuclear Science

- **Identify faculty to teach the course:**
  G.T. Bereznai

- **Faculty qualifications required to teach/supervise the course:**
  Ph.D. degree in Electrical Engineering and relevant experience in teaching and research. Faculty members will normally be registered Professional Engineers.

5 OUTCOMES

5.1 Enrolment and graduations

As this is an application for a new program, this section is not applicable.

5.2 Employment

Employment records of the graduates from the program will be maintained on an ongoing basis.

5.3 Publications

Publication records of the graduates from the program will be maintained on an ongoing basis.

5.4 Projected graduate intake and enrolments

Table 5-1 shows the projected graduate student enrolment (both full-time and part-time students) over the next seven years. As additional faculty will be hired over the next few years, the planned enrolment in the program is expected to increase.

Table 5-1 Projected Intake and Enrolments for MASc and MEng Programs

YEAR	FULL-TIME				PART-TIME				TOTAL ENROLMENT	
	Intake		Enrolments		Intake		Enrolments		MASc	MEng
	MASc	MEng	MASc	MEng	MASc	MEng	MASc	MEng		
2007	5-10	5-10	5-10	5-10	1-3	5-10	1-3	5-10	6-13	10-20
2008	10-15	5-10	15-25	10-20	1-3	5-10	2-6	10-20	17-31	20-40
2009	10-15	5-10	20-30	10-20	1-3	5-10	3-9	10-20	23-39	20-40
2010	10-20	10-15	20-35	10-25	1-3	5-10	3-9	10-20	23-44	20-45
2011	10-20	10-15	20-40	10-30	1-3	5-10	3-9	10-20	23-49	20-50
2012	10-20	10-15	20-40	10-30	1-3	5-10	3-9	10-20	23-49	20-50
2013	10-20	10-15	20-40	10-30	1-3	5-10	3-9	10-20	23-49	20-50

In the spring of 2009, the first class of students will graduate from UOIT's undergraduate programs in Electrical Engineering and Software Engineering. It is expected that as more and more students successfully complete their undergraduate degrees at UOIT, the enrolments in the master's programs will rise as some of these students pursue post-graduate degrees.

APPENDIX A: LIBRARY RESOURCES

LIBRARY SUBMISSION TO ONTARIO COUNCIL OF GRADUATE STUDIES (OCGS)
FOR:
THE MASTER OF APPLIED SCIENCE AND MASTER OF ENGINEERING PROGRAMS IN ELECTRICAL AND COMPUTER ENGINEERING
UNIVERSITY OF ONTARIO INSTITUTE OF TECHNOLOGY (UOIT)

Compiled by: Carol Mittlestead, B.A. (Hon), M.L.S., Acting University Librarian/Associate Librarian

Introduction

With respect to the University of Ontario Institute of Technology's Master of Applied Science and Master of Engineering in Electrical and Computer Engineering as offered by the Faculty of Engineering and Applied Science, the following document discusses the Library in relation to the collection; the accessibility of resources and services, and research support, staffing, and partnerships. The collection is defined as including both the traditional paper book or periodical, and the more nontraditional–but increasingly common-electronic index, book or journal database. Librarian recommended web sites are also a unique part of the collection in that they direct students and staff to valid academic sources. A subscription to the Data Liberation Initiative (DLI), a detailed comprehensive series of data sets offered through Statistics Canada, was recently acquired in response to expanded research initiatives at UOIT. Similarly, D-Space, an institutional repository system that captures, stores, indexes and preserves digital research material is also being launched by the UOIT Library. Accessibility addresses the physical presence of the Library, onsite reference assistance, the Library web page www.uoit.ca/library as a 24/7 portal, and interlibrary loan and document delivery. Research support, staffing, and partnerships emphasize the Library's role in teaching students, liaising with faculty, and connecting with government and corporate agencies.

Collections

It is understood that the Library's acquisition plan must be based on evolving pedagogical needs as determined by the academic schools. In close liaison with the deans and faculties, subject specialist Librarians will define collection development strategies for the ongoing curriculum-based purchase of resources as well as for the evaluation and review of existing material.

Books:

The Library offers a small but comprehensive collection. At present, there are approximately 73,000 volumes on the shelves. In August 2004, the Library took possession of its new building (described below) and this additional space will allow for the relatively quick expansion of the collection to 160,000 texts. Currently, there are approximately 8,500 volumes focusing on pure and applied science topics many of which relate directly to the Electrical and Computer Engineering master's programs. For example, books on circuit design, power electronics, computer architecture, software quality engineering, algorithms and data structures, user interface design, signal processing and digital communications are already available. Please note that in the Fall of 2005, the Faculty of Engineering and Applied Science launched an undergraduate program in Electrical and Software Engineering, and a Master of Information Technology Security (MITS) program. The Library obviously had to be prepared for these students and faculty. It is expected that there will be some overlap in the resources required for this Program and that of the MITS offering in terms of cryptography and secure communications. Although this is only the third year that UOIT has offered courses, with the Library understandably being in a significant growth phase, these master's programs are

particularly well placed in terms of resources. From its onset, UOIT has been building its reputation on science- based programming in mathematics, physics, chemistry and biology; Library collection development has echoed this.

More specialized and academically focused books are being bought in preparation for year four of UOIT's operation and for postgraduate programs. This includes texts that address the drafting of research proposals, grant writing, public speaking and presentation techniques, technical communications including abstracting, and university teaching. The Library's goal is to increase its holdings by 2,000 to 3,000 volumes per year for several successive years with a current projected cost of $400,000. to $450,000. per annum. Books are selected primarily (Faculty suggestions are most welcome) by Subject Specialist Librarians both directly from noteworthy academic publishers (e.g. Wiley, CRC Press, Sage, Elsevier, Academic Press, Addison-Wesley, Kluwer, Springer-Verlag, Pearson Prentice Hall) and from Blackwell's Book Services, an arrangement that allows for the simultaneous purchase of titles from a wide array of vendors.

The importance of specialty publishers for both print and online documents is also recognized. The Library will access and/or purchase as necessary standards, proceedings, and technical reports from key scientific organizations. Example sources include the Canadian Standards Association (CSA), the American National Standards Institute (ANSI), the National Research Council – Canada Institute for Scientific and Technical Information (NRC-CISTI) and the National Electrical Manufacturers Association (NEMA).

With over 15,000 titles (not included in the total above), e-books are an integral part of the UOIT library collection. Currently, Access Science and the Encyclopedia of Materials Science and Technology are the databases most likely to interest the graduate students and faculty. Especially given UOIT's commitment to the laptop university concept, the Library's e-book collection is destined to grow.

Journals, Transactions and Conference Proceedings:

In addition to the indexing and abstracting that the Library provides for thousands of periodicals (journals, magazines, newspapers) through its electronic databases, 30,000 of these titles are available in full text electronically and 350 in paper. Of relevance to the Electrical and Computer Engineering master's programs is that over 2,800 full text titles are categorized under the heading of Science with approximately 200 of these titles designated as chemistry, 250 as physics, and 270 as mathematics. There are nearly 11,000 full text Technology journals; over 800 of these have a computer focus and approximately 230 titles address the closely related discipline of electrical engineering. Electronic databases are not only a venue for periodicals, but many such as IEEE Xplore (Institute of Electrical and Electronics Engineers) also offer technical reports, conference proceedings, and standards.

UOIT library databases believed to support these master's programs are categorized and then listed alphabetically below. Top priority is of course given to those products exclusively focused on Engineering.

Extremely Relevant:

ACM (American Computing Machinery)
Compendex
IEEE (Institute of Electrical and Electronics Engineers)
Inspec (IEE- Institution of Electrical Engineers)

Very Relevant:
Elsevier Science/Science Direct
IOP (Institute of Physics)
MathSciNet
Proquest Science
Science Citation Index Expanded (Part of ISI Web of Science)
Scitation (AIP – American Institute of Physics)

Relevant (multidisciplinary databases):
Academic Search Premier
Cambridge University Press
Kluwer
Sage
Springer-Verlag
Wiley/Interscience

Please note that there are several ways to access electronic journals. UOIT is a member of both OCUL (Ontario Council of University Libraries) and CRKN (Canadian Research Knowledge Network) – the provincial and national university library consortia, respectively, that provide for the effective group purchase and distribution of electronic resources. Scholars Portal and E-Journals at Scholars Portal are OCUL platforms that allow an individual to access a number of databases simultaneously. The UOIT Library also provides Faculty and subject guides highlighting pertinent indexes and databases, a searchable alphabetical list of all indexes and databases, a searchable alphabetical list of all periodical (journal, magazine and newspaper) titles, and a citation locator that checks for either journal or article availability. Further, cross-referencing amongst databases is provided by a federated search engine or linking software called "Find It @ UOIT". If a patron is searching one database, but the article is available in another, he/she will be redirected to this resource. If the article is not available at UOIT, the option to request an ILL (interlibrary loan) is displayed.

The Library also hosts Refworks, a software tool that allows for citations to be "harvested" from various periodical databases or imported directly so bibliographies can be easily prepared. The user selects the appropriate bibliographic format (e.g. MLA, APA) and Refworks applies it to the references that have been assimilated. The complementary component is Refshare; it allows for bibliographies to be shared amongst colleagues and/or to be used as electronic reserve listings. Students are directed to an article by their professor and simply authenticate into the Library system.

Following the mandate of the University of Ontario Institute of Technology as a laptop university with "round the clock" accessibility to resources, wherever possible, the Library will purchase significant holdings to a journal including archives in electronic format. It is, however, realized that paper copies may sometimes be essential, and must be purchased accordingly.

Internet:
While the prevalence and importance of the Internet is recognized, it is also realized that not all information on the Internet is of equal value and/or prominence, and that not all people have equal search skills. The Library, therefore, strives to make staff and students aware of quality web sites appropriate to their programs. Listings of Recommended Web Sites are part of the Library Faculty Guides that are prepared with each UOIT program in mind. Posted on the Library web site www.uoit.ca/library , these Faculty Guides are discussed in detail under "Accessibility". For example, amongst the relevant sites for these master's programs are: EEVL

(Edinburgh Engineering Virtual Library – Heriot Watt University), efunda (Engineering Fundamentals), Project Euclid (Cornell University), Scirus (Elsevier), IC (Integrated Circuits) Master and Circuits Archive (University of Washington, College of Engineering) along with specific societal sites such as IEEE (Insitute of Electrical an Electronic Engineers), IEE (Institute of Electrical Engineers) and ACM (Association for Computing Machinery).

Data Liberation Initiative:
The DLI is an expansive collection of detailed statistical sets assimilated and maintained by Statistics Canada and offered through the IDLS (Internet Data Library System) hosted by the University of Western Ontario's Social Science Computing Laboratory. Those files that relate to manufacturing will be of interest to researchers in the Electrical and Computer Engineering master's programs.

D-Space:
The Library has already acquired the necessary server and is planning to launch its own D-Space within the next few months. This is an open archive initiative (OAI) developed by the Massachusetts Institute of Technology (MIT) that allows for the capturing, storing, indexing, preserving and distributing of digital research material. Faculty members are invited to post their research findings and papers in this institutional repository thus encouraging collaboration amongst colleagues.

Accessibility:

The Building:
A new state-of-the-art, 73,000 square foot Library was opened in August 2004. The intent of the design is to create a print/electronic library that accommodates new and emerging technologies without sacrificing the personal warmth of a traditional library. The building offers various types of study and activity spaces to accommodate different learning styles and user needs. These spaces include:

- Quiet public study spaces as well as a formal Reading Room, all within a "wireless" environment
- Collaborative learning spaces for groups of various sizes
- Common spaces and public service research workstations that facilitate intellectual interaction and engagement
- Electronic classrooms for regular ongoing educational sessions on library resources and research strategies
- Attractive and appealing display areas for art and library exhibitions
- Special needs adaptive technology equipment

Staff, students and faculty have welcomed this new building with its seating for over 500 patrons and 150 public access workstations with Internet access. The grand opening was October 29, 2004.

