School of Business and Information Technology

Appraisal Brief
of the
Master of Information Technology Security Program

To Be
Submitted to the
Ontario Council on Graduate Studies

[For Discussion Only – November 10, 2003]

Volume 1: The Program

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1 INTRODUCTION

1.1 Brief listing of program

The master's program leads to the Master of Information Technology Security. This is a new degree program to be offered at the University of Ontario Institute of Technology. This program can be completed in twenty-four months of full-time study.

1.2 Objectives of the program

The primary objective of the Master of Information Technology Security (MITS) program at the University of Ontario Institute of Technology (UOIT) is to prepare graduates to work in the high-demand Information Technology (IT) Security industry. Our proposed MITS program not only emphasizes excellence in graduate level business *and* information technology security knowledge but soundness in the soft skills (i.e., interpersonal relations, team building, and communication) and in business and IT ethics.

This unique MITS program, the first of its kind in Canada and part of a handful of such specialized IT Security graduate degree programs in North America and globally (for example, at James Madison University, Mary Washington College, and Idaho State University in the United States and at the University of The Hague in the Netherlands), prepares students to work in the high-tech professions as well as in business corporations, particularly in the IT security areas.

Moreover, our partnership with the SANS (SysAdmin, Audit, Network, Security) Institute in the United States, the trusted leader in information security research, education, and certification, will allow our MITS graduates to write tests for GIAC (Global Information Assurance Certification). No other graduate degree programs in Canada offers such a tangible career outcome.

In 1989, the SANS Institute was established as a cooperative research and education organization to enable more than 156,000 security professionals, auditors, system administrators, and network administrators to share the lessons that they are learning and to find solutions to the challenges they face. A decade later, SANS founded GIAC, which has grown steadily ever since its creation. GIAC offers certifications that address a range of IT Security skill sets, including security essentials, intrusion detection, incident handling, firewalls and perimeter protection, operating system security, and more. GIAC is unique in the field of information security certifications by both testing a candidate's knowledge and testing a candidate's ability to put that knowledge into practice in the real world. Because of the rapidly changing nature of IT Security, GIAC certification only lasts for 2-4 years,

after which the candidate must continually update himself/herself and be retested to be re-certified. Because of GIAC's practical focus, a Garner Group study in the spring of 2001 named GIAC "the preferred credential" for individuals having technical security responsibilities.

In addition, the MITS program prepares graduates to take the CISSP exam offered by the International Information Systems Security Certification Consortium, Inc. $(ISC)^2$ is a not-for-profit consortium and certification organization which is charged with the responsibility for maintaining various Common Bodies of Knowledge (CBK) for Information Security Professionals, including those for CISSPs (Certificate of Information Systems Security Professionals), certifying the minimum acceptable competence for professionals seeking to hold various credentials (also including CISSP and SSCP). The CISSP Certification designations are recognized and honored by the technology industry worldwide. They continue to grow in recognition and stature as a mark of excellence in the industry. Moreover $(ISC)^2$ certifications are required for employment in an ever-increasing number of private and public sector organizations. CISSP and other $(ISC)^2$ certifications identify individuals as having demonstrated competence and industry knowledge directly related to job performance by virtue of passing the required examination(s) and meeting the other examination prerequisites. Clearly, as more and more employers seek and even require one or more of the $(ISC)^2$ certifications, $(ISC)^2$ certifications significantly benefit individuals seeking advancement, improved marketability or access to peer networking.

Therefore, the MITS curriculum consists of the following learning outcomes and experiences:

a. To understand the research process in the discipline of information technology security.
b. Demonstrates mastery of the basics of information security by producing a practical, original research paper or case study.
c. Demonstrates mastery of risk assessment, IT infrastructure, and related security policies.
d. Master the content of these 10 Domains in the CISSP exam:
    - d.1 Access Control Systems and Methodology
    - d.2 Applications and Systems Development
    - d.3 Business Continuity Planning
    - d.4 Cryptography
    - d.5 Law, Investigation and Ethics
    - d.6 Operations Security
    - d.7 Physical security
    - d.8 Security Architecture and Models
    - d.9 Security Management Practices
    - d.10 Telecommunications, Network and Internet Security
e. Master the content of these Domains in the SANS Security Essentials Course:

e.1 Risk Assessment and Auditing
e.2 Host and Network Based Intrusion Detection
e.3 Honeypots, Firewalls and Perimeter Protection
e.4 Security Policy
e.5 Password Management
e.6 Security Incident Handling
e.7 Information Warfare and Hacking
e.8 Web Security
e.9 Network Fundamentals and IP Concepts and Behaviour
e.10 Primary Threats for Perimeter Protection
e.11 PGP, Steganography
e.12 Anti-viral tools
e.13 Windows (2000, XP, NT, 98) Security Administration and Auditing
e.14 IIS Security
e.15 Unix Security Fundaments

f. Understand different types of security related issues and applications in various businesses and disciplines.

To achieve the objective of the program and to enhance students' learning experience, it is important for the program to provide students with the necessary security hand-on skills and knowledge. The School of Business and Information Technology will have as part of the MITS curriculum a Hacker Research Lab," dedicated space which literally mimics a network setting. Faculty members will incorporate various IT security lab assignments into the MITS courses. For example, teams of students will be assigned to work as either "defense" or "attack." The "defense" team's role will be to secure their system with available hardware and software tools, while the "attack" team's role will be to attempt to breach the security system as designed by the "defense" team. This simulated network environment will train our graduate students to better understand IT security from two different perspectives; namely, from that of a technology security officer and from that of a criminally-motivated hacker.

Evidence That These Objectives Need to be Met

Until now, the information security expertise gap among management has never been adequately addressed by traditional computer security graduate degrees. By combining Information Technology Security expertise with management expertise, this program's graduates will create a new kind of manager who understands both contemporary business practices and the implications of information security. One of our primary objectives is to have IT- and management-savvy graduates who can serve as the liaison between high-tech groups and senior management. Currently, there are few such individuals who can talk to both groups.

On September 19, 2002, for example, Ernst & Young, one of the world's largest professional services firms, called upon the U.S. business schools, in particular, to consider expanding the core curriculums of their regular business programs to include studies in digital security risk management. The call for change, which came at the heels of the release of the latest draft of the President's Critical Infrastructure Protection Board's National Strategy to Secure Cyberspace, was the result of an informal analysis the firm conducted of the curriculums of the United States' top 30 business schools. The review, conducted by Ernst & Young's Security and Technology Solutions practice, analyzed the MBA curriculums posted on the Web sites of leading business schools. While many schools, such as Stanford, Carnegie Mellon, and Dartmouth offered in-depth and nationally recognized computer security research centers or forums, these programs often were not part of general business school studies and few classes appeared to address cyber-security issues directly (www.eye.com.)

Prime Minister Jean Chrétien stated in the *OCIPEP Announcement* in Febrary 2001, "The protection of Canada's critical infrastructure from the risks of failure or disruption is essential to assuring the health, safety, security and economic well-being of Canadians." Canadian evidence begs for such a useful pairing between Information Technology Security and Managerial prowess. According to the second annual survey of Canadian IT managers and professionals conducted jointly in 2002 by Athabasca University and CIO Canada, the findings indicated that 19 % of respondents had recently observed at least one external IT security breach in their organizations. Surprisingly, a significant 65% of the respondents indicated that the breach went unreported. In addition, while 81% of the respondents believed that security and privacy audit tools are important corporate tools, far too many top managers working in major organizations today are clueless about how to effectively utilize such tools. These are alarming findings based on this national survey of Information Technology experts (www.athabascau.ca). This survey is further supported by the results of the 2003 *Global Economic Crime Survey* conducted by PricewaterhouseCoopers: "Looking to the future, a majority of companies expect fraud to increase in the next five years. Over half of Canadian companies…expect their greatest fraud risk to continue to be asset misappropriation, followed closely by cybercrime which primarily involves computer hacking, virus attacks, denial of service and theft of electronic data." Peter Neumann of SRI International described the recent blackout in Ontario and New York, "This power infrastructure is all band-aids and baling wire. And, of course, it's all dependent on computers. This stuff is riddled with security and reliability flaws."

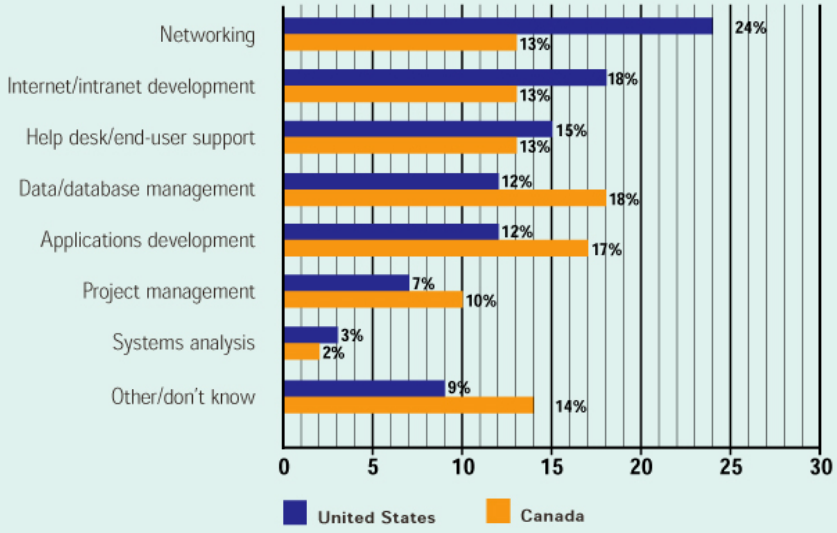
Recent popular reports have written about Canada's lack of preparedness for stepping up our war against on-line terrorism and apocalyptic cyber-attacks. Simon Gauthier, who in May, 2003, became the federal government's deputy chief information officer, said to a Globe and Mail reporter (June 26, 2003, p. B18), "The potential for a significant and serious incident happening on the

Internet is absolutely real" and could extend well beyond a basement hacker's launching a widespread denial-of-service assault to a major terrorist strike targeting air navigation systems or North America's electrical power grid. The trouble is, no one yet knows how this cataclysmic event might occur, and currently there is little Canada and other countries can do to prevent it, noted Mr. Gauthier. "We're still at the bow-and-arrows stage with the technology we employ—intrusion detection systems, virus checkers, and so on—which are still in their infancy. We haven't reached a warfare level of protection, which is where we need to go." Highly trained IT security- and management-savvy researchers would bring Canada and the rest of North America closer to the safety zone where we need to be.

The chart below was based on a U.S. and Canadian survey of more than 1,650 Chief Information Officers from companies with more than 100 employees. This survey was conducted by RHI Consulting in 2002.

INFORMATION TECHNOLOGY'S HOTTEST JOBS

The seven specialty areas experiencing the strongest growth in U.S. and Canadian corporate IT departments, according to CIOs surveyed, are:



Source: RHI Consulting *U.S. and Canadian survey of more than 1,650 CIOs from companies with more than 100 employees*

"The core objective of the National Strategy to Secure Cyberspace is to empower all Americans to secure their portions of cyberspace," stated Richard A. Clarke, Chairman of the President's Critical Infrastructure Protection Board. "Education and training are key components of making that empowerment a reality," he added, "and in large enterprises that needs to happen across the board—and that includes the classrooms where tomorrow's business leaders are being developed. Jose Granado, a former

captain in the United States Air Force's Information Warfare Center, who currently leads Ernst & Young's Attack and Penetration Advanced Security Center in Houston, Texas, added: "Millions of dollars have already been spent training information technology managers to better manage the inherent vulnerabilities associated with doing business in the digital world, but that's not enough. Training and educating just the IT manager is like preparing for a war by arming the generals with howitzers and giving the front line soldiers—the rest of the work force—pop guns. Managing cyber security needs to be a core business discipline for an entire enterprise, and MBA programs are a great place to provide that training." (www.eye.com, page 1 of 2)

Finally, an *IDC Report* published in February 2003 revealed that the IT security market is expected to grow from $25 billion in 2003 to $45 billion by 2006. Moreover, while there was a reported 84% increase in the number of security incidents and confirmed attacks from the third quarter to the fourth quarter of 2002, it was often close to impossible to estimate the loss to companies during these types of security intrusions and attacks.

Based on the above-noted findings by a number of Canadian and United States industry and government studies, the graduates of the University of Ontario Institute of Technology Master of Information Technology Security program will be in high demand, will be part of the IT Security and Management elite, and will be able to contribute to the cyber-safety and cyber-security of North America, while reaping the personal rewards of a highly-paid and highly respected professional position. According to the *SANS 2002 Salary Survey*, the 2002 global average salary for an information security professional was USD$65,200, while the average salary in Canada was about USD$45,000 and in US was approximately USD$69,500 (source: http://www.sans.org/surveys/salary02.php.)

Despite the current downturn in the IT market, a 2002 survey of IT professionals by *Certification Magazine* revealed that even in the certified professional market segment, a significant 79% of certified professionals from 20 companies plan to earn more technical certifications in 2003. Why? According to more than two-thirds of the respondents, technical certifications play a major role in their job security. That is likely one reason why more than half—58%, invested personally in at least part of their primary certification, with an estimated certification Return on Investment (ROI) ranging from 5.6-to-1 to 7.9-to-1. The highest average salary based on primary technical certification (without the business value-added component in the MITS program) was for the HP/Compaq Master ASE position at $81,131 USD. (www.cissp.com, p. 7 of 8) Professionals with this IT Security certification would likely earn over $100,000 Cdn per year.

GIAC and CISSP Certification will provide an independent method of assuring that security professionals meet a minimum standard of technical

competency. Individuals who hold a GIAC or CISSP Certification have demonstrated both that they know what needs to be done to secure and administer systems and have demonstrated that they can put that knowledge into real-world practice.

1.3 Method used for the self-study as well as the preparation of the brief, including faculty and student input and involvement

This appraisal is prepared by the faculty of the School of Business and Information Technology. Comments and suggestions on the proposed curriculum have been sought from a number of research faculty in the field of information technology security and professionals in the industry. A thorough review of the appraisal has also been done by the Provost and the Associate Provost of Research and Graduate Programs as well as the *Ad hoc* Graduate Program Committee. A draft of this Appraisal was also reviewed by Dr. Ali Miri, Assistant Professor, School of Information Technology and Engineering, University of Ottawa; and Dr. Ali Ghorbani, Professor, Faculty of Computer Science, University of New Brunswick.

1.4 Fields in the program

Information Technology Security

1.5 Review concerns expressed in previous appraisal and actions taken

N/A

1.6 Special matters and innovative features

This is a joint, cross-functional program with the Schools of Manufacturing Engineering, Nuclear Engineering and Radiation Science, Science, and Criminology and Justice. The School of Manufacturing Engineering will be offerings bachelor degree programs in Software Engineering and Telecommunications Engineering by Fall 2005. Professors Ali Grami and Clemens Martin are both core faculty of the Schools of Business and Information Technology, and Engineering programs

Numbers of courses in the MITS program will be taught by faculty from the above-mentioned Schools. For example, MITS Advanced Communications Networks and MITS 5801G Biometrics/Access Control and Smart Card Technology will be taught by faculty from the School of Manufacturing Engineering; MITS 5620G Special Topics in IT Management: Nuclear Safety

Management will be taught by faculty from the School of Nuclear Engineering and Radiation Science; MITS 5802G Cryptography and Secure Communications will be taught by faculty from the School of Science.

The School will house a Hacker Research Lab, as described in *section 1.2*, which is to enhance the learning experience of students enrolled in the proposed program. Each student is required to obtain an IBM ThinkPad laptop computer. This unique laptop program is further described in *section 3.3*.

This program is the only IT security program in Canada to prepare students for the GIAC and CISSP certifications in information technology security (*see section 1.2*).

2 THE FACULTY

2.1 List of faculty in each "field" of the program

Faculty Members by Field					
					Fields
Faculty Name & Rank	**M/F**	**Ret. Date**	**Home Unit[1]**	**Supervisory Privileges**	**1**
Category 1					
Schell – Dean & Full	**F**		SBIT	Full	X
Wu – Full	**M**		SBIT	Full	X
Friedlan – Associate	**M**		SBIT	Full	X
Goodman - Associate	**M**		SBIT	Full	X
Grami - Associate	**M**		SBIT/SME	Full	X
Waller - Associate	**M**		SNERS	Full	X
Lewis – Assistant	**M**		SCI	Full	X
Martin – Assistant	**M**		SBIT/SME	Full	X
Siddiqui – Assistant	**M**		SBIT	Full	X
Wayne - Assistant	**M**		SBIT	Full	X
Category 2					
N/A					
Category 3					
N/A					
***Category* 4**					
N/A					
***Category* 5**					
Fong – Asst Dean	**M**		SBIT	Master=s	X

Notes:
Home Unit (SBIT) = School of Business and Information Technology
Home Unit (SCI) = School of Science
Home Unit (SME) = School of Manufacturing Engineering
Home Unit (SNERS) = School of Nuclear Engineering and Radiation Science
Field #1 = Information Technology Security

The School has already conducted an interview for a faculty member whose research area is in Information Technology Security, and he is expected to join the School in the Fall of 2004. The School has also planned to hire at least one more faculty member in IT Security to begin in the Fall of 2004. The following advertisement for a Research Chair in IT Security has numbers of excellent candidates for the position. In addition, a major bank in Canada is expected to soon vote on their funding of a Research Chair in IT Security for UOIT.

University of Ontario
INSTITUTE OF TECHNOLOGY

Research chairs

Canada's newest university will welcome its first students in September. Building on a 21st-century vision of learning, research and service excellence, we invite you to consider joining us, to help build a reputation for being student-centred, innovative and responsive, while respecting the best traditions of Canada's great established universities.

In keeping with our technology-enhanced mobile learning environment, in which every student and professor uses a laptop, our university seeks faculty who will use a technology-enhanced learning approach and who strive to explore and develop new pedagogies. For more information about our university, please visit **www.uoit.ca**.