On Campus Reference Assistance:
Reference services are provided by professional librarians for 68 hours of the 89 hours per week that the Library is physically open or 76.5% of the time. Librarians liaise with professors so classes specific to student research topics can be offered, and general information literacy

sessions are offered campus-wide throughout the year. Topics such as the research process, Internet site evaluation, and bibliographic citation are addressed. Making individual or small group appointments with a librarian is encouraged too.

Library Web Page:
The Library web page is available at www.uoit.ca/library and is accessible 24 hours a day, seven days a week. Both a general Library e-mail address and a Reference Desk e-mail are provided as well as telephone information so individuals can leave messages at any time. In collaboration with other Ontario University Libraries, the Library is also currently investigating a web-based service such as the Virtual Reference Desk (www.lssi.com) which uses chat software to deliver reference service to users regardless of time and location. The Librarian can "push" pages to patrons so they can literally see both the steps involved and the results achieved with a given search. Consequently, this technology promises to be more effective than e-mail and telephone. Beginning with limited hours and an after-hours e-mail default, the ultimate goal is to make virtual reference a "round the clock" service.

General reference assistance is provided through Library web page sections that explain topics such as computer search techniques, article searching, internet evaluation, and bibliographic citation. Amongst the services outlined are circulation procedures, reserves, and interlibrary loan. What makes the UOIT Library web page truly unique is its Faculty Guides. Prepared with each program in mind for a particular Faculty, every Guide outlines and links to pertinent Electronic Databases and Indexes; provides sample listings with links to relevant journals along with subject headings for further investigation; highlights the Catalogue with suggestions from the Reference collection; describes and links to the most appropriate E-book databases; and offers Recommended Web Sites. These Guides are indeed resource portals. As UOIT's Faculties are becoming more and more diverse, Subject Guides are also being launched. These are of particular assistance to students taking electives from areas outside their discipline.

Interlibrary Loan and Document Delivery:
As UOIT is still in its developmental stages, Interlibrary Loan is currently available free of charge to students, staff and faculty. Individuals have the option of making their requests online or in person. RACER (rapid access to collections by electronic requesting) is a VDX (Virtual Document Exchange) interlibrary loan system implemented in OCUL member libraries. Searches are performed throughout all Ontario university libraries and CISTI (Canada Institute for Scientific and Technical Information). As part of OCUL and the IUTS (Inter University Transit System), the Library now receives book loans in a very reasonable amount of time, and Ariel, an electronic transmission system for periodical articles, allows journal requests to be filled within a few days.

Faculty and students from UOIT may also visit any of Canada's university libraries and may borrow books (Reciprocal Borrowing Agreement) directly from them upon presentation of their UOIT photo identification card. Materials may be returned directly to the lending library or may be left at the UOIT Library where they will be returned to the appropriate lending library.

Since a postgraduate program is being discussed here, the borrowing restrictions that the University of Toronto Libraries have on undergraduates are obviously not applicable.

Research Support, Staffing and Partnerships

The following strategies are established and/or being developed:

1. As described above, the Library as part of a newly formed institution (June 2002) has already made significant progress in terms of collection development, instruction and resource accessibility. Continued efforts will be made to improve and expand information services. As professors arrive on the UOIT campus, librarians are meeting with them to identify their teaching and research objectives.

2. A professionally qualified librarian (M.L.S.) with subject expertise in the sciences and health sciences joined the UOIT Library staff in August 2002. Given the anticipated appearance and evolution of more UOIT postgraduate programs, the hiring of a Graduate Studies Librarian will occur within the next two years.

3. The importance of liaising with the UOIT Centre for Academic Excellence and Innovation (CAEI), a facility where faculty are introduced and mentored in the use of instructional technology such as computerized teaching packages, presentation software, web development, and distance learning delivery is recognized. This would ensure that the Library's resources, in digital format, are included amongst the links for courses developed within the Faculty of Engineering and Applied Science. A link to the Library Web Page Faculty Guides from each student's "My WebCT" template is planned.

4. The Library will connect to national and global resources that both enhance student employment opportunities and that support high levels of applied scholarly research.

The Library is indeed preparing for the University of Ontario Institute of Technology's initial postgraduate degree offerings, and lends its support to the resource and research needs of both faculty and students.

CM
March 24, 2006

Appendix B

General Policies and Procedures for Graduate Studies

at the

University of Ontario Institute of Technology

June 1, 2006

Preamble:

As a young and dynamic institution, the University of Ontario Institute of Technology (UOIT) continues to develop policies and procedures for matters related to graduate studies. The new policies in this paper are based on the best practices of leading institutions across Canada, while recognizing UOIT's unique mission, principles and dynamics.

The main purpose of this document is to consolidate proposed new graduate studies policies with existing ones, thus creating a comprehensive set of conventions for all UOIT students, faculty members and staff pursuing graduate-level study, teaching or administration.

To clarify any information in these policies, please contact the Dean of Graduate Studies. The General Policies and Procedures for Graduate Studies will be reviewed no later than fall 2010.

The following current UOIT policies and guidelines also apply to graduate studies:

- Student Conduct;
- Protection of Privacy and Access to Information;
- Research Guidelines;
- Intellectual Property; and
- Use of Turnitin.com's Plagiarism Detection System.

List of Policies

List of Policies *continued*

List of Policies *continued*

15. Academic Conduct

1. Administration of Graduate Studies

1.1 Dean of Graduate Studies

The role of the Dean of Graduate Studies is central to all major academic and administrative graduate study activities.

1.1.1 Responsibilities

The responsibilities of the Dean of Graduate Studies include:

- providing leadership, strategic planning and vision, particularly in the growth and development of graduate programs and activities;
- administering all regulations relating to graduate studies;
- chairing the Graduate Studies Committee of Academic Council;
- representing graduate studies at Academic Council; and
- representing the university's graduate studies to internal and external individuals and groups.

1.2 Graduate Program Directors

Each program will have a Graduate Program Director. This role is of critical importance to ensuring the success of the program and its students.

Graduate Program Directors should have a strong interest in students and their success, thoroughly understand UOIT's policies and procedures for graduate studies, and be available on a regular basis to assist students seeking advice on issues related to their studies.

The Graduate Program Director is accountable to the Dean of the Faculty and, with respect to graduate activities, to the Dean of Graduate Studies.

1.2.1 Appointment

The Graduate Program Director is appointed by the Dean of the home Faculty, in consultation with the Dean of Graduate Studies. The duration of the appointment may be two or three years at the discretion of the home Faculty Dean with opportunity for re-appointment.

1.2.2 Responsibilities

Each Graduate Program Director has a formal role and responsibilities relating to the Graduate Studies Committee of Academic Council, including nominations, Supervisory Committees, student awards and similar matters.

The main duties of the Graduate Program Director are to:

1. ensure that all graduate studies policies and procedures are administered fairly and correctly and are communicated to students in their program;
2. chair the Academic Committee for the program and make recommendations to the Dean of Graduate Studies regarding the admission of applicants;
3. approve a program of studies for each student and provide advice

regarding changes to a student's status or program;
4. appoint a faculty advisor or research supervisor for each student;
5. where applicable, work with the student and research supervisor to form a Supervisory Committee and appoint a committee Chair;
6. recommend external examiners to the Dean of Graduate Studies;
7. consider requests from students to defer an examination;
8. consider for approval changes to a student's grade;
9. liaise regularly with the Dean of Graduate Studies and, as needed, with the Registrar;
10. maintain student records and forward to the appropriate UOIT office(s), as required;
11. provide advice, as needed, to units and bodies such as the Graduate Studies Committee of Academic Council;
12. help ensure that graduate students have the necessary resources, facilities and support;
13. co-ordinate financial assistance (including assistantships and fellowships) for graduate students;
14. help monitor the progress of graduate students;
15. provide input and assistance as requested for the creation and review of graduate programs;
16. mediate as needed in conflicts or disputes between a graduate student and his or her research supervisor; and
17. co-ordinate graduate student recruitment activities for the program.

2. Graduate Faculty Appointments

Faculty members who are eligible to participate in the supervision of graduate students and teach graduate courses must have an academic appointment at UOIT. This may be a core or definite-term appointment, or that of an Adjunct Professor or Professor *Emeritus/Emerita*. Individuals wishing to teach at the graduate level are nominated by the Dean of the Faculty through which the program is delivered. Once approved by the Dean, the nomination is forwarded to the Graduate Studies Committee of Academic Council for final approval.

All faculty members who are currently involved in any aspect of graduate education, including acting as a research supervisor and/or member of a Supervisory Committee and who are listed in the Ontario Council of Graduate Studies (OCGS) briefs, automatically become eligible to teach graduate courses and supervise graduate students. The category of membership will be determined by the criteria set out in section 2.1.

Membership is effective from the date of introduction of a graduate program until the program is scheduled for a periodic appraisal by OCGS. At this point—and every seven years thereafter—all faculty members will be re-evaluated for graduate teaching and supervision privileges. In effect, the normal renewal of graduate teaching and supervision privileges will be synchronous with OCGS

periodic program appraisal.

The updated faculty list will be printed annually in the paper and electronic versions of the graduate section of the *Calendar*. It is the responsibility of the Graduate Program Director to keep an up-to-date list of eligible faculty members who participate in a graduate program.

2.1 Categories of Graduate Teaching and Supervision Privileges
Graduate studies at UOIT offers three categories of eligibility: Graduate Faculty, Probationary Faculty and Special Faculty.

Graduate Faculty are UOIT faculty members who are authorized to participate in all aspects of a graduate program on a regular and sustained basis. These privileges are renewable every seven years at the time of the OCGS periodic appraisal of the graduate program in which the faculty member participates. Graduate Faculty are authorized to perform a variety of activities including: serving as a research supervisor or co-supervisor or as a member of a student Supervisory Committee, participating in an Examining Committee, teaching graduate-level courses, acting as a faculty advisor, and mentoring and advising graduate students in all aspects of their program. Graduate Faculty have a research program that includes externally refereed publication as well as previous experience in graduate teaching and/or supervision.

Probationary Graduate Faculty status is accorded to new faculty members at UOIT who are authorized to participate in graduate education immediately upon commencement of duties at UOIT. Faculty with graduate supervisory or teaching experience and a research program that includes externally refereed publication may be accorded Probationary Graduate Faculty or Graduate Faculty status on appointment. Normally, Probationary Graduate Faculty privileges are granted for two-year periods. Probationary Graduate Faculty have the same responsibilities as Graduate Faculty, but cannot act as a student's sole research supervisor. In graduate programs involving theses, projects or major papers, a faculty member may apply for Graduate Faculty status after successful committee participation in the completion of at least one master's thesis or acting as a co-supervisor for a project or major paper, as well as the publication of at least one refereed article. In graduate programs involving only coursework, a faculty member may apply for Graduate Faculty status after successfully teaching courses in the graduate program and publishing at least one refereed article.

Exceptions to this regulation will be considered by the Graduate Studies Committee of Academic Council on a case-by-case basis. Probationary Graduate Faculty status can be withdrawn at any time by the Graduate Studies Committee of Academic Council.

Special Graduate Faculty status is intended for non-core faculty members who have temporary appointments at UOIT (in certain cases where qualifications

warrant) and who provide a limited graduate educational activity for a limited time (i.e. two to three years). Faculty members in this category may be appointed to serve on a Supervisory Committee and/or as external examiners. They may also be allowed to teach graduate courses for a limited time and participate on an Examining Committee. Permission for such appointments must be obtained from the Dean of the host Faculty with a memo to the Dean of Graduate Studies and an up-to-date curriculum vitae.