The University of Ontario Institute of Technology is an equal opportunity employer and welcomes applications from qualified women and men, including members of visible minorities, Aboriginal Peoples and persons with disabilities. All qualified candidates are encouraged to apply; however, Canadians and permanent residents will be given priority.

Applications will be accepted until **October 31, 2003**, or until suitable candidates are found. Applications should include a curriculum vitae with a list of publications, a statement of teaching interests, as well as the name, title and full contact information (including e-mail address) for five referees whom we may contact to obtain confidential letters of reference. Applicants should provide a statement of research objectives and a proposed multi-year research plan (tailored to the format used by the Canada Research Chairs program). Applications should be sent electronically to the dean of the school at **careers@uoit.ca**. All appointments are subject to budgetary approval.

The School of Business and Information Technology may award a chair in business processes and information technology security. Candidates are expected to have an outstanding and innovative research program and a strong record of publication and research funding. The chair will spearhead the development of a new Centre for Information Technology Security and promote academic excellence and industry partnership as well as diversity and outreach programs. Successful candidates will have a PhD in computer science, engineering or a closely related discipline. Salary will be commensurate with qualifications and experience. Please quote competition number UOIT03-23.

The School of Manufacturing Engineering invites applications for research chairs (either Canada research chairs or others) at all ranks, in the following strategic directions:

- **manufacturing or mechatronics engineering**, with possible emphases including flexible manufacturing, lean manufacturing, high-performance manufacturing, robotics, mechatronics, MEMS, CIM or efficient and environmentally conscious engineering;

- **automotive engineering**, with possible foci including mechanical and automotive components and systems, advanced automotive concepts and power plants (including fuel cells), and automotive design; and

- **energy engineering**, with possible foci including hydrogen systems and fuel cells, alternative energy technologies, energy efficiency and management, and integrated energy systems.

The school offers a Bachelor of Engineering (Honours) in Manufacturing Engineering, and in 2004 plans to launch programs in Mechanical Engineering (with options in Mechatronics Engineering and Energy Engineering) as well as programs in Manufacturing Engineering and Management and Mechanical Engineering and Management. Further undergraduate programs as well as graduate programs are anticipated.

The successful candidates will be expected to conduct innovative, pioneering research programs, liaise with industry and attract research funding, and teach at the undergraduate and graduate levels. Applicants should have a PhD in a relevant engineering discipline, such as manufacturing, mechanical, mechatronics or industrial engineering, or a related area. As well, applicants should have an excellent scholarly and professional record, including a strong record of achievement in research and teaching, appropriate for the rank.

Candidates must be registered as professional engineers in Ontario, or be eligible for and committed to registration. Experience in curriculum and laboratory development and the engineering accreditation process would be an asset, as would industrial experience and experience using a laptop to enhance teaching and learning. In addition, candidates should have excellent communications skills and be committed to working collegially. This is an exciting opportunity to help implement new engineering programs and a cutting-edge research program. Salary will be commensurate with qualifications and experience. Please quote competition number UOIT03-24.

The School of Energy Engineering and Nuclear Science invites applications for research chairs at all ranks, in the following strategic directions:

- **nuclear engineering**, with specialization in one or more of the following areas: human factors, human performance, knowledge management, nuclear waste management, distributed simulation, advanced reactors or applications to hydrogen generation;

- **radiation science**, with specialization in public safety and emergency response measures in the event of inadvertent release of radioactivity, and/or radiological threat detection and mitigation; and

- **energy systems engineering**, with emphases on alternative energy systems, and the life-cycle environmental impact assessment of new and existing energy technologies and systems.

The school offers a Bachelor of Science (Honours) in Nuclear Engineering and Bachelor of Science (Honours) in Radiation Science. In 2004, the school plans to launch a program in Energy Systems Engineering. Further undergraduate programs as well as graduate programs are anticipated.

The successful candidates will be expected to conduct innovative, pioneering research programs, to liaise with industry and attract research funding, and to teach at the undergraduate and graduate levels. Applicants should have a PhD in a relevant engineering or science discipline, as well as an excellent scholarly and professional record, including recognized achievements in research and teaching, appropriate for the rank. Salary will be commensurate with qualifications and experience.

Candidates for the engineering chairs must be registered as professional engineers in Ontario, or be eligible for and committed to registration. As well, candidates should have excellent communications skills and be committed to working collegially. Experience in using computers to enhance teaching and learning is an asset. Please quote competition number UOIT03-25.

2.2 External operating research funding

There is no report in this section as this is a new program. However, our core faculty has submitted proposals for NSERC grants.

In addition, each faculty will receive an average of $12,000 to support their research activities as well as $1,000 for professional development.

The University of Ontario Institute of Technology Research Strategy Plan is included in Appendix 1.

2.3 Graduate supervision:

Completed and Current Numbers of Thesis Supervisions by Faculty Member						
	Completed			**Current (N/A)**		
Member	**Master's**	**PhD**	**PDF**	**Master's**	**PhD**	**PDF**
Category 1						
Schell – Full	5	1				
Wu - Full	11	1				
Friedlan - Associate	10	0				
Goodman - Associate	0	0				
Grami - Associate	0	0				
Waller - Associate	2	0				
Lewis – Assistant						
Martin – Assistant	11	0				
Siddiqui – Assistant	4	0				
Wayne – Assistant	0	0				
***Category* 5**						
Fong – Asst Dean	4	0				

2.4 Current teaching assignments (graduate and undergraduate)

Teaching Assignments for the Year Immediately Preceding the Appraisal		
Faculty Member	**Rank**	**Undergraduate (2003-04)***
Bernadette Schell	Dean & Full Professor	Collaborative Leadership
Terry Wu	Full Professor	Management of the Enterprise External Environment of Management
John Friedlan	Associate Professor	Financial Accounting
William Goodman	Associate Professor	Statistics
Ali Grami	Associate Professor	Business Computer Applications Mathematics Foundations for Business
Greg Lewis	Assistant Professor	
Clemens Martin	Assistant Professor	Business Communications and Computing Skills Introduction to Programming
Anjum Siddiqui	Assistant Professor	Microeconomics Macroeconomics
Paul Wayne	Assistant Professor	Managerial Accounting
Wilfred Fong	Assistant Dean	Collaborative Leadership

*All courses are 3 credits.

Teaching Assignments for the Past 3 Years				
Faculty Member	**Rank**	**Undergraduate**	**Graduate**	**Comments**
Wilfred Fong	Assistant Dean	- Internet Planning &Implementation for Information Services Centers - Multimedia Applications Development - Foundation of University Library Research - Senior Capstone - Information Internship	- Windows NT/2000 Server Security* - Management of Information Centers - E-Learning and Technology Training* - Microcomputers for Information Resources Management - Instructional Technology - Multimedia Technology	Taught at the University of Wisconsin-Milwaukee
John Friedlan	Associate Professor	- Financial Accounting for managers	- Financial Accounting for managers - Contemporary Issues in Accounting - Independent Study Courses	Taught at the York University
William Goodman	Associate Professor	- Introduction to Statistics - Economics		Taught at the Durham College
Ali Grami	Associate Professor	- Introduction to Communication Systems		Taught at the University of Ottawa
Greg Lewis	Assistant Professor		-	

Clemens Martin	Assistant Professor		- Introduction to programming languages - Operating systems - System administration and management - Introduction to the Unix Operating Environment - Internet technologies - MRP and Production Planning systems - Computer Simulation	Taught at the TechBC, Munich University of Technology, and in the industry
Bernadette Schell	Dean and Full Professor	- Interpersonal Skills for Managers* - Communication Theory for Managers* - Dealing with People Problems* - Advanced Research* - Research Project*	- Organizational Behaviour - Organizational Processes - Management & Minorities - Marketing Research* - Personnel Management* - Consumer Behavior*	Taught at the Laurentian University
Anjum Siddiqui	Assistant Professor	- Microeconomics - Macroeconomics - Regional Economics of South & Southeast Asian - Development and International Economics - Microeconomics - Macroeconomics - Corporate Finance - Development and International Economics - Managerial Economics	- Monetary Economics - Regional Economics of South & Southeast Asian - Corporate Finance - Monetary Economics	Taught at the University of Toronto Taught at York University Taught at Wilfrid Laurier University Taught at University of Auckland

Ed Waller	Associate Professor	- Mechnical Engineering Measurements -	- Occupational Health and Safety* - Manufacturing Systems and Design – Part II – Occupational Health and Safety in Manufacturing and Industry* - Non-Destructive Testing*	Taught at University of New Brunswick
Paul Wayne	Assistant Professor	- Management Accounting - Intermediate Financial Accounting	- Accounting* - Intermediate Financial Accounting*	Taught at the York University
Terry Wu	Full Professor	- International Business - Government Finance - Information Technology in Japan (Reading class)	- International Business - International Trade Administration	Taught at the University of Regina

* Course offered at undergraduate/graduate level.
Note: All courses are 3 credit hours unless otherwise noted.

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

Professors Ali Grami and Clemens Martin have joint appointments with the School of Manufacturing Engineering which expressed its full support for this program. Professor Greg Lewis is an Assistant Professor of the School of Science and is expected to teach MITS 5500G Cryptography and Secure Communications. Professor Ed Waller is an Associate Professor of the School of Nuclear Engineering and Radiation Science and is expected to teach MITS 5620G Special Topics in IT Management: Nuclear Safety Management.

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, teaching, study and conversation of the University by providing 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 has begun in summer 2003. Designed by internationally renowned Diamond and Schmitt Architects Incorporated, the 73,000-square-foot library will serve students, faculty and staff at both institutions. The four-storey, $20.7-million library will house individual and collaborative learning spaces, research workstations, electronic classrooms, a round pavilion with a reading room and periodicals collection, and other facilities. It will offer 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. The scheduled completion date of the library is late 2004.

The University's Mobile Learning environment provides students with access to library resources using their wireless laptop anytime, from anywhere. Students will be able to work individually or collaboratively anywhere in the building. For students in traditional college programs, the library will offer 100 computer workstations. 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, our students will also have access to the resources available at the largest academic library in Canada, the University of Toronto Libraries, through a partnership program.

To keep faculty and students informed of our library's continued growth and to provide easy access to resources, the UOIT Library staff has been constructing and revising its web site: www.uoit.ca/library on an ongoing basic. While general information is provided, our School has its own Guide providing descriptions of and links to Electronic Databases and Indexes; Magazines, Journals, and Newspapers; E-Books; the Catalogue; and Recommended Web sites for research and other related resources.

A more detailed presentation on the library resources is listed in Appendix 3: Library Assessment for the Masters of Information Technology Security Program.

3.2 Laboratory Facilities

In order to enhance students' learning experience and provide them with the necessary security hands-on skills and knowledge, the School will launch a Hacker Research Lab. This lab will mimic a network setting with equipment such as servers, clients, firewalls, routers, etc. Two teams of students will be assigned to work as "defense" and "attack". The "defense" team is to secure their system with available hardware and software tools while the "attack" team will attempt to breach the security system as designed by the "defense" team. This simulated environment will train our students to better understand the information technology security from two different perspectives, namely, a technology security officer and a hacker.

The Hacker Research Lab will consist of a variety of network connectivity, including CAT5, wireless (802.11x), Bluetooth, etc., and dedicated servers, workstations, laptops, as well as handheld devices. The "defense" and "attack" systems will also have a variety of hardware and software installed. An initial plan is to include Unix (Solaris/Linux) and Windows operating systems.

The Hacker Research Lab has a capacity for 24 workstations/students which will be divided into eight groups of three students. Four groups will be assigned as the "defense" team while the other four groups will be the "attack" team. Courses that require the use of the Hacker Research Lab is shown in the Program Description section.

A tentative hardware configuration has been planned for the development of the Hacker Research Lab. There will be 8 sets of servers/workstations for each group of the students. However, both types of the "defense" and "attack" hardware equipment are expected to be similar. The following is the description of the hardware, software, and operating system configurations:

a. 8 Sun Sparc Servers installed with Unix (Solaris/Linux) operating systems. One or more may be used for Firewall configuration. Each server will have 2 network cards installed.
b. 8 Pentium-based Servers installed with Windows operating systems. One or more may be used for Firewall configuration. Each server will have multiple network cards installed.
c. 8 Pentium-based workstations installed with a mix of Unix (Solaris/Linux) and Windows operating systems.
d. 8 Pentium-based laptops installed with Unix (Solaris/Linux) or Windows operating systems.
e. 4 handheld PDAs with wireless/Bluetooth capabilities.
f. 8 Ethernet routers with a minimum of 4 connections
g. 4 switches with a minimum of 4 connections
h. 4 switches with VLAN capabilities and a minimum of 4 connections

i. 8 wireless access points
j. 4 smart card readers
k. 4 smart card programming devices
l. Checkpoint Firewall software
m. IDS software
n. Content scanning software

The UOIT IT department has been consulted to set up a separate network routing for this Hacker Research Lab, which allows a better and secure learning environment for the MITS students.

Before each student is allowed to use the Hacker Research Lab, he/she must sign a statement of Computer Ethical Use. Any student who uses the facilities to conduct illegal and unauthorized activities to damage other computer systems may be expelled from the program.

It is also expected that the School will partner with the industry in ethical hacking of new software under development.

3.3 Computer facilities

The University of Ontario Institute of Technology is committed to advancing the highest quality of learning, teaching, research and professional practice. This means using educational technologies to enhance the learning experience, inspire innovative teaching and foster student success. This is learning and teaching for the 21st century.

A laptop in every hand

At the heart of our program is a personal laptop for each student. The connectivity that the laptop provides gives every student an equal opportunity to communicate with faculty, access course materials, make quality presentations, conduct research and pursue personal knowledge. The laptop facilitates broad access to information and gives professors the opportunity to employ advanced learning technologies.

Each student receives a current model of the IBM ThinkPad complete with hardware and software. Personal assistance, computer support, service and training are included. The laptop is upgraded every two years to ensure students and faculty have the most current capacity and technology.

Access anytime

The latest wireless technology is available in common public areas such as seminar rooms, learning commons, cafeterias and other special areas.

Every laptop includes a wireless network card to ensure connectivity at the user's convenience as well as connection to wired laptop classrooms. A comprehensive data network-part of the campus and residence infrastructure-provides access to other students, faculty, program materials and the Internet.

Access to education resources from residence and off campus is available.

Support and Service

From the moment that students pick up a personal laptop at the university's Mobile Computing Centre the university will ensure that they have access to on-going support and service. The Centre provides personal assistance in configuring, installing and testing software as well as regularly scheduled training seminars and hardware servicing. Drop-in or call-in Helpdesk services are available at the Centre

3.4 Space

Construction for the 50,000-square-foot School of Business and Information Technology building is expected to complete by September 2004. This building will consist of four floors which house faculty and teaching assistant offices plus three state-of-the-art classrooms that holds 36, 50, 250 students respectively. A Hacker Research Lab, of appropriate 242.2 sq. ft. will also be in this building, as described in Section 1.7 in this Appraisal. There are currently 4 rooms which have been assigned for graduate student assistants. Each room fits at least 2-4 graduate assistants. In addition, there are two discussion rooms which fits 8-10 students will also be available for our graduate students.

3.5 Financial support of graduate students

The University fully intends to support this new program. UOIT will provide scholarship funding to qualified students. A special “Security” competition will also provide our MITS students with an opportunity to compete for a travel stipend to attend an international computer security conference. Details are described in 4.1.

The School has planned to offer teaching assistantships during the first year of the implementation of the MITS program. Preference will be given to MITS students. With this allocation, the School anticipates that the ratio of teaching assistants and MITS students should be at about 1 to 4 in the first year. The teaching assistants will provide faculty with technical and instructional support in undergraduate courses.

In addition, current faculty is actively seeking research grants from agencies such as NSERC, which will generate additional financial support of graduate students in our research activities and programs.

4 PROGRAM REGULATIONS AND COURSES

4.1 The intellectual development and the education experience of the student

The MITS program is a graduate professional program which is designed to enable students to "learn how to learn" in the rapidly evolving information technology security field. The curriculum, which includes an IT Security Capstone project, provides students with the experience to apply core course materials to a substantial project in the workplace. This plan of study introduces students the fundamental knowledge of the ever-changing IT security field. The MITS graduates will understand and be able to apply the best of current practice, but will also be able to act as managers of transformation to improve that practice as the field evolves.

The School has planned to host an annual “Security and Hacking” competition for all students to be the “Defense” or “Attack” team. The winning team will receive a travel stipend to attend the International DefCon conference and to represent the School to compete in their annual security competition. This program gives students an opportunity to apply their classroom knowledge and hands-on skills in a simulated practical situation.

The University has developed a Strategic Research Plan to set the research plan and direction for the faculty. This Plan also reflects the commitment of our School in research, instructions, and services. A copy of the UOIT Strategic Research Plan is in Appendix 1.

A group of experts affiliated with the University of New Brunswick is creating an application to the Networks of Centres of Excellence (NCE) program to establish a Privacy, Security & Trust Network in Canada. This institution will form the hub of an interdisciplinary network of research activities and relationships of national and international scope. Quintessential for the success of this application is the submission of tangible evidence that collaborative research arrangements have been made with university, industry and other experts and partners in the areas of privacy, security and trust. The School of Business and Information Technology presently participates in this network.