In no case may a non-core faculty member or Adjunct Professor serve as the sole research supervisor of a graduate student. Individuals with special graduate teaching and supervision privileges may assist with the direction of a graduate student's research, following approval by the Dean, through appointment as a co-supervisor. In this case, however, one of the co-supervisors must be a member of the Graduate Faculty for that graduate program.

3. Program Format

Some master's programs require students to write a thesis, while other programs require a project, major paper or other work. The thesis, project or major paper is a central part of the student's program and helps fulfill one of UOIT's mandates: to promote the generation of knowledge through scholarly research of the highest quality.

In some UOIT programs, students may choose between one or more formats such as a thesis, project or a course work option. The program format and options are specified in the program description in the graduate section of the *Calendar* and in other program information.

A graduate thesis is an original work that is overseen by a research supervisor and a Supervisory Committee. Theses are worth at least nine credits and involve an oral examination that includes an assessment by an external examiner. A project or major paper is an original work that is supervised by a research supervisor and includes a second reader. Projects and major papers are worth at least six credits and do not require an oral examination or an external examiner.

4. Student Supervision

Each master's student will have a faculty advisor or research supervisor to provide guidance throughout the program. In programs that do not require a thesis, project or major paper, the student will be guided by a faculty advisor throughout the program.

A student registered in a program that requires a thesis, project or major paper may initially have a faculty advisor, but will be assigned a research supervisor when the student begins his or her research. In some cases a student may have co-supervisors, with the terms established through an agreement for co-

supervision and made clear at the outset to all involved.

4.1 Faculty Advisor Appointment

The Graduate Program Director is responsible for assigning faculty advisors.

4.2 Faculty Advisor Responsibilities

The faculty advisor will be a member of the student's home Faculty. The main responsibilities of the faculty advisor are to:

1. consult with the student, recommend a program of study, and submit it to the Graduate Program Director for approval;
2. help the student choose an appropriate area of research, if applicable;
3. ensure that the student understands all degree requirements and regulations, as well as applicable policies;
4. be knowledgeable about, and inform the student of, key deadlines and related information;
5. be reasonably available to the student to discuss the program of study, as well as any academic concerns;
6. if requested, advise the student on academic or personal student services or resources; and
7. monitor the student's academic progress.

4.3 Research Supervisor Appointment

The relationship between the student and the research supervisor is most important to the student's successful completion of a graduate degree. The Graduate Program Director will seek input from the student before assigning a research supervisor.

All research supervisory appointments must be approved in the first instance by the Dean of the primary Faculty in which the student is registered. Except in extraordinary circumstances, approved on an individual basis by the Dean of Graduate Studies, research supervisors must be members of the UOIT core faculty. Associate members and Adjunct Professors may serve as co-supervisors with the approval of the Dean of the Faculty.

Before approving the appointment of a research supervisor, the Dean should give careful consideration to the faculty member's research activities, supervisory experience and training, previous performance in graduate student supervision, the number of graduate students already being supervised, any imminence of leave (i.e. research, maternity or administrative) or retirement, and any other relevant factors.

Since continuity of supervision is important in all graduate work, a change of research supervisor may be made only for strong reasons and after extensive consultation with all involved. A request for a change may come from the student, the research supervisor, the Graduate Program Director or the Dean. It should normally be sent, in writing, to the Graduate Program Director accompanied by

the reasons for the proposed change. If the home Faculty Dean concurs with the request, the recommendation for change should be sent to the Dean of Graduate Studies for final approval.

4.4 Research Supervisor Responsibilities

Specific responsibilities of the research supervisor include:

1. being sufficiently familiar with the field of research to provide guidance and/or be willing to gain that familiarity before agreeing to act as a research supervisor;
2. being accessible to the student for consultation and discussion of the student's academic progress and research;
3. helping the student select and plan a suitable, timely and manageable research topic;
4. co-operating with the student and Graduate Program Director to establish a Supervisory Committee to convene meetings, normally at least once annually, to evaluate the student's progress;
5. responding in a timely, consistent and thorough manner to written work submitted by the student, with constructive and well-informed suggestions for improvement and continuation;
6. providing a research environment that is safe, healthy, tolerant and free from harassment, discrimination and conflict;
7. within the norms appropriate to the discipline, providing financial support and/or helping the student obtain financial support from all reasonable sources;
8. when there is conflicting advice, or when there are different expectations on the part of co-supervisors or members of a student's Supervisory Committee, endeavouring to achieve consensus and resolve differences in the best interests of all involved;
9. acknowledging appropriately the contributions of the student in presentations and published material, in many cases via joint authorship;
10. being sensitive to cultural factors which may influence the individual student's learning and research behaviour and experience; and
11. making arrangements for continuity of the student's supervision before beginning an extended leave of absence.

4.5 Student Responsibilities

Student responsibilities include:

1. making a commitment and showing substantial effort, initiative and dedication to gain the background knowledge and skills needed to pursue the research project successfully;
2. working with their research supervisor to develop a plan and a timetable for completion of all stages of the research project, and working assiduously to adhere to a schedule and to meet appropriate deadlines;
3. meeting regularly with their research supervisor and reporting fully and regularly on progress and results;
4. keeping their Graduate Program Director fully informed regarding any

matter relevant to their status in the program and seeking advice from their research supervisor, as appropriate;
5. meeting agreed-upon performance standards and deadlines of funding organizations to the extent possible when financing has been provided by UOIT or a funding agency, or through a contract or grant; and
6. adhering to the standards of research ethics, health and safety, and respecting the requirements of academic integrity, honesty and professionalism (this includes, but is not limited to, acknowledging and crediting any source of ideas, assistance, materials and/or data provided by others).

4.6 Student-Research Supervisor Conflicts

It is the responsibility of UOIT and its Faculties to ensure that all graduate students receive appropriate and fair supervision. Due to the nature of the relationship between the student and research supervisor, conflicts may arise. In such instances, the first step must be to attempt to resolve the conflict informally between the student and research supervisor. It is the responsibility of the Graduate Program Director to act as a mediator.

A student who believes the conflict has not been resolved should contact the Dean of the student's home faculty. If the conflict persists, the student may pursue appropriate resolution through the Dean of Graduate Studies.

5. Supervisory Committee

Each graduate student in a program that requires a thesis will have a Supervisory Committee. Early formation of a Supervisory Committee, along with regular meetings and formal meeting records, will help ensure higher completion rates.

5.1 Appointment

The Supervisory Committee will be appointed by the Graduate Program Director, after consultation with the research supervisor and the student. The appointment will be made once the research supervisor is satisfied that the student has made adequate progress in the chosen research area.

5.2 Composition

Normally, each Supervisory Committee consists of the student's research supervisor and at least one other UOIT faculty member. The Chair, who may be someone other than the student's research supervisor, will be appointed by the Graduate Program Director of the student's home Faculty.

5.3 Responsibilities

The Supervisory Committee's main responsibilities are to:

1. advise the student and help define the course of study;
2. assess and approve the student's research proposal;

3. provide support to the student and research supervisor by broadening and deepening the range of expertise and experience available;
4. be reasonably accessible to the student to discuss and suggest other sources of information;
5. offer comments when requested on written work submitted by the student;
6. review the student's progress toward successful completion of the thesis with scheduled meetings at least once per year;
7. provide constructive feedback and provocative discussion of the student's program of study, thereby exposing the student to a wider range of expertise and ideas than can be provided by the research supervisor alone;
8. report progress to the Graduate Program Director and recommend continuation in the program based on satisfactory performance (in the case of reports of unsatisfactory progress, the student may be required to withdraw from the graduate program); and
9. recommend to the Graduate Program Director and the Dean of Graduate Studies whether a thesis should move to oral examination (this stage must be completed no less than three months prior to the date set for examination).

5.4 Chair's Responsibilities

The main responsibilities of the Chair of the Supervisory Committee are to:

- convene and run Supervisory Committee meetings;
- keep the Graduate Program Director informed of the student's progress;
- recommend potential External Examiners to the Dean of Graduate Studies; and
- forward a copy of the student's thesis to members of the Examining Committee at least four weeks before the oral examination.

6. Thesis, Project or Major Paper

Many master's programs require students to write a thesis or major paper, or produce a project. All written work must be in English and in correct, concise and scholarly language.

6.1 Permission to Begin

Permission to begin the thesis is given by the student's Supervisory Committee when there is general agreement that sufficient research has been done. If the student's program requires a project or major paper, the student's research supervisor will authorize the student to begin the project or major paper.

Students should seek guidance from their research supervisor regarding the use of a style manual appropriate to the academic discipline in which they are working, as well as other available guides to assist in effective writing. Also, students are expected to be aware of and observe copyright requirements, and

follow other standards as outlined in the UOIT policies on Research Ethics (http://www.uoit.ca/EN/main2/11246/13525/14057/14152/research_ethics.html) and Research Involving Animals (http://www.uoit.ca/EN/main2/11246/13525/14057/14152/research_guidelines.html).

6.2 Use of Copyright Material in Student Work

When preparing a thesis, major paper or other program work, students may include some copyright material, typically in the form of excerpts from books or articles, charts, diagrams or similar previously published materials. It is the student's responsibility to acknowledge properly any copyright materials used, strictly following the citation guidelines and rules of their Faculty and/or program.

As well, students who use extensive selections of copyright work may need to seek advance written permission from the author, and must append the letter to their work. Students should contact the copyright holder well in advance of their deadline, as obtaining permission to use copyright materials may take considerable time. In addition, students may be required to pay a fee to obtain such permission. Questions regarding the use of copyright materials should be discussed with the faculty advisor or research supervisor, as appropriate.

Students may be required to submit their work to Turnitin.com. Further information can be obtained from UOIT's policy on the Use of Turnitin.com's Plagiarism Detection System (http://www.uoit.ca/EN/main2/11246/13525/14057/14152/turnitin_policy.html).

6.3 Oral Examination

Master's candidates whose programs require a thesis will be required to defend their work orally in front of an Examining Committee. Students are expected to follow the advice of their research supervisor and their Supervisory Committee in establishing when their work is ready for examination. In exceptional circumstances students may request that the Dean of Graduate Studies arrange for an examination of the thesis or other work without the support of the research supervisor and Supervisory Committee.

It is the student's responsibility to ensure that all materials are prepared and assembled appropriately. Students should consult their research supervisor for specific regulations on the preparation and presentation of materials.

6.3.1 Examining Committee

The Examining Committee evaluates the academic merit of each student who defends a thesis and decides whether the student has satisfactorily passed the oral examination.

The Examining Committee consists of all members of the Supervisory Committee plus one external examiner (section 6.3.2). The committee is chaired by the Graduate Program Director or designate.

6.3.2 External Examiner

An external examiner is typically a faculty member outside the student's program. The external examiner can not be an Associate or Adjunct member of the student's home Faculty, nor have had any direct or indirect supervision of the student's thesis. This person will have considerable direct knowledge in the field of study of the subject matter.

Conflicts of interest must be avoided when recommending the names of external examiners to the Dean of Graduate Studies. External examiners must not be teaching or supervising family members or relatives of the student, must not be closely linked in a personal or research capacity, nor shall they have shared financial interests with either the student or the research supervisor. Should the student's thesis contain chapters or sections of previously published works, the external examiner shall not have been involved in the review or editing of this material in any capacity.

When an external examiner from outside the university is recommended, a curriculum vitae and written rationale for the choice must be provided to the Dean of Graduate Studies.