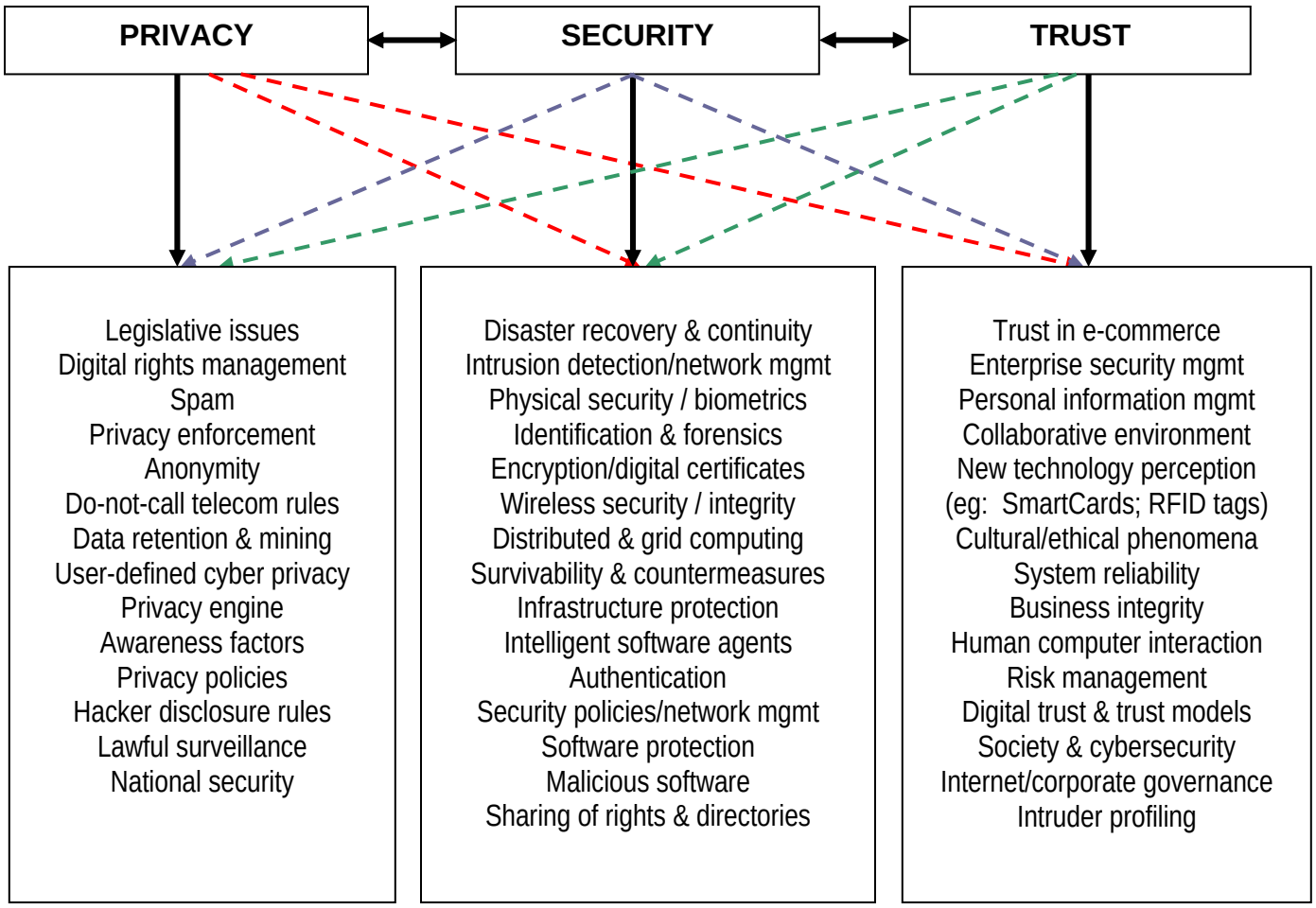
The Network would set up the research, technology, and legislative infrastructure to help the Canadian government anticipate and prevent cybercrimes (by insiders and outsiders) before they happen. Currently, Canada does not have a coordinated system of researchers, corporate, and federal partners devoted to network security and information assurance. The Information Technology Privacy and Security Network (ITPSN) would fill this void. The Network could assist the Federal government in designing and

implementing policies and programs to combat cybercrime as well as encourage companies to create the enabling technology.

The Network is to create and cultivate a network of research talent from industry and the user-sector, academia, and government to examine and address broadband network security, privacy and trust issues. As a result, Canadians' social and economic welfare will be better protected, and Canada's economic growth will be advanced. Collaboration and knowledge-sharing will be continuous among the growing partnerships and alliances dedicated to cybercrime prevention. Accumulated body of knowledge that would lead to policies, procedures, and legislation aimed at controlling cybercrime. Moreover, the research output of the Network would lead to new products aimed at eliminating cybercrime.

The table in the following page shows the Network's projects and sub-themes.

The missions and objectives of the Network will not only greatly enhance the learning and educational experience of our students but also provide opportunities for our faculty to conduct research in the areas of information technology security.



The above table shows the three major Projects, namely, Privacy, Security, and Trust; and their respective sub-themes, of the Network.

4.2 Program regulations

Admission requirements

Each applicant for the MITS program must meet the following admission requirements:

1. A four-year bachelor's degree from an accredited institution with an overall undergraduate GPA of at least a B average (3.0 GPA based on a 4.0 scale). The undergraduate degree is preferred to be in the field of information technology, engineering, science or related fields.

2. Submit a completed Application for MITS Admission with $100 Cdn non-refundable application fee.

3. Submit an official transcript from all post-secondary institutions attended. All non-English transcripts must be accompanied by an official translation.

4. Submit two letters of reference from persons having direct knowledge of the applicant's professional and academic competence to succeed in the MITS program.

5. Submit a portfolio indicating relevant work experience and skills in Information Technology, including a two years' minimum work history.

6. Previous working knowledge in computer programming is required. Students are expected to have working experience with at least one type of computer programming language, e.g. Java, C++, etc.

7. International students whose first language is other than English must submit TOEFL scores of 220 (computer-based) or 560 (paper-based).

8. The following are the suggested filing deadlines for the MITS program:
   - Fall semester: May 1
   - Winter semester: September 1
   - Note: The application review will begin as soon as the applicant's file is complete. Early admissions may be granted. Applicants are recommended to submit applications as early as possible.

Degree requirements

The degree program requires a total of 36 credit hours as listed below.

Time Limit

The student must complete all degree requirements within four years of initial enrollment.

Program

YEAR ONE

SEMESTER ONE (9 credit hours)

MITS 5100G	Law & Ethics of IT Security
MITS 5200G	Advanced Communications Networks
MITS 5300G	Operating Systems Security

SEMESTER TWO (9 credit hours)

MITS 5400G	Secure Software Systems
MITS 5500G	Cryptography and Secure Communications
MITS 5600G	Elective*

YEAR TWO

SEMESTER ONE (9 credit hours)

MITS 6100G	Attack and Defence
MITS 6200G	eCommerce Infrastructure Security
MITS 6300G	IT Security Capstone Research Project I

SEMESTER TWO (9 credit hours)

MITS 6400G	Biometrics/Access Control and Smart Card Technology
MITS 6500G	Incident Handling, Recovery, Policies, & Risk Management
MITS 6600G	IT Security Capstone Research Project II

***ELECTIVES**

MITS 5610G	Special Topics in IT Security Example: Multimedia Technology
MITS 5620G	Special Topics in IT Management Example: Economics of Information Technology Contemporary Management for IT Security Professionals Risk Management for Information Systems Nuclear Safety Management

Note: All courses are 3 credit hours unless otherwise noted.

Programming Language Requirements

Academic Regulations

1. All grading in the MITS program will be assigned in accordance with the following grade definitions:

A Superior course performance indicators
B Good course performance indicators
F Fail

2. Students must have an overall average grade of B or above for all the courses taken in order to graduate.

3. Students may not be allowed to continue in the MITS program if they have received less than a B grade in two courses. Students who receive a grade of lower than a B in a course must retake it. Students must pass on the second attempt of either a required or elective course.

4. Students are allowed a maximum of four years from their first semester in the MITS program to complete the course requirements for the degree.

5. Students may be given advanced standing depending on their academic record and upon the approval of the School of Business and Information Technology Admissions Committee. Advanced standing credit hours are usually assessed *after* the student is formally admitted into the graduate program. Advanced standing credit requests must be initiated by the applicant at the time of application and will not be granted automatically. Course descriptions, including course outlines, must be submitted for review. No student will be given advanced credit for more than 6 credit hours or for university courses where a grade is lower than B was obtained. Advanced standing credit hours will only be given to required courses.

6. Once enrolled in the program, students may be given credit towards their MITS degree for not more than 6 credit hours taken at other institutions. Prior approval for such courses must be obtained from the Admissions Committee for all such courses. If it is granted, students will be expected to take up to 6 credits from the University of Ontario Institute of Technology elective offerings.

Advising

An orientation meeting will be held in the beginning of each semester. All newly admitted and continuing students are recommended to attend. The MITS Director and other faculty members will be present to answer questions, to address concerns, and to offer advice regarding programs of study and career opportunities. Detailed information will be made available on the School's web site.

The School will also provide general academic advising services to students. Each student will have the opportunity to meet with the MITS Director to confer on academic matters related to program requirements and elective selection.

Communications

As this is a technology-oriented program, communications between faculty and students will occur face-to-face, as well as via e-mail. Each student will be assigned an e-mail address by the University upon admission to the MITS program. The faculty and MITS Director will use this e-mail address to regularly communicate with students about news and announcements, special seminars and events, research grant opportunities, internships, and job opportunities.