The external examiner is appointed by the Dean of Graduate Studies, upon recommendation of the Chair of the Supervisory Committee.

6.3.3 Approval for Oral Examination

Before an oral examination can be held, the Supervisory Committee must approve the thesis for examination (no more than one negative vote and/or abstention). The work must be submitted at least four weeks prior to the proposed oral examination.

The Examining Committee will meet at least one week prior to the scheduled date of examination and will determine if the work in its form and content is ready to be examined. If the work is deemed not ready for defense, the Examining Committee must provide to the candidate and the Dean of Graduate Studies in writing its reasoning for disagreement within 72 working hours. In this instance, the oral examination shall be postponed for a period of time not exceeding one year from the scheduled date.

6.3.4 Examination Procedure

Once the work has been deemed ready for examination, the Chair of the Examining Committee shall make all necessary arrangements for sending the thesis to the external examiner, setting the examination date, and preparing the relevant documents needed at the time of the examination.

If a member of the Examining Committee finds that he or she is unable to attend the oral examination, the Graduate Program Director should secure a suitable replacement. Should a suitable replacement not be found, the member is asked to submit his or her questions or concerns, to be read by the Examining Committee Chair at the defense. In extraordinary circumstances, the examination will be rescheduled if one or more members of the Examining Committee are unable to attend.

The oral examination consists of a short presentation (15-20 minutes) by the candidate summarizing the main findings of the work. The presentation is an open event that can be attended by all interested parties at the discretion of the Chair, but visitors may not remain for the rest of the proceedings.

Once the presentation has concluded, the student answers questions from members of the Examining Committee, including the committee Chair. Questions must be related to the work done by the student for the thesis and be based on knowledge directly related to the material.

When the question period is over, the student is asked to leave the room and members of the Examining Committee will determine the outcome of the oral examination. The Examining Committee Chair is a non-voting member, unless the Chair's vote is needed to break a tie.

6.3.5 Outcomes of Completion of the Oral Examination
The Examining Committee will render one of the following four decisions:

1. acceptable without change;
2. acceptable with minor change;
3. acceptable with major change; or
4. not acceptable.

1. Acceptable Without Change
A grade of pass is given if there is acceptance of the student's work with no required revisions by the committee as a whole.

2. Acceptable with minor change
A grade of pass is given if there is acceptance of the student's work with minor revisions to be completed within four weeks; revisions must not alter or drastically change the content of the thesis.

3. Acceptable with major change
A thesis which is not acceptable as a pass but not deemed a fail is referred for major revision. A thesis cannot be referred for a major revision and a second oral examination more than once; no further defense is permitted. In order to qualify for a decision of major revision, the work must meet one of the following requirements:

a) the committee agrees that the work requires considerable change in order to be deemed a pass; or
b) there is a majority vote in favour of major revision.

In the case of a major revision, the Examining Committee will reconvene within six months to continue the examination including the revisions. The revised thesis will be distributed within four to six weeks prior to the meeting to all members of the committee for review and assessment.

4. Not Acceptable
A thesis is deemed failed if:

a) there is a majority vote to fail it; or
b) the thesis is deemed unacceptable after major revisions.

Detailed reasons for failure must be submitted by the Chair of the Examining Committee to the Dean of Graduate Studies, the Graduate Program Director, and the candidate within two weeks.

6.4 Project or Major Paper Evaluation
The research supervisor or co-supervisors, and at least one other reader appointed by the Graduate Program Director from among the Graduate Faculty, Probationary Graduate Faculty, or Special Graduate Faculty for that program, shall submit a grade for the project or major paper. All grades must be accompanied by a report that outlines the reasons for the grade.

Each of the submitted grades will be one of the following.

1. acceptable without change;
2. acceptable with minor change;
3. acceptable with major change; or
4. not acceptable.

In cases where all the submitted grades are acceptable without change, a grade of pass will be given.

In cases where at least one grade is “acceptable with minor change” and there are no “acceptable with major change” or “not acceptable” grades, the research supervisor will ensure that the student’s work is revised to respond to the recommended minor changes. Normally, these revisions must be completed within four weeks. Revisions must not alter or drastically change the content of the project or major paper. Upon the satisfactory completion of the revisions, a grade of pass will be submitted for the student.

In cases where at least one grade is “acceptable with major change” and there are no “not acceptable” grades, the research supervisor will ensure that the student’s work is revised to respond to the recommended changes. These revisions must be completed within six months. After these revisions are

complete the student's project or major paper will be circulated a second time for evaluation by the research supervisor or co-supervisor and at least one other reader appointed by the Graduate Program Director. Any grade of "acceptable with major change" or "not acceptable" from the second reading will result in a grade of fail. Any evaluations of "acceptable without change" or "acceptable with minor change" will be processed accordingly and the student will be given a grade of pass.

In cases where there are at least two "not acceptable" grades, the student will be given a grade of fail.

In cases where there is only one "not acceptable" grade, the Graduate Program Director will meet within two weeks with the research supervisor and the student. The Graduate Program Director has two options after this consultation:

1. The Graduate Program Director sends the project or major paper to another reader within four weeks. The project or major paper may incorporate only minor revisions. If the new reader determines that the project or major paper is either "acceptable without change," "acceptable with minor change" or "acceptable with major change," the assessment of the student's work will continue with the appropriate level of response as outlined above for the evaluation that requires the greatest revision. If the new reader assigns a grade of "not acceptable," the student will have then received a second "not acceptable" and will be given a grade of fail.

or

2. The Graduate Program Director follows the procedures associated with "acceptable with major revision."

6.5 Thesis, Project or Major Paper Notation

Upon acceptance of the student's thesis, project or major paper, the title of the work and date of approval will be recorded on the transcript.

7. Submission of Student Work

Once a student's thesis, project or major paper has been approved, the student must submit the work formally. The following procedures and conditions apply:

1. one bound copy and one electronic copy of the original thesis, project or major paper become UOIT property;
2. the student grants UOIT a royalty-free, non-exclusive licence to make copies of the work for academic purposes at UOIT, and upon request from other universities or bona fide institutions;
3. the international copyright symbol (©) is displayed prominently on the title page of the thesis (or displayed with similar prominence on other types of work);

4. the site licence, signed by the student at the start of the program, takes effect; the site licence permits the UOIT library to circulate as part of its collection and/or copy the work for academic purposes only (the university's copyright notice is placed on all copies made under the authority of the licence);
5. while the site licence excludes the sale of authorized copies for profit, UOIT may recover duplication costs through a fee;
6. every copy made available under the licence clearly states that the copy is being made available in this form with full consent of the copyright owner and only for the purposes of private study or research; and
7. UOIT may submit the work to the National Library of Canada, which is permitted to reproduce and lend copies for educational or research use only.

8. Intellectual Property

Intellectual property (IP) comprises original work which often takes various forms such as research data, books, journal papers, theses, projects, photographs, computer programs, websites, equipment, devices, or audio recordings.

8.1 Students and Ownership of Intellectual Property

Students, as well as faculty members and researchers, may create intellectual property. This may be done individually or in collaboration with one or more students, the student's research supervisor or faculty advisor, or other faculty members.

UOIT's Intellectual Property policy generally states that creators own their work. As a result, student rights are treated as equivalent to those of all other academic personnel, including faculty members. When a student works collaboratively with other students, the student's research supervisor, or other UOIT faculty members or researchers, credit for the work is generally shared among the research collaborators. To be considered for joint authorship, all collaborators must:

- have made a significant contribution to the concept, design, collection, analysis or interpretation of the data; and
- have helped write and revise the draft publication for intellectual content.

In addition, as the Student Contributors section of UOIT's Research Guidelines states:

> "A student should be granted due prominence on the list of co-authors for any multiple-authored article or report that is based primarily on the student's own work, according to the commonly accepted practice in the field."

8.2 Students and Ownership of Externally Funded Research

While jointly created intellectual property (IP) is owned jointly, other ownership rules may apply when a student participates in a project that is funded by

externally sponsored contracts or grants. In such cases, the sponsoring organization or any contractual agreement with UOIT may determine ownership and control of IP.

Students should discuss with their research supervisor or faculty advisor whether any such conditions apply to the student's work. Nevertheless, an external organization or agency may not delay completion of a student's thesis, project or major paper. Only in special circumstances may an outside organization or agency be permitted to temporarily delay public dissemination of such student work.

If the work has commercial value, the student, in conjunction with other co-creators of the work, may wish to apply for a patent or other IP protection. Upon request, UOIT will assess the commercial value of the work and may agree to pay for these costs and manage the IP commercialization process on behalf of the creators. In all cases, commercialization activities require authorization from the Associate Provost, Research to confirm that obligations to UOIT and any research sponsors have been met and will continue to be satisfied.

9. New Graduate Programs and Review of Existing Programs

When developing new graduate programs or reviewing existing ones, UOIT will follow the policies and procedures of the Ontario Council on Graduate Studies (OCGS). OCGS policies and procedures can be found at http://ocgs.cou.on.ca/.

10. Admission Policies and Regulations

10.1 Application Procedure

Applications for admission to graduate studies programs are normally submitted online at http://www.uoit.ca/. Where paper applications are required, they shall be submitted to:

Registrar's Office
UA2071
University of Ontario Institute of Technology
2000 Simcoe St. North
Oshawa, Ontario L1H 7K4

10.2 Application Deadline Dates

Prospective students should consult the university academic schedule and/or program information for application deadlines relating to specific programs.

10.3 Admissions

To be eligible for admission to any graduate degree program at UOIT, applicants must normally meet the following requirements:

a) Hold a four-year honours degree or equivalent from a recognized

institution in the area of graduate study or a closely related subject.

b) Have an 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.
c) Provide a minimum of two letters of reference from persons having direct knowledge of the applicant's academic competence. Some Faculties may require three letters. Academic references are preferred; however professional references will be accepted. Letters of reference should come from individuals under whom the applicant has worked closely or studied.
d) Provide proof of English proficiency if the first language is not English (see current policy on English proficiency in the graduate section of the *Calendar*).
e) Submit one official copy of each previous undergraduate and graduate transcript directly from the granting institute. It is the student's responsibility to provide a certified English translation of the transcript if the original is in another language.
f) If required, submit a brief description of the courses listed on the official transcripts or provide a copy of the relevant calendar where they are listed.

The aforementioned requirements are the minimum required for entry into graduate studies at UOIT. Some Faculties may have additional requirements for entry into a specific program.

10.3.1 Offers of Admission
All offers of admission are based on the recommendation of the Graduate Committee of the graduate program in question.

10.3.2 Refusal of Admission
Due to enrolment limitations and additional requirements in some programs, meeting the minimum requirements does not guarantee admission to the program. UOIT may, at its sole discretion, refuse admission to an applicant even if the above minimum admission criteria have been met.

10.3.3 Appeal of Admission Decisions
Individuals may appeal their admission decision in writing within 10 working days to the Registrar's office. There may be a charge assessed for such appeals. Admission appeals are directed to the Dean of Graduate Studies who will refer the appeal to the Graduate Studies Committee of Academic Council.

10.3.4 Letters of Permission (students from other universities)
Students completing graduate programs at other Ontario universities may register under the Ontario Visiting Graduate Student Plan (see section 13.8). Students completing graduate programs from universities outside of Ontario may apply to complete individual courses on a Letter of Permission (LOP) from their home university. Such students shall be admitted to UOIT as non-degree

students.

LOP students will still be required to complete the UOIT Application for Admission form, as well as submit a letter from the Dean of Graduate Studies at the student's home university to the Office of Graduate Studies at UOIT, outlining the expectations of work to be completed while at UOIT.

10.4 Description of Graduate Students

Regular student: Applicants meeting the minimum admission requirements are considered for admission as a regular student.

Probationary student: Applicants who do not meet the minimum admissions requirements may be considered for admission to a probationary year. Applicants must be approved by the Graduate Program Director who will prescribe a program of studies to meet the admission requirements for a master's program. During this time, the student will be admitted as a non-degree student until the qualifications outlined have been met and the student can be moved into regular student status.

Special student: Applicants who are non-degree-seeking students may apply to take graduate-level courses for professional upgrading or personal interest. Applicants will apply through the Registrar's office and successful students must receive Faculty consent prior to registering for the course.

11. Student Status

11.1 Classification of Graduate Students

Full-time*:* Graduate students are considered full time if they meet the following criteria:

a) pursue their studies as a full-time occupation;
b) formally identify themselves as full-time students on all documentation;
c) maintain regular contact with their faculty advisor or research supervisor, if applicable, and be geographically available and visit the campus regularly; and
d) if employed by UOIT, work no more than 10 hours per week per term for which they are registered as a full-time student.

Part-time*:* Graduate students who do not meet the above criteria are deemed part-time students. Part-time students may have course load restrictions. Students should consult the individual Faculty with regard to the availability of part-time studies within their program.

11.2 Absences from Studies

Graduate students are expected to be uninterruptedly registered in their

designated program of study in order to support the timely completion of their degree. However, the university recognizes that under certain circumstances a student may need to absent themselves from regular study while maintaining their relationship with UOIT. Such circumstances must have sufficient cause and an official leave of absence must be requested through the Office of Graduate Studies and approved by the Dean of Graduate Studies.

Acceptable circumstances include:

a) exceptional circumstances: medical, extraordinary demands of employment, compassionate circumstances;
b) maternity leave: available to students during or following a pregnancy; and
c) parental leave: available to students who face extraordinary demands in parental responsibilities, or whose duties require that they be absent from their studies for a period of time.

12. Financial Aid

UOIT endeavours to help support graduate students in their programs by offering teaching assistantships, research assistantships, scholarships and bursaries. The Office of Graduate Studies and individual Graduate Program Directors have the most up-to-date information on external and internal awards and other financial support.

13. Registration Policies and Regulations

13.1 Session Dates

Graduate students normally register for three academic semesters per year: fall (September to December), winter (January to April) and summer (May to August).

13.2 Registration

Students must be registered in all terms commencing with the term specified in their letter of acceptance and continuing until graduation. Failure to register in all terms will result in withdrawal from the program. If a student does not register within one term of acceptance, readmission to the program is required. All courses in the student's program must be approved by the Graduate Program Director.

Students will be automatically registered in a graduate continuance course until graduation, withdrawal or program termination. Students must actively register for all other program courses.

13.3 Changes in Course Registration

Students may add courses with the approval of the Graduate Program Director within the first two weeks of lectures in any given semester. Students may drop courses without academic penalty within the first 75 per cent of the semester,

with the approval of the Graduate Program Director. Students should see the academic timetable for specific add and drop deadlines. Financial deadlines may differ from these dates.

13.4 Residency Requirement
At least half of a graduate student's courses must be from the UOIT course offerings in order to meet the residency requirements for graduation.

13.5 Program Changes
Changes to a graduate student's program must be approved by the Graduate Program Director.

13.6 Provision for Waiver of Regulations
Waivers of course prerequisites/co-requisites may be granted by the Graduate Program Director. Waivers of Faculty, degree or general regulations may be granted by the Dean of Graduate Studies.

13.7 Transfer Credits
All course credit transfers into graduate programs require the approval of the Graduate Program Director of the Faculty delivering the equivalent course. Transfer courses may not have been used to satisfy other degree requirements. Graduate transfer courses will not be considered for transfer if they were completed more than eight years prior to admission or if the grade received if the course is below B- (70%).

13.8 Visiting Students
The Ontario Visiting Graduate Student Plan (OVGSP) permits a graduate student to take courses at other Ontario universities while remaining a registered student at his or her home institution. UOIT students must complete the OVGSP form (available from their Faculty) and provide an outline of the course, desired term, and the reasoning for requesting such permission. The course must be a requirement of the student's program and must be formally approved by the Graduate Program Director as well as the student's faculty advisor or research supervisor before submission to the Registrar's office. Students from other universities wishing to register for graduate-level courses at UOIT should contact the Office of Graduate Studies at their home institution for more information regarding the process.

UOIT students wishing to take courses at institutions outside Ontario may do so on a letter of permission. Such a course must be approved in advance by the student's Graduate Program Director, in consultation with the student’s faculty advisor or research supervisor, as applicable. A letter of permission ensures that the courses to be taken at the host institution will be recognized for credit at UOIT and are applicable to the student's program of study. This allows the student to attend the host institution without formal admission. If the student is in clear academic standing (section 14.11) and has the necessary prerequisite

courses, the student shall complete a Letter of Permission Request form and submit the course outline(s) to the Registrar's office. Students are responsible for having copies of the final transcript from the host institution forwarded to the UOIT Registrar's office for award of transfer credit. The minimum mark a student must achieve to have the course transferred is B- (70%).

UOIT students must apply for a letter of permission before taking a course elsewhere. Failure to do so could result in revocation of admission.

13.9 Repeating Courses
Students who fail one required course may be permitted to continue their program with permission of their Graduate Program Director. Students who do not successfully complete the second attempt at the course, or who fail more than one course, will be required to withdraw immediately from their program of study.

13.10 Deferral of Course Examinations
Students whose religious obligations conflict with a scheduled final examination will be permitted to write a deferred examination. Such students are required to give three weeks' notice to their Graduate Program Director and to document the religious obligations involved.

Graduate Program Directors may grant deferred examinations on medical or compassionate grounds where sufficient documentation exists. A request for deferral on medical or compassionate grounds, along with supporting documentation, must be provided to the Graduate Program Director within four days after the scheduled writing of the examination.

A Graduate Program Director may also grant a deferred examination to a student who is scheduled to write three examinations in a 24-hour period. In this case, the exam in the middle of the three is normally the one that will be considered for deferral. Scheduling is conducted in such a way as to minimize the instance of consecutive examinations for students.

If a technical difficulty prevents the writing of a computer-based examination, the Graduate Program Director may arrange for a deferred examination for all students in the class. Such an examination will be scheduled no later than the end of the first week of classes in the following semester.

13.11 Supplemental Examinations
In some circumstances students may be allowed to write one supplemental examination. The mark from a supplemental examination may replace or otherwise augment a mark previously obtained in an examination in the same course. Students should contact their Graduate Program Director for regulations concerning supplemental examinations.

13.12 Grading Scheme

Grade	Percentage	Grade Points	Description
A+	90-100	4.3	**Very Good to Excellent**— Student demonstrated mastery of the course material
A	85-89	4.0	
A-	80-84	3.7	
B+	77-79	3.3	**Acceptable to Good**— Student demonstrated adequate knowledge of course material
B	73-76	3.0	
B-	70-72	2.7	
F	0-69	0	**Inadequate**— Student did not perform to academic expectations

13.13 Minimum Average

In order to continue in a prescribed program of study at the graduate level, a student must maintain a minimum B- average overall.

13.14 Grade Changes

After grades have been officially approved and released, any grade changes must be submitted in writing to the Registrar. Grade changes may result from the submission of course work, the writing of a deferred examination, clerical errors, or an approved examination reread. All grade changes must be approved by the course instructor and the Graduate Program Director or designate.

If a student's grade is not available when final grades are approved at the end of the term because of special circumstances, a special designation will be temporarily added to the student’s record. If a deferred examination has been granted, a grade of DEF will be assigned. If a portion of the work required for the course is incomplete, a grade of INC may be recorded. These grades may satisfy prerequisites for further courses on a temporary basis, but not beyond the end of the subsequent term after which these grades revert to "F."

Graduate continuance courses will be assigned a grade of CO (continuance) and will not be included in grade point average calculations.

13.15 Grade Appeals

Students may, with sufficient academic grounds, request that a final grade in a course be appealed (which will comprise only the review of specific pieces of tangible but not oral work). Grounds not related to academic merit are not relevant for grade appeals.

Students are normally expected to contact the course director first to discuss the grade received and to request that their tangible work be reviewed. Students

should be aware that a request for a grade appeal may result in the original grade being raised, lowered or confirmed. The deadline for submitting grade appeals is three weeks after the release of final grade reports in any term.

If the condition of sufficient academic grounds has been met, the student shall lodge a request with the Registrar's office, which will contact the Graduate Program Director and collect any fees incurred for the appeal. Students must specify the rationale for their appeal by making clear the component of the final grade upon which they seek appeal. The Graduate Program Director will be responsible for ensuring that the work is reappraised by an appropriate faculty member, ensuring anonymity of both the student and the reappraiser, and for communicating the result of the appeal (including the reappraiser's comments) and the route of appeal to the student and the course director. The reappraiser will be given the nature of the assignment and the rationale for the original grade. It is expected that every effort will be made to render the decision within 30 days of the reviewer having received the work.

In the event that a student is still not satisfied with the final grade, or the course director is not available to review the work, a student may submit, in writing, a formal request for a grade appeal to the Graduate Studies Committee of Academic Council. Such appeals can only be considered on the grounds of procedural irregularity. Appeals must be submitted within 15 working days of notification of the decision. Appeals shall be heard by a panel of a minimum of three committee members, as determined by the Dean of Graduate Studies, including at least one student and at least two faculty members. The appeal hearing shall be chaired by the Dean of Graduate Studies or designate, who shall be counted as a panel member.

At the discretion of the relevant faculty committee, the student and/or the faculty member may be invited to meet with the panel to present their case(s) orally. The panel's decision will be taken in camera and it is expected that parties will be informed of the decision in writing within 20 working days of the filing of the appeal.

13.16 Conferral of Degrees

Students expecting to graduate in any given term are required to contact the Registrar's office to complete the necessary forms. All applications must be received no later than January 15 for June graduation.

Degrees will be conferred at the time of Academic Council approval and notation of the degree awarded will be entered on the student's record. All students who are awarded a degree are eligible to attend the session of Convocation that immediately follows the date of conferral.

14. Degree Requirements

All candidates pursuing a master's degree shall enroll in an advanced course of

study approved by the Graduate Program Director where the graduate student is registered. Each student must meet the program requirements laid out by the host Faculty, while maintaining the required average to qualify to graduate in a timely manner.

14.1 Time Limits

The minimum time allowed for full-time students to complete all requirements for a master's program is one year, and the maximum time is three years from the time of initial registration as a full-time student. Students registering on a part-time basis have a maximum of five years to complete the degree. Terms for which a student is granted a leave of absence shall not be included in these time limits.

Students needing to exceed the normal allotted time for completion of their program must formally request an extension to their program. Extension requests are to be made after the normal program length to the Dean of Graduate Studies.

Students who do not complete degree requirements within the allotted time and have not been granted an extension may be required to withdraw from the program. Under exceptional circumstances and on the recommendation of the Chair of the Supervisory Committee, a student who did not complete the degree requirements within the allotted time may be readmitted for one semester only to complete those requirements. Final approval for readmission must be granted by the Dean of Graduate Studies.

15. Academic Conduct

15.1 Code of Academic Conduct

Faculty members and students share an important responsibility to maintain the integrity of the teaching and learning relationship. This relationship is characterized by honesty, fairness, and mutual respect for the aims and principles of the pursuit of education. Academic misconduct impedes the activities of the university community, and is punishable by appropriate disciplinary action.

UOIT and its members have the responsibility of providing an environment which does not facilitate the inadvertent commission of academic misconduct. Students and faculty should be made aware of the actions which constitute academic misconduct, the procedures for launching and resolving complaints, and the penalties for commission of acts of misconduct.