Fees

Tuition
Because of the highly specialized nature of this professional program, each 3-credit course has a set tuition fee of $2,100 and the full load per year is $12,600 (Domestic) and $25,000 (International) for the academic year 2004-2005.

Ancillary and Graduate Student Association Fees
In addition, ancillary fees for athletics, recreation, student services, student life, counseling, student handbook and information technology infrastructure fees are set at $520 and Graduate Student Association fees are set at $125 for the academic year 2003-2004.

Health and Dental Insurance
Also, Health and dental insurance fees are charged annually and are assessed as follows in academic year 2003-2004:
The Health and Dental fees are $146.83. The UHIP fee is determined by the insurer.

Mobile Learning Fee
Because all full-time students are required to participate in the Mobile Learning program, there will be an annual fee for the IBM laptop computer and related software. The fee was $1,480 in academic year 2003-2004.

Residence
For students wishing residence on campus, suites are priced at an annual fee of $4,800 for 2003-2004.

Meal Plan
The meal plan is voluntary. Meal plans consist of a set number of meals per week, and a credit account which may be used to purchase food from on-campus eating facilities. The following three plans are available in 2003-2004:
5 meals per week and an $800 credit: $1,990 annually
3 meals per week and a $1,000 credit: $1,700 annually
A $1,200 credit: $1,200 annually

Parking
Parking rates are determined annually. Current 2003-2004 fees are $140 annually, or $90 per semester.

Miscellaneous fees (2003-2004)
Application for Admission: $100
Letter of Permission for taking courses at another institution: $25
Late payment: $40
Grade appeal fee (refundable if appeal is successful): $30
Supplemental/special examination fee: $25
Verification of enrollment: $10
Verification of fees paid: $10

Distance Delivery

There is no plan to offer this program via distance delivery at this time.

4.3 Part-time studies

Students can complete this program on a part-time basis, but as the IT security field changes rapidly, any students who want pursue security certification are encouraged to enroll full-time. It is also important for part-time students to consult with their faculty advisors regarding their study plan.

4.4 Total graduate courses listed and level

Each course is expected to have the following course grading requirements:

10-20%	Assignments
15-25%	Test(s)
30-60%	Final
15-25%	Project

MITS 5100G Law & Ethics of IT Security

Course Description
This course covers the many ways in which commercial law applies to information technology security. As more and more business transactions and communications are now conducted electronically, the IT function within an institution has become the custodian of the official business records. This course introduces the laws governing the daily business of an institution or government agency, as those laws apply to the protection of information and computer systems. Emerging issues, such as privacy and information disclosures, will be discussed in the course.

Course Outline
- Legal Background
- Legislature in different countries
- Law Enforcement Agencies
- Intellectual Property
- Privacy
- Digital Rights Management
- Controversial Case Studies
- Understanding Hacking
- Ethical Hacking

Prerequisite
None

Textbook(s)
1. Salehnia, A. ed. Ethical Issues of Information Systems. Hershey, PA: Idea Group Publishing, 2002. (ISBN: 1931777152)
2. Denning, Dorothy. Internet Besieged: Countering Cyberspace Software. ON: Addison-Wesley, 1997. (ISBN: 0201208207)
3. Spinello, Richard A. Case Studies in Information Technology Ethics. ON: Pearson, 2002. (ISBN: 0130991503)

MITS 5200G Advanced Communications Networks

Course Description
Networks are the essential components to information transmission, without which there are no communications. This course presents an overview of telecommunications networks and the fundamental concepts of the field, as well as advanced topics and detailed network architectures. This course blends an accessible technical presentation of important networking concepts with many business applications. Addressing networks from a top-down approach, this course shows students the big picture of networks in general so that they may see how the various parts of the network fit in to the picture. The course gives detailed descriptions of the principles associated with each layer and highlights many examples drawn from the Internet and wireless networks. The TCP/IP protocol stack will be discussed in detail with a variety of examples on its various layers. This course also describes all aspects of various wireless systems, from cordless phones, pagers, PDAs to mobile phones and wireless computers. The wide deployment of cellular phones for M-commerce applications and wireless LANs in corporate environments have resulted in interesting security challenges.

Course Outline
- Digital Transmission Fundamentals
- Packet and Circuit Switching Networks
- Wired Media: Twisted-Pair, Cable, Fiber Optics
- Wireless Media: Cellular and LANs (Wi-Fi)
- Wireless Security Protocols, Threats, Measures
- Broadband Systems: DSL, Cable-Modems, Satellite
- Multiple Access Schemes and Topologies: FDMA/TDMA/CDMA(Bus, Ring, Star)
- Contention Access Schemes: Ethernet's CSMA, Token Ring
- ATM Networks
- Internet and OSI Models
- ARP/RARP
- TCP and UDP, IP
- Routing Protocols: RIP, OSPF, BGP
- Application Layer Protocols: SMTP, HTTP, SMB, NFS
- Network Management and Quality of Service
- Next Generation Internet IPv6

Prerequisite
None

Textbook(s)
1. Forouzan, B. A. Business Data Communications. Whitby, ON: McGraw-Hill, 2003. (ISBN: 0072397020)
2. Tanenbaum, A. S. Computer Networks. Toronto, ON: Pearson Education, 2002. (ISBN: 0130661023)
3. Maxim, M. and Pollino, M. Wireless Security. Whitby, ON: McGraw-Hill, 2002. (ISBN: 0-07-222286-7)
4. Engst, A. and Fleishman, G. Wireless Networking, CA: Peachpit Press, 2003. (ISBN: 0321174089)

MITS 5300G Operating Systems Security

Course Description
Study of operating system security with particular focus on the Windows and Unix/Linux operating system. Provide an overview of the security risk and management of the specified operating systems, and the preventive efforts to use the security features built-in within the systems and third-party applications. Understand and familiarize with various essentials reference sources available on the subjects on computer security, including organizations such as CERT.

Course Outline
- Basics of the Unix OS family
- Unix Boot Process
- Major Subsystems
- Commands for Navigation and Auditing
- Unix Services
- Vulnerabilities and Associated Risks
- Application Level Security
- Managing User and System Management Communities
- Public Domain and Commercial Security Tools
- Basics of the Windows OS family
- Basic Security features in the Windows OS family
- Authentication
- Authorization
- System Level Security
- Application Level Security
- Security in Networked Windows Environments
- Vulnerabilities and Associated Risks
- Advanced Security Control Features
- Undocumented Flaws and Features

Prerequisite
None

Textbook(s)
1. Pipin, Donald L. Halting the Hacker: A Practical Guide to Computer Security. Upper Saddle River, NJ: Prentice-Hall, 2003 (ISBN 0-13-046416-3)
2. McClure, Stuart, Joel Scambray, and George Kurtz. Hacking Exposed: Network Security Secrets and Solutions, Fourth Edition. New York: McGraw-Hill Companies, 2003. (ISBN: 0-07-222742-7)
3. Turner, Aaron, Elliot Lewis, and Members of the Microsoft Security Team. Microsoft Windows Security Resource Kit. Microsoft Press, 2003. (ISBN: 0735618682)

MITS 5400G Secure Software Systems

Course Description
Computer security is a bigger problem today than ever before even though most organizations have firewalls, antivirus software, and intrusion detection in place to keep attackers out. The simple cause for the problem at the heart of all computer security problems is bad software.

This course takes a proactive approach to computer security and covers areas from the technical side of coding secure software to more managerial and project management tasks. Common coding problems like buffer overflows, random number generation and password authentication are addressed. A secondary focus is set on the a software design process; it needs to be set up so that security is built in at the very early stages and considered throughout the design process and not patched in a later point of time. Risk management in the development cycle as well as software and system audits will be discussed within the course.

Course Outline
- Introduction to Software Security
- Managing Software Security Risk
- Selecting Technologies
- Open vs. Closed Source
- Principles of Software Security
- Auditing Software
- Buffer Overflows
- Access Control
- Race Conditions
- Randomness and Determinism
- Applying Cryptography
- Trust Management and Input Validation
- Password Authentication
- Database Security
- Client Side Security
- Through the Firewall

Prerequisite
Knowledge of computer programming.

Textbook(s)
1. Viega, John and Gary McGraw. Building Secure Software: How to Avoid Security Problems the Right Way. Boston, MA: Addison-Wesley, 2002. (ISBN: 020172152X)
2. Howard, Michael and David C. LeBlanc. Writing Secure Code. 2nd Book and CD-ROM edition. Microsoft Press (ISBN: 0735617228)

MITS 5500G Cryptography and Secure Communications

Course Description
Secrecy is certainly important to the security or integrity of information transmission. Indeed, the need for secure communications is more profound than ever, recognizing that the conduct of much of our commerce and business is being carried out today through the medium of computers and digital networks. This course is on cryptography, the umbrella term used to describe the science of secret communications. In this course, students with strong mathematical background learn the details about the transformation of a message into coded form by encryption and the recovery of the original message by decryption. This course describes cryptography through which secrecy, authentication, integrity, and non-repudiation can all be provided.