15.1.1 Academic Misconduct: Offences

Academic misconduct includes, but is not limited to:

- unreasonable infringement on the freedom of other members of the academic community (i.e. disrupting classes or examinations, or harassing, intimidating or threatening others);
- violation of safety regulations in a laboratory or other setting;
- cheating on examinations, assignments, reports or other work used to evaluate student performance (cheating includes copying from another student's work or allowing one's own work to be copied, submitting another person's work as one's own, fabrication of data, consultation with an unauthorized person during an examination, and use of unauthorized aids);
- impersonating another student or allowing oneself to be impersonated for purposes of taking examinations, or carrying out laboratory or other assignments;
- plagiarism, which is the act of presenting the ideas, words, or other intellectual property of another as one's own (the use of other people's work must be properly acknowledged and referenced in all written material);
- obtaining by improper means examination papers, tests or similar materials, or the use or distribution of such materials to others;
- falsifying academic records, including tests and examinations, or submitting false credentials for the purpose of gaining admission to a program or course, or for any other purpose;
- misrepresentation of facts, whether written or oral, which may have an effect on academic evaluation; this includes making fraudulent health claims, obtaining medical or other certificates under false pretenses, or altering certificates for the purposes of misrepresentation;
- submission of work when a major portion has been previously submitted or is being submitted for another course, without the express permission of all instructors involved; and
- professional unsuitability, such as behaviour inconsistent with the norms and expectations of the profession.

15.2 Procedure for Resolution

With respect to all accusations of academic misconduct, students are presumed innocent until the contrary has been established. Decisions regarding the commission of academic misconduct are based on the balance of probabilities. A record of all allegations of misconduct, along with details of the resolution, will be entered into the central academic records kept by the Registrar's office.

Faculty, staff, or students who have reason to believe that an academic offence has been committed should report the matter promptly to the appropriate Dean. A written report of the alleged offence shall be prepared, together with any relevant evidence.

The Dean must decide promptly whether an attempt is to be made to resolve the matter informally; otherwise, the Dean shall follow the procedures for formal

resolution. In either case, a student will not be permitted to withdraw from the course in which the offence was alleged to have been committed until the matter is resolved and penalty imposed, if applicable.

15.2.1 Informal Resolution

The Dean must inform the student of the accusation of academic misconduct. The student will have five working days in which to respond to these allegations. If the alleged offender responds with an admission of guilt and agrees to the terms of a resolution as set out by the Dean, the matter will be considered closed. The terms of the resolution shall be detailed in writing and signed by the Dean and the student in question. A copy of this document will be sent to the Dean of Graduate Studies.

Informal resolution may not result in the expunging of grades, the revoking of degrees, or in the student being suspended or expelled.

15.2.2 Formal Resolution

When an attempt at informal resolution fails or is deemed inappropriate, the Dean must inform the student in writing of the charge, the possible penalties, and a copy of the pertinent policy statement. The student will be given five working days to prepare a response. The Dean will then meet with the student to hear the response. Both the Dean and the student are entitled to be accompanied by up to two advisors at this meeting, provided 48 hours' advanced notice is given of the identity of the advisors.

The Dean shall then conduct a thorough investigation of the allegations and response, to be concluded within 10 further working days, and notify the parties of the decision in writing. A copy of the decision will be provided to the Dean of Graduate Studies and, on a need to-know basis, to administrative units (i.e. the Graduate Program Director, other Faculties, the Registrar).

15.3 Penalties

If a student is deemed to have committed academic misconduct, one or more of the disciplinary penalties in the following list may be imposed. The severity of the penalty will be determined by the nature of the offence and the student's past record of conduct. Students found guilty of successive acts of misconduct will receive increasingly severe penalties.

The disciplinary penalties are:

- Resubmission of the piece of academic work in respect of which the misconduct was committed, for evaluation.
- A written reprimand, warning the student that the behaviour was unacceptable and that further misconduct will lead to additional penalties. A copy of the reprimand will be placed in the student's file, but no notation will appear on the academic record.

- Submission of a failing grade in an examination, test, assignment or course.
- Disciplinary probation for the remainder of the student's registration in his current program of study. A note to this effect will be placed in the student's file, but no notation will appear on the academic record. Any further offence will lead to a more severe penalty.
- Expunging of grades or revoking of degrees.
- Restraining orders or monetary restitution where appropriate in the case of threats, harassment, or damage to property.
- Suspension from attendance in a course, program, Faculty or UOIT itself, for a period not exceeding three years as deemed appropriate. While suspended, a student may not register, and loses the right to attend lectures, write examinations, and receive payment from UOIT sources. Courses taken elsewhere during the period of suspension are not eligible for transfer credit. Notice of suspension will be placed in the student's file and will appear on the student's academic record. The conditions of suspension will specify the length of time such notice will remain on the student's academic record.
- Permanent expulsion from UOIT. A note to this effect will be placed in the student's file and will remain on his academic record.
- Such other penalty as deemed appropriate.

15.4 Termination of Student Enrolment

UOIT may terminate a student's enrolment in a graduate program on any of the following grounds:

- failure to achieve the required grades to continue as outlined in the degree regulations;
- failure to achieve the required grade on a comprehensive exam or project;
- failure to successfully complete a thesis, project or major paper;
- failure to register in any semester;
- failure to report, in advance, courses being taken at another institution;
- lack of progress toward completion of the program;
- recommendation of termination from the Supervisory Committee;
- failure to meet the conditions of admission;
- academic misconduct;
- professional unsuitability as defined by the program; or
- research misconduct and/or noncompliance with UOIT's research ethics guidelines or policies.

15.5 Academic Appeals

All decisions of the university relating to academic conduct or program termination may be appealed to the Graduate Studies Committee of Academic Council. The student will be given 10 working days to gather new evidence and to submit a letter of appeal to the Dean of Graduate Studies. Under normal circumstances, disciplinary penalties will not be imposed before an appeal is decided; however, official transcripts will not be issued during this period. Formal

registration may be revoked where warranted. In the case of suspected professional unsuitability, a student may be withdrawn from classes, practica, work placements or other program-related activities pending resolution of the case.
A student may apply to the Dean of Graduate Studies for continued attendance in classes and related activities while the appeal is being heard. In order for such a request to be granted, the Dean of Graduate Studies must be satisfied that there would be no detrimental effect of such continued attendance. If the appeal is granted, formal registration will be reinstated.

15.5.1 Graduate Academic Appeals Procedures

1. Appeals shall be heard by a panel of a minimum of three committee members, as determined by the Dean of Graduate Studies, including at least one student and at least two faculty members.
2. The appeal hearing shall be chaired by the Dean of Graduate Studies or designate, who shall be counted as one of the panel members.
3. Decisions with respect to the final disposition of an appeal will be carried by a simple majority of panel members hearing the appeal.
4. An appellant must have completed any prior levels of appeal open to him or her before filing a Notice of Appeal with the committee.
5. An appeal to the committee shall be commenced by filing a Notice of Appeal in the required form no later than 4 p.m. on the 10th working day after the date of the decision which is being appealed.
6. The chair may refuse to give a hearing to an appeal on the grounds that it is not within the jurisdiction of the committee.
7. The panel of the committee hearing an appeal may dismiss an appeal by unanimous decision after considering the written submissions notwithstanding a request for an oral hearing on the grounds that there is no real case for an appeal (i.e. the appeal is frivolous or vexatious and without merit).
8. In the Notice of Appeal, the appellant shall elect whether an oral hearing is requested. If no election is made, the appeal shall be determined in writing.
9. Where an appeal is to be determined in writing:
    i. As soon as reasonably practicable the panel shall provide a copy of the Notice of Appeal to the responding Faculty;
    ii. The responding Faculty has 10 working days to deliver to the panel a written response to the Notice of Appeal, attaching any documents relevant to the decision under appeal. A copy of the written response and attached documents shall be mailed to the appellant; and
    iii. The appellant shall have 10 working days from the mailing date of the responding Faculty's response to provide any final written response. A copy of this shall be mailed to the Faculty.
10. Where the appeal is to be determined by oral hearing:

a. Upon receipt of the Notice of Appeal, the panel, in consultation with the appellant and the responding Faculty, will schedule a date for the oral hearing;
b. No less than 10 working days prior to the hearing, the appellant shall deliver to the panel (three copies) and the responding Faculty (one copy) of:
    i. Any written submissions to be relied upon at the hearing;
    ii. Copies of all documents to be referred to at the hearing; and
    iii. A list of persons attending as witnesses and a brief summary of each witness's intended evidence.
c. No less than five working days prior to the hearing, the responding Faculty shall deliver to the panel (three copies) and the appellant (one copy) of its material listed at paragraph 10.1(b), (i) to (iii), above.

11. Where the appeal is to be determined in writing, the members of the panel may convene in person or via teleconference.
12. For an oral hearing, the following procedures shall apply:

i. At the commencement of the hearing, the chair shall identify the parties and the members of the panel;
ii. The appellant or a representative shall briefly describe the case to be presented, and provide factual support for the case through documentary evidence and testimony of the appellant and any witnesses, if relevant;
iii. The responding Faculty or a representative shall briefly reply to the appellant's case and provide facts in opposition to the case through documentary evidence and the testimony of witnesses, if relevant;
iv. Panel members may ask questions at the conclusion of each person's statement or testimony, or at the conclusion of the appellant's or responding Faculty's case;
v. Normally, neither the appellant nor the responding Faculty may ask questions of the other's witnesses. Where facts important to the decision of the appeal are in dispute, however, either party may ask permission and, if appropriate, the panel may grant permission for the cross-examination of some or all witnesses;
vi. Following the presentation of the appellant's and the responding Faculty's cases, the appellant and the responding Faculty may each make brief closing statements to summarize the main points of their respective positions;
vii. Following the foregoing steps, the parties will withdraw and the panel will move in camera for its deliberations;
viii. The decision of the panel will be in writing and shall include the names of the panel and all who appeared, a brief summary of the issues on the appeal, the panel decision and reasons in support of the decision.

13. The time limits specified under these procedures may be extended by the chair at the request of the appellant or responding Faculty, if reasonable grounds are shown for the extension.

Appendix C: Additional Information

1. PROGRAM DEGREE-LEVEL STANDARD

1.1 Degree-Level Summary

UOIT is committed to providing high quality, challenging graduate programs which clearly meet and/or exceed the standards required for master's degrees. The MASc and MEng programs in Electrical and Computer Engineering are master's-level programs as defined in the *Handbook for Public Organizations, 7.1.4*. and their design is guided by benchmarks described in the *Postsecondary Education Quality Assessment Board Handbook for Applicants.* The MASc is a research-oriented master's degree, and the MEng is a professional master's degree program. Both build upon the knowledge and skills of well qualified applicants from relevant undergraduate programs.

The mission of the Faculty of Engineering and Applied Science is to contribute to society through excellence in education, scholarship, and service. We will provide for our graduate students a rigorous education and endeavour to instil in them the attitudes, values, and vision that will prepare them for a lifetime of continued learning and leadership in their chosen careers. We engage in scholarship of discovery, application, and integration.

The master's programs in Electrical and Computer Engineering are planned to achieve the following goals:

- *Depth – To provide students with an understanding of the fundamental knowledge prerequisites for the practice of, or for advanced study in communications and signal processing, software engineering, control systems, electronics, and power systems.*

- *Breadth – To provide students with the broad and advanced education necessary for productive careers in the public or private sectors and in academia.*

- *Professionalism – To develop skills necessary for clear communication and responsible teamwork, and to inspire professional attitudes and ethics, so that students are prepared for modern work environments with diverse needs and for lifelong learning and enrichment.*

- *Learning Environment – To provide an environment that will enable students to pursue their goals through innovative graduate programs that are rigorous, challenging, and supportive.*

In order for students and faculty engage to in scholarship of discovery, application, and integration UOIT has made every effort to provide state-of-the-art learning resources including the library, learning technologies, and laboratories. For example, students in the MASc and MEng programs will have access to major equipment and common facilities such as: IMC, ACE and Hacker Lab. Details about these facilities are described in Section 3.2.

The learning outcomes for the MASc program are achieved through a combination of course work, supervised research, a research seminar, and a research thesis.
The main purpose of the MEng program is to provide the opportunity for engineers in industry to

upgrade and expand their skills. Graduates of the program will be able to apply what they have learned in a variety of applications in industry. The learning outcomes for the MEng program are achieved through either a combination of course work and a project, or solely course work depending on which option the student selects. MEng students are exposed to research through course-based research projects.

The combination of courses and/or projects and research, will be designed collaboratively between the student and an assigned faculty advisor/mentor. Each learner will have the opportunity to develop the prerequisites for specialized practice of, or for advanced study in areas within Electrical and Computer Engineering, such as Communications and Signal Processing; Software Engineering; Electronics, Control, and Mechatronics; and Electromagnetics and Power Systems, including their scientific principles, analysis techniques, and design methodologies. Learning activities and materials in graduate courses will be carefully designed to ensure that learners are deliberately exposed to study, the majority of which is at, or informed by, the forefront of engineering theory and practice.

The courses have been designed to give students in depth learning in a specialized area of engineering, opportunity for advanced development of generic skills such as communication and teamwork, as well as participation in the scholarly activities of research, seminars, and presentations. Throughout the curriculum, learning activities are planned, and student progress will be monitored to ensure that safety, professional guidelines, and ethical responsibilities relevant to engineering and for specific areas of advanced study are modelled, developed, and evaluated.

UOIT's faculty of Engineering and Applied Science has assembled a team of highly qualified and experienced faculty who will deliver the curriculum in interesting and challenging ways and ensure that students are exposed to knowledge and technical applications which are at the forefront of the discipline.

Successful completion of a master's program in Electrical and Computer Engineering will require the students to advance their knowledge and understanding of complex issues in a specific field of engineering, to identify problems and to search for approaches in systematic and innovative ways.

Relevant Knowledge and Understanding

The master's program is designed to enable students to acquire a high level of knowledge and to develop skills to tackle problems in the rapidly evolving discipline of electrical engineering. The program draft has been reviewed by academics and industry professionals. Courses have been designed to help students develop an advanced expertise which incorporates current theory, research, and practice in a specialized area of engineering. The proposed program emphasizes excellence in engineering knowledge and practice and builds upon transferable skills (i.e., interpersonal relations, leadership and team building, communication, critical analysis and decision making) from undergraduate education.

To achieve the overall goals of the program and to ensure that graduates achieve the learning outcomes, the curriculum provides students with advanced theory, research, project

management, and technical and laboratory skills, as well as opportunities to apply this learning. The graduate programs in engineering will incorporate relevant lab and technical skills into learning activities and assignments. Graduate students will develop an in-depth understanding of the technological, social, political, economic, and global issues that affect engineering in general, and in particular, their area of specialization.

Application

Students will acquire a systematic knowledge of inquiry and research methods, including qualitative and quantitative approaches. They will use technology models and state of the art equipment, including current versions of Computer-Aided Engineering (CAE) tools and techniques used for engineering practice. They will be expected to demonstrate sound decision-making strategies to address problems.

The MASc Thesis offers students the opportunity to apply core course concepts and techniques to a substantial investigation under the guidance of a faculty expert. Those students who choose the MEng-Project program plan will be required to work with a faculty member in conducting a significant project. Students from both of these program plans will be required to present their findings to a panel of faculty assessors. Their understanding of relevant theory related to a specialized area of engineering, their ability to use appropriate qualitative and quantitative methods of analysis and to create and evaluate a range of options, and their research and project management skills will all be challenged during the design and implementation of the project or thesis and during seminars and presentations. Students who follow the course based MEng will be required, in the majority of their courses, to apply research and project management strategies and to develop professional presentation skills.

Cognitive Skills

Problem solving, critical analysis, and synthesis are cognitive skills essential to success in any discipline. Graduate students in engineering are expected to utilize these skills throughout the program and they will be provided with ample opportunities to refine these skills through such delivery models as problem based learning activities, collaborative and independent work, simulation lab exercises, written critiques of theory and research, debates and discussions in classes, and oral presentations that require justification of decisions. Students will be actively engaged in these intellectual processes as they work with challenges encountered by individuals in the profession. Such realistic and practical assignments will develop and strengthen students' abilities to critically analyze the information they see, hear and read, to identify assumptions and implicit values, to gather appropriate data to inform and guide decision-making, to propose new hypotheses, to create and assess a range of solutions, to predict risks and to evaluate outcomes. Students will be required to work in teams in appropriate courses; they will be exposed to a variety of perspectives and called upon to listen, assess and incorporate the ideas of others into the problem solving process. Collaborative activities will enable them to pose questions, devise and sustain arguments, and, most importantly, to be active participants in the learning process. While engaged in such interactive processes, they will learn from and contribute to the learning of others.

Lifelong Learning

Realistic case studies and lab exercises, presentations by representatives from industry, and the research, projects, and seminars will expose students to the complexities and challenges and dynamics of engineering. Master's level engineering graduates will need to be prepared to work in complex and unpredictable environments, in different types of corporations and institutions, and with a wide range of colleagues and clients. Change and ambiguity are normal features of an engineering environment and students will develop positive attitudes and pro-active strategies to manage them. Students will come to recognize that a strong foundation of technical knowledge, an ability to locate and utilize up-to-date resources, and ability to make informed decisions will be required in the demanding situations and changing environments of engineering practice, research and education. They will have developed the commitment and strategies necessary for the lifelong learning required for their profession.

Students will learn how to engage in advanced research by using print and electronic publications, including scholarly journals, books, and research websites for the most up-to-date information. They will recognize the need for independent and ongoing learning to maintain currency in a rapidly changing field and to further develop their professional skills. Graduates will have the advanced knowledge base and skill set needed to undertake further education to support and advance their careers.

Transferable Skills

The curriculum has been designed to emphasize the development of qualities and transferable skills which contribute to the students' success as independent learners and as team players. Throughout the program, graduate students will be involved in a variety of tasks that involve the demonstration of effective communication skills using oral, written, graphic and electronic formats. They will be expected to share information in ways which are suitable for both lay and specialist audiences. Students will participate in small and large group activities and hone their skills as both team members and leaders. The coursework in the program will require hours of research along with activities involving practical applications. The demanding workload will require students to organize their time and manage their projects efficiently in order to meet clearly defined standards of performance and expected deadlines.

UOIT is confident that the proposed program is sufficiently comprehensive and rigorous to meet the standards of a master's level graduate degree program. It aims to develop in students the advanced knowledge base, the enhanced technical, cognitive, and interpersonal skills as well as the positive attitudes that will enable them to experience personal, academic, and professional success during their graduate studies at UOIT and beyond.

2. CAPACITY TO DELIVER STANDARD

2.1 Enrolment Projections and Staffing Implications

PROJECTED INTAKE AND ENROLMENTS Master of Applied Science in Electrical and Computer Engineering						
YEAR	Cumulative Enrolment		Staff Requirements - Projected			
	Full-time	Part-time	Cumulative Full-time Faculty FTE	Cumulative Part-time Faculty FTE	Technical Support	Ratio of Full-time Students/ Full-time Faculty
2007	5-10	1-3	23	0	5	1:2.3
2008	15-25	2-6	38	0	5	1:1.52
2009	20-30	3-9	52	0	5	1:1.73
2010	20-35	3-9	60	0	5	1:1.71

PROJECTED INTAKE AND ENROLMENTS Master of Engineering in Electrical and Computer Engineering						
YEAR	Cumulative Enrolment		Staff Requirements - Projected			
	Full-time	Part-time	Cumulative Full-time Faculty FTE	Cumulative Part-time Faculty FTE	Technical Support	Ratio of Full-time Students/ Full-time Faculty
2007	5-10	5-10	23	0	5	1:2.3
2008	5-20	10-20	38	0	5	1:1.9
2009	5-20	10-20	52	0	5	1:2.6
2010	10-25	10-20	60	0	5	1:2.4

2.2 Resource Renewal and Upgrading

- **For library renewal and upgrading, refer to Appendix A: Library Resources**

- **Computers and Computer Access:**

Refer to OCGS Appraisal Brief Section 3.3 for details on computers and computer access.

- **Classrooms and Physical Facilities:**

Capital Plans are in place to develop two phases of buildings. The government has invested $60 million in development of the University of Ontario Institute of Technology. Initial construction took place on 115 acres immediately adjacent to Durham College. The University has also purchased a scenic 385 acres to the north of this area to accommodate future development.

The first University building, which was ready for occupancy in September 2003, contains classrooms, laboratories, and academic and staff offices. A 300-bed residence was also ready for the first class of UOIT students in September 2003.The second phase of construction, included one additional (200 bed) residence building, two additional academic buildings comprised of classrooms, laboratories, academic and staff offices and a new library shared by UOIT and Durham College. This phase was completed in September 2004.

In early November 2003, engineers completed drilling of a geothermal well field, and it is the largest heating and cooling system of its kind in Canada and the second largest in North America. This is the first phase in development of a thermal energy system that will use the earth's relatively constant temperature to provide highly efficient heating and cooling for campus buildings. Academic buildings feature an environmentally friendly "green" roof comprised of grass that helps reduce heating and cooling costs and improve storm water management.

The initial core facilities for teaching and research at the UOIT are housed in the three academic buildings. Together with the new University library, these buildings overlook the landscaped campus commons. This precinct is the heart of the University and will be its central crossroads.

A key characteristic of each academic building is the provision of generous student study and lounge space. These are complemented by a faculty lounge, Council room and student club offices. The lounge and study spaces are concentrated around a central skylit atrium which provides a point of orientation, gathering and connection for students and faculty. The buildings are designed to be highly flexible, adaptable to programs and teaching configurations as yet unknown. Wired and wireless connections are provided through all dedicated and informal teaching spaces.

The new University library has been is designed as the intellectual and social commons for this 21st century university. In particular, the library has two points of focus; the provision of access to electronic collections and resources and work and study space for 750 students. While the

library will house a print collection of about 125,000 volume equivalents, with an emphasis on reference materials, it is in the provision of access through wired and wireless connection to electronic collections that the library will be distinguished. The building is designed on three floors with the connectivity and staff resources to fulfill this mission. Much attention has been devoted to the quality and variety of student space. Large study halls overlook the landscape commons and provide a variety of table, carrel and soft lounge seating. Many enclosed rooms are also provided for group study, seminar discussion and quiet work activities.

Construction of the new engineering building was started in early 2005 with completion for student use scheduled for summer 2006.

- **Laboratories/Equipment:**

Refer to OCGS Appraisal Brief Section 3.2 for details of current and planned laboratory resources.

3 CREDENTIAL RECOGNITION STANDARD

3.1 Program Design and Credential Recognition

UOIT is committed to providing high quality, challenging graduate programs which clearly meet and/or exceed the standards required for master's degrees. The design of the master's programs in Electrical and Computer Engineering has been guided by benchmarks described in the *Postsecondary Education Quality Assessment Board Handbook for Applicants.* ***(Program Degree Level, Benchmark 1, Handbook – Public, 7.1)***

Research was conducted and documentation is on file, to compare the breadth and rigour of the elements of this proposed Master's program in Electrical and Computer Engineering to similar programs, in Canada and elsewhere. The plans for the UOIT curriculum certainly achieve the breadth and rigor of these similar programs. Information about programs available at other universities can be found in Section 1.3 of the OCGS brief.