Course Outline
- Discrete Mathematics
- Basic Principles of Cryptography
- Symmetric Encryption
- Asymmetric Encryption
- Key Distribution Problem and Public-Key Cryptography
- Digital Signature & Certificate
- Standardization in Cryptography
- Network and Transport Security Protocols
- Application Layer Security Protocols
- Implementation: HW & SW Solutions and Limitations
- Data Integrity
- Authentication
- Public Key Infrastructures

Prerequisite
None

Textbook(s)
1. Stalling, William. Cryptography and Network Security: Principles and Practice. Toronto, ON: Prentice Hall, 2002. (ISBN: 0130914290)
2. Schmeh, Klaus. Cryptography and Public Key Infrastructure on the Internet. New York: John Wiley & Sons, 2003. (ISBN: 047084745X)
3. Ferguson, Niels and Bruce Schneier. Practical Cryptography. John Wiley & Sons, 2003. (ISBN: 0471223573)

MITS 5620G Special Topics in IT Management: Contemporary Management for IT Security Professionals

Course Description:
The business world has changed dramatically over the past five years, with increasing pressures on managers to not only integrate information technology into all aspects of an organization's business operations to improve efficiency and customer responsiveness but to understand and manage diversity and other key human resource issues in the workplace. This course integrates contemporary management theories and approaches into the analysis of management and organizations by covering a wide range of topics, including the fall of the dot-coms and problems and challenges encountered by the dot-coms; moods and emotions; emotional intelligence; how managers create culture; ethical organizational cultures; different kinds of diversity; groups and teams; effective communication; how Information Technology is making the world smaller; designing global Information Technology systems; B2Bnetworks and Information Technology; knowledge management and Information Technology; control systems and Information Technology; employee stock options and other motivational devices; and transformational leadership.

Course Outline:
- Technology Managers and Managing Technology
- Managing Diverse People in a Diverse Global Environment
- Organizational Culture and Structure
- Human Resources Management
- Motivation and Leadership
- Groups Interaction and Communication
- Conflict and Negotiation
- Innovation and Entrepreneurship

Prerequisite
None

Textbook(s)
1. Jones, Gareth R. and George, Jennifer M. Contemporary Management. Third Edition. McGraw-Hill, 2003. (ISBN: 007291890X)
2. Card, Duncan Cornell. Information Technology Transactions: Business, Management and Legal Strategies. Ontario: Thomson Carswell, 2002. (ISBN: 0459274481)

MITS 5620G Special Topics in IT Management: Economics of Information Technology

Course Description

The course applies basic economic principles to understand the post internet New Economy, also referred as the Network Economy. Internet has brought in its wake the buying and selling of information goods. This has not given birth to a new economics, rather the application of known economic laws to information goods. Intellectual property rights, product differentiation and conflicts of information economy with the government's antitrust policies and regulatory policies of the telecommunications sector become crucial for the managers when planning their marketing strategies.

Course Outline

- To provide an understanding of core economic principles in the operation of the Network Economy for assisting strategic decision making.
- Information Economy: Economic issues of both "information" and "technology" are examined.
- Pricing Information: Focuses on special cost structure of information and discusses how time tested principles of competitive strategy.
- Acquiring Customer Information & Product Packaging.
- Rights Management: Examines how copyright laws present challenges and lessons in managing rights of producers of information.
- Understanding and Managing Lock-in.
- Antitrust and Regulatory Policies: Competition in information goods and services can be at odds with antitrust laws and telecommunication policies of the regulating agencies of the government. This course discusses mergers and acquisitions, standards and patents and monopoly issues and the rules governing these areas.

Prerequisite

None

Textbook(s)

1. Shapiro, Carl and Hal R. Varian. Information Rules: A Strategic Guide to the Network Economy. Boston, MA: Harvard Business School, 1999. (ISBN: 087584863X)
2. Supplementary Readings: These will be provided in class and based on journal articles or chapters/case studies from various sources.

MITS 5620G Special Topics in IT Security: Multimedia Technology

Course Description
As networks and bandwidth availability increases, networked multimedia communications systems are becoming increasingly powerful and ubiquitous. This course highlights a comprehensive guide to the theory, principles, and practical techniques associated with implementing these systems. It covers the latest multimedia architectures to the implications of Internet for advanced multimedia delivery, as well as multimedia communications system development, emerging standards, advanced processing techniques, and network and traffic management.

Course Outline
- Networked Multimedia Systems: Models & Elements
- Multimedia Traffic Types and Transmission Requirements
- Compression Techniques: Lossless & Lossy
- Distributed Multimedia Systems
- Bit Error Rate, Cell/Packet Loss Ratio, and Multimedia Quality of Service
- Digital Fax/Text Compression Techniques: LZ/Huffman Coding
- Digital Music Compression Techniques & Standards: MP3
- Digital Image Compression Techniques & Standards: JPEG
- Digital Video Compression Techniques & Standards: MPEG
- Multimedia Broadband Networks
- State-of-the-Art Multimedia Equipment and Emerging Trends

Prerequisite
None

Textbooks
1. K.R. Rao, Z.S. Bojkovic, and D.A. Milovanovic. Multimedia Communication Systems. New York: Prentice-Hall, 2002. (ISBN: 013031398X)
2. D. Cyganski, J.A. Orr, and R.F. Vaz. Information Technology: Inside & Outside. New York: Prentice-Hall, 2001. (ISBN: 0130114960)

MITS 6100G Attack and Defense

Course Description
The course covers attackers' tactics and strategies and presents ways in finding vulnerabilities and discovering intrusions. It also discusses the latest cutting-edge insidious attack vectors, the "oldie-but-goodie" attacks that are still so prevalent, and everything in between. This course also presents the understanding tools needed to defend against attackers maintaining access and covering their tracks. This course examines and reviews various types of hacking tools and ways to harden the system or application against the attack. The course also discusses defenses and attacks for Windows, Unix, switches, routers and other systems.

Course Outline
- IP revisited
- Characteristics of Signatures
- Intro to Intrusion Detection and Prevention
- Firewalls, Secure and Demilitarized Zones and Firewall Assessment
- Implementing a Security Policy
- Analysis and Error Correction of Firewall Configurations
- Hacking Tools & Techniques, and Discussion of Exploits
- Web-Servers and E-Commerce Systems
- Trojan Horses
- Intrusion Detection Systems
- Protecting an Organization from Common Attacks
- Attack Signatures
- Configuration of IDS
- Collecting the Right Type and Amount of Data
- Anomalous Traffic
- Hacking tools: the Ins and Outs
- How Hacker Attacks a System by Gaining Access and Tracing a Hacker's Track
- Protection Against an Attack

Prerequisite
MITS 5200G Advanced Communications Networks
MITS 5300G Operating Systems Security

Textbook(s)
1. Cole, Eric. Hackers Beware: The Ultimate Guide to Network Security. Pearson Education, 2001. (ISBN: 0735710090)
2. Northcutt, Stephen, et al. Inside Network Perimeter Security: The Definitive Guide to Firewalls, VPNs, Routers, and Intrusion Detection Systems. Pearson Education, 2002. (ISBN: 0735712328)
3. Skoudis, Edward and Radia Perlman. Counter Hack: A Step-by-Step Guide to Computer Attacks and Effective Defenses. Prentice Hall Professional Technical Reference, 2001. (ISBN: 0130332739)
4. Spitzer, Lance. Honeypots: Tracking Hackers. Pearson Education, 2002. (ISBN: 0321108957)
5. Spitzer, Lance. Know Your Enemy: Revealing the Security Tools, Tactics, and Motives of the Blackhat Community. Pearson Education, 2001. (ISBN: 0201746131)

MITS 6200G eCommerce Infrastructure Security

Course Description

This course introduces the main components of an eCommerce setup and covers the security related problems with these components. This course will visit some topics, that are addressed in context of Advanced Networking or Operating System Security. It will provide an eCommerce context to these more technical issues. Major components that will be discussed are VPNs in business contexts, Mail Systems, WebServers, and in particular Middleware Suites like Microsoft's .NET framework and Sun's J2EE architecture and it's implementation in industrial strength products like JBOSS and IBM's WebSphere. Strategy and policy topics on how to find the right balance between security and usability will be addressed as well as the management of maintaining a secure infrastructure.