The main objective of the MASc program is to prepare students for a career as a R&D engineer. Graduates of the program will be prepared for a career in research and development or other employment which requires advanced preparation in Electrical and Computer Engineering. They will also be able to continue their education and pursue a doctorate degree. It is understood that applications for graduate school are considered on a case-by- case basis by the admitting university.

The main objective of the MEng program is to provide the opportunity for engineers in industry to upgrade and expand their skills. Graduates of the program will be able to apply what they have learned in a variety of applications in industry. This is a terminal degree developed for students who do not intend to proceed to a doctorate degree.

3.2 Consultation

Academic details of the proposed program were submitted to UOIT's Curriculum and Program Review Committee for examination in May, 2006. The proposal was then referred to the University's Academic Council and approved by that administrative body on June 20, 2006. These advisory and decision-making bodies endorsed the design of the MASc and MEng in Electrical and Computer Engineering and authorized the submission of this document to OCGS and PEQAB.

UOIT has initiated formal consultation with universities in Ontario which offer related programs, in order to ensure recognition of its degree credentials for students who wish to transfer or to proceed to other graduate degrees.

Letters which confirm consultation with other universities and with important stakeholders and potential employers of graduates are attached on the following pages.

John D. Wood, P.Eng.
Senior Advisor
R&D and Technology

GM Canada

General Motors of Canada
Mail Code: CA1-098-001
1908 Colonel Sam Drive
Oshawa, Ontario L1H 8P7
john.wood@gm.com

April 24, 2006

Dr. Marc A. Rosen, P.Eng.
Professor and Dean
Faculty of Engineering and Applied Science
University of Ontario Institute of Technology
2000 Simcoe Street North
Oshawa, Ontario L1H 7K4

Dear Dr. Rosen:

Subject: Proposal for the UOIT Masters Programs in Electrical and Computer Engineering

I have recently reviewed your plans for the proposed UOIT Masters programs in electrical and computer engineering and am very pleased to provide this letter of support and enthusiastic endorsement. The plans for both the M.A.Sc. and the M.Eng. programs are well thought out. Clearly, to support the university's founding theme as an institute of technology, the M.Eng. program will generate graduates very well educated and trained for future industrial employment, and aligned with the needs for more highly qualified personnel in ever-increasing numbers. The M.A.Sc. program likewise is designed to promote candidates into more investigative, exploratory roles in organizations with needs for R&D personnel, and just as importantly, into succeeding Ph.D. programs for eventual positions as qualified industrial researchers or into academic careers.

The proposal describes a well-planned curriculum, with appropriate course and projects/thesis tracks, as appropriate. With the sophisticated infrastructure support in the university, I believe that the right level of learning environment is being provided, not the least of which is world class research and teaching laboratories. The calibre of the faculty is already outstanding – UOIT's Canada Research Chair, Premier's Research Excellence Award and NSERC Design Chair are great endorsements of the academic capabilities that the UOIT team has already assembled.

General Motors of Canada is very pleased to see this application being made at this point in time. Negotiations with UOIT over the past several years have led to the major Beacon Project investment program , which incorporates plans for the construction of the Automotive Centre of Excellence, along with a major thermodynamic wind tunnel and associated development and research facilities, to be co-located with UOIT's own engineering building. The addition of these Masters programs is absolutely the right next step to further the generation of new graduates in the automotive and related fields who can participate first hand in industrial scale research and development projects

as part of their education. In particular, these new electrical engineering programs are a direct response to a need by our industry, and others, for greater expertise in the fields of computing, communications, power and energy management systems, controls and mechatronics. These are fields in which we currently have some difficulty recruiting due to shortages in relevant education and experience. This highly directed response and partnership can only grow deeper as the graduates of this program either find employment in the electrical, computing or power engineering and manufacturing fields, or as they go on to post graduate studies, building on the success of the Masters programs, and their opportunities within the Automotive Centre of Excellence.

I look forward to the success of UOIT's application for the electrical and computer engineering Masters programs, and wish you and your colleagues all the best in this exciting process.

Sincerely,

John D. Wood, P.Eng.
Senior Advisor
R&D and Technology
General Motors of Canada

SIEMENS

April 12, 2006

Marc A. Rosen, P.Eng
Professor and Dean
Faculty of Engineering and Applied Science
University of Ontario Institute of Technology
2000 Simcoe Street North
Oshawa ON L1H 7K4

Dear Doctor Rosen:

Proposal for UOIT Graduate Programs in Electrical and Computer Engineering

I have examined the plans for the proposed UOIT Masters program in Electrical and Computer Engineering and I am pleased to offer this letter of endorsement. The graduate curriculum is well developed and it would provide enhanced knowledge and skills in electrical and computer engineering, as well as appropriate degrees of specialization therein. The graduate programs are innovative and they have been designed to respond to defined needs in Canadian industries. The graduate programs will address needs for specialized engineering expertise in Canadian industries and they will provide credentials that will be well recognized for employment opportunities and advanced studies in electrical and computer engineering.

Yours truly,
SIEMENS CANADA LIMITED

Dominic Caranci, P.Eng
Automotive Sector Manager

DC/kb

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FACULTY OF APPLIED SCIENCE AND ENGINEERING

UNIVERSITY OF TORONTO

Dr. Marc A. Rosen, P.Eng.
Professor and Dean
Faculty of Engineering and Applied Science
University of Ontario Institute of Technology
2000 Simcoe Street North
Oshawa, Ontario
L1H 7K4

April 7, 2006

Dear Dr. Rosen:

Re: Proposal for UOIT Graduate Programs in Electrical and Computer Engineering

I have closely examined the plans for the proposed UOIT Masters program in Electrical and Computer Engineering and I am pleased to offer this strong letter of endorsement.

The graduate curriculum is well developed and it would provide enhanced knowledge and skills in electrical and computer engineering, as well as appropriate degrees of specialization therein. The graduate programs are innovative and they have been designed to respond to defined needs in Canadian industries.

The proposed graduate programs will address needs for specialized engineering expertise in Canadian industries and they will provide credentials that will be well recognized for employment opportunities and advanced studies in electrical and computer engineering.

Regards,

Beno Benhabib
Professor
Mechanical and Industrial Engineering, and
Electrical and Computer Engineering
University of Toronto
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beno@mie.utoronto.ca

IBM Canada Limited
690 Dalton Ave., Suite 2
Kingston, Ontario K7M 8N8

April 6, 2006

Dr. Marc A. Rosen, P.Eng.
Professor and Dean
Faculty of Engineering and Applied Science
University of Ontario Institute of Technology
2000 Simcoe Street North
Oshawa, Ontario, Canada,
L1H 7K4

Subject: Proposal for UOIT Graduate Programs in Electrical and Computer Engineering

Dear Dr. Rosen:

The demand for deep skills in the electrical and computer engineering fields continues to grow, especially within companies like IBM. Having examined the plans for the proposed UOIT Masters program in Electrical and Computer Engineering and I am pleased to offer this letter of endorsement.

The graduate curriculum is well developed and will provide enhanced knowledge and skills in electrical and computer engineering, as well as appropriate degrees of specialization therein. The programs are innovative and have been designed to respond to defined needs of industry, addressing the requirement for specialized engineering expertise in Canadian industries. They will provide credentials that will be well recognized for employment opportunities and advanced studies.

If I can provide any additional support please let me know.

Yours truly,

Don Aldridge
General Manager
Higher Education, Research & Life Sciences
daldridg@ca.ibm.com
613-531-2901

4 CONFORMITY WITH MINISTERIAL POLICY DIRECTIVES

4.1 Applicant Acknowledgement and Agreement

The Applicant Acknowledgement and Agreement form, signed by the President and Vice-Chancellor of the University, is included on the pages that follow.

Ontario

Ministry of Training, Colleges and Universities

Applicant Acknowledgement and Agreement

(To accompany every application for ministerial consent under the Post-secondary Education Choice and Excellence Act, 2000)

This form must be completed by a representative of the applicant who is authorized to bind the applicant, and must be included with the materials accompanying an application to the Minister for a consent under the Post-secondary Education Choice and Excellence Act, 2000.

Name of applicant: University of Ontario Institute of Technology

Insert name of applicant organization

Purpose of application: MASc / MEng in Electrical and Computer Engineering

Insert name of degree and title of program (e.g., Bachelor of Science in physics)

☐ Please indicate if this application relates to use of the term *university*.

1. The applicant hereby **acknowledges** that, in making this application, it understands that:

1.1 The granting of a consent by the Minister of Training, Colleges and Universities under the act is a privilege, not a right.

1.2 A consent by the Minister of Training, Colleges and Universities under the act is normally granted for a specified period of time and remains in force only during that specified period.

1.3 A Minister's consent does not include any express or implied entitlement to:
- a renewal of such consent; or
- a consent for additional or different activities regulated by the act.

1.4 A Minister's consent does not entitle the consent holder to any funding from the Government of Ontario, including but not limited to operating, capital, or research funding.

1.5 A private organization from outside Ontario will be treated no less favourably, in like circumstances, than a private organization from Ontario.

1.6 A private organization, whether from Ontario or from outside the province, is not entitled to treatment that is no less favourable, in like circumstances, than the treatment accorded by the Minister to a public institution.

1.7 A Minister's consent is not transferable, directly or indirectly, to a third party.

1.8 If the applicant fails to comply with any legislative requirements or with the terms and conditions of the consent, the Minister may amend or change the terms and conditions of the consent or suspend or revoke the consent.

1.9 A Minister's consent does not make the consent holder's students eligible to apply for government financial assistance, grants, or awards that are provided directly to students (e.g., assistance under the Ontario Student Assistance Program). Approval of organizations and programs for the purposes of Ontario student loans is established pursuant to the Ministry of Training, Colleges and Universities Act and regulations thereunder, as amended from time to time.

1.10 The Minister's criteria and policy statements related to the review of applications for a ministerial consent may change from time to time.

1.11 All information provided to the Minister or the Postsecondary Education Quality Assessment Board in applications and related documentation may be subject to disclosure under the Freedom of Information and Protection of Privacy Act.

(continued)

1.12 No consent shall take effect until the applicant provides confirmation, in a written form approved by the Minister, that the applicant understands and agrees to comply with all of the terms and conditions attached to the consent.

1.13 Should the Minister grant a consent, the consent holder will be required to ensure that the following statement appears on promotional and other materials, in any media, that relate to the program offered under the consent:

This program is offered under the written consent of the Minister of Training, Colleges and Universities for the period from (day/month/year) *to* (day/month/year). *Prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).*

1.14 The consent holder has a positive obligation under the Post-secondary Education Choice and Excellence Act, 2000, to notify the Minister of Training, Colleges and Universities promptly if the consent holder has reason to believe that not all of the terms and conditions of a consent may be met.

2. The applicant hereby **agrees** to provide the Minister or the Postsecondary Education Quality Assessment Board with any additional material required by the Minister or the board to assess the application.

3. The applicant hereby **confirms and warrants** that:

3.1 All information and representations provided by the applicant as part of this application, including information given in the Organization Review Submission and the Quality Assessment Review Submission, are true.

3.2 This application was duly approved by the applicant's governing body or by another representative duly authorized to bind the applicant on

June 20, 2006

(date of approval)

at

Oshawa, ON.

(place of approval).

Dr Gary Polonsky

Name of authorized representative

President and Vice-Chancellor

Position in applicant organization

Signature

May 12/06

Date