Course Outline

- Introduction eCommerce Infrastructure Components
- Introduction to Authorization and Authentication in an eCommerce Context
- Importance of Operating System Security as basis for secure eCommerce
- Mail Systems Security
- Virtual Private Networks
- Demilitarized Zones and their limitations
- Securing Web servers: Apache and IIS
- Scripting Languages on the Server: Java Script, ASP, Python, PHP, and Perl
- Servlets and JSP
- Web Services Architecture WSA
- eCommerce Frameworks: .NET; EJBs with JBOSS, WebSphere, et.al.
- Database Security for eCommerce
- Payment Systems and Electronic Money
- Standardization in eCommerce
- How to Read Security Bulletins
- Keeping up with Patching and Security Updates
- Security vs. Usability

Prerequisite

MITS 5200G Advanced Communications Networks
MITS 5300G Operating Systems Security
MITS 5500G Cryptography and Secure Communications

Textbook(s)

1. LaMacchia, Brian A.; Sebastian Lange; Matthew Lyons; Rudi Martin; and Kevin T. Price. NET Framework Security. Addison-Wesley Pub Co., 2002. (ISBN: 067232184X)
2. Kumar, Pankaj. J2EE Security for Servlets, EJBs, and Web Services. Prentice Hall PTR, 2003. (ISBN: 0131402641)
3. Hartman, Bret; Donald J. Flinn; Konstantin Beznosov. Enterprise Security with EJB and CORBA®. John Wiley & Sons, 2001. (ISBN: 0471401315)
4. Radu, Cristian. Implementing Electronic Card Payment Systems (Artech House Computer Security Series). Artech House, 2002. (ISBN: 1580533051)
5. O'Mahony, Donal; Michael Peirce; Hitesh Tewari. Electronic Payment Systems for E-Commerce. Artech House, 2001. (ISBN: 1580532683)

MITS 6300G IT Security Capstone Research Project I

Course Description
This course provides students with an opportunity to gather knowledge and skills learned from the program coursework and to conduct a research project with industrial applications. Students are expected to do a research literature review and to develop a set of hypotheses for a research project in IT security. A research proposal outlining alternative remedies to the problem and hypotheses should be submitted to the research faculty advisor by the end of the course semester.

Prerequisite
18 credit hours in MITS courses.

MITS 6400G Biometrics/Access Control and Smart Card Technology

Course Description
Traditionally, most security systems authenticate you based on something you *know*, i.e., a password. However, where security really matters, it makes sense to add a second layer, which could be something you *have* (e.g., a smartcard). Also, as a third option, probably the most authentic method, it could be something you *are*, something that, at least theoretically, would be virtually impossible to forge. To this end, this course is about biometric controls, where biometrics is generally the study of measurable physical characteristics and behavioral patterns. This course deals with various authentication techniques their effectiveness, cost, intrusiveness, and accuracy.

Course Outline
- Finger-/Palm-Print and Face Geometry Technology
- Iris & Retina Vascular Pattern Technology
- Signature & Handwriting Technology
- Voice Recognition & Speech Patterns
- Multi-biometrics and Multi-factor Authentication
- Keyboard/Keystroke Dynamics
- DNA
- Biometric Standards
- Privacy in Biometric System Design
- Techniques: Intrusiveness vs. Application vs. Cost vs. Accuracy
- Scanning and RFID Technology
- Application and Solution Areas
- Smart Card Architecture
- Application Design for Smart Cards
- Data Transfer and Transmission Protocols
- Security Mechanisms
- Card Terminals and Life Cycle
- Fraud Resistant Data Encryption Techniques
- North American, European, and International Standards
- Testing of Smart Cards
- Commercial Applications (Visa, MasterCard, Electronic Purse, Europay)

Prerequisite
MITS 5400G Secure Software Systems
MITS 5200G Advanced Communications Networks
MITS 5500G Cryptography and Secure Communications

Textbook(s)
1. Rankl, Wolfgang and Wolfgang Effing. Smart Card Handbook. New York: John Wiley & Sons, 2000. (ISBN 0471988758)
2. Reid, Paul. Biometrics and Network Security. New York: Prentice-Hall PTR, 2004 (ISBN: 0131015494)
3. Chirillo, John, Implementing Biometric Security. New York: John Wiley & Sons, 2003 (ISBN: 0764525026)
4. Nanavati, S., Thieme, M., and Nanavati, R. Biometrics: Identity Verification in a Networked World. John Wiley & Sons, 2002 (ISBN: 0471099457)

MITS 6500G Incident Handling, Recovery, Policies, and Risk Management

Course Description

This course introduces a practical approach for responding to computer incidents, a detailed description of how attackers undermine computer systems in order to learn how to prepare, detect, and respond to them. The course will also explores the legal issues associated with responding to computer attacks, including employee monitoring, working with law enforcement, and handling evidence. This course will also focus in particular on practical, computer-assisted techniques for risk-related modeling and calculations. Identification of threats through Hazard and Operability Analysis [HAZOP]) and PHA (Process Hazards Analysis) will be illustrated, as well as probabilistic techniques for estimating the magnitude and likelihood of particular loss outcomes.

Course Outline

- Crisis-Management
- Role of the System Administration and Management
- Security Policies
- Backup & Archives
- Education, Preparation, and Identification
- Containment, Eradication, and Recovery
- Risk Management Terms and Definitions
- Risk Assessment Issues
- Uncertainty
- Qualitative vs. Quantitative Risk Assessment
- Probability Theory and Statistics, including:
- Probability Distributions
- Techniques for Modeling Dependencies
- Monte Carlo Methods
- Hazard/Threat Identification and Modeling
- Methods of Risk Estimation and Analysis, including:
- FMEA (Failure Modes and Effects Analysis)
- FTA (Fault Tree Analysis)

Prerequisite

MITS 5200G Advanced Communications Networks
MITS 5300G Operating Systems Security
MITS 6100G Attack and Defense (Concurrent)

Textbook(s)

1. Northcutt, Stephen. Computer Security Incident Handling: An Action Plan for Dealing with Intrusions, Cyber-Theft, and Other Security-Related Events. The SANS Institute, 2003. (ISBN: 0972427376)
2. Schultz, E. Eugene and Russell Shumway. Incident Response: A Strategic Guide to Handling System and Network Security Breaches. Whitby, ON: Pearson Education, 2001. (ISBN: 1578702569)
3. Voss, David. Risk Analysis: A Quantitative Guide. 2nd Edition. New York: John Wiley & Sons, 2000. (ISBN: 047199765X)

MITS 6600G IT Security Capstone Research Project II

Course Description
The research outlined in the MITS 6300G proposal should be completed during the Winter semester. The final report of the research findings and recommendations for the problem addressed should be submitted to the research faculty advisor, along with a presentation of the results. The results should have direct practical applications and/or be publishable in refereed publications.

Prerequisite
MITS 6300G

4.5 Collateral and supporting departments

The following Schools have extended their full support to our programs and will provide us with their faculty expertise in developing and teaching selected courses in the MITS curriculum:

School of Manufacturing Engineering
- MITS 5400G Secure Software Systems
- MITS 6400G Biometrics/Access Control and Smart Card Technology

School of Nuclear Engineering and Radiation Science
- MITS 5620G Special Topics in IT Management: Nuclear Safety Management

School of Science
- MITS 5500G Cryptography and Secure Communications

5 OUTCOMES

5.1 Enrolment and graduations

(Present data as follows, for the past seven years, separately for each level and type of program)

5.1.1 Master's program

Not Applicable

5.1.2 Doctoral program

Not Applicable

5.2 Employment

The School will keep ongoing track records of the employment of our graduates.

5.3 Publications

(Show proportion of graduates who have at least one publication, or work accepted for publication (not an abstract), emanating directly from their graduate work.

The School will keep ongoing track records of the publications of our graduates.

5.4 Projected graduate enrolments

(Provide information for the next seven years, include a statement on whether the unit has met its enrolment targets in the past seven years, and explain any discrepancies.)

PROJECTED INAKE AND ENROLMENTS Master's of Information Technology Security Program					
YEAR	FULL-TIME		PART-TIME		TOTAL ENROLMENT
	Intake	Enrollments	Intake	Enrollments	
2004	16-24	16-24	32-48	32-48	48-72
2005	16-24	30-48	32-48	62-96	92-144
2006	16-24	30-48	32-48	62-96	92-144
2007	16-24	30-48	32-48	62-96	92-144
2008	24-32	40-56	48-64	80-126	120-182
2009	24-32	48-64	48-64	96-128	144-192
2010	24-32	48-64	48-64	96-128	144-192

Appendix 1

University of Ontario Institute of Technology

Strategic Research Plan

University of Ontario Institute of Technology
Office of Research
July, 2003

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VI. Institutional Research Directions

VII. Evaluating Success

I. Introduction

The University's Strategic Research Plan has been developed in line with the following principles:

1. the Plan sets out the University's research directions from an institutional perspective;

2. the research directions are consistent with the University's mission, strategic vision and objectives for the future;

3. The University's institutional research directions are in fields:

    a. which do not duplicate or overlap major research activities of other Canadian or nearby U.S. universities;

    b. which represent "niche" or focused areas of research in which the University is able to specialize and may expect to excel;

    c. where the University can utilize innovative and/or different methods of conducting its research;

    d. where the University can reasonably expect to become recognized as an international leader.

4. the Strategic Research Plan reflects existing government policies regarding publicly-funded research;

5. the University's research directions reflect the different strengths and advantages of the University;

6. the University will make proposals in the form of specific research projects which will allow the University to:

    a. become internationally recognized as a leader in specific fields of research;

    b. sustain internationally-competitive research programs which will attract the best researchers, the best students and the most private sector interest and participation;

    c. have a major positive impact in terms of Canada's, Ontario's and the Durham/Northumberland Region of Ontario's economic and social well-being.

d. allow the University to 'transform' itself, in the long term, from a relatively small, regional undergraduate University into one of Canada's leading research universities.

II. The Institution's Strategic Research Plan and Individual Research Programs

The Plan is intended to provide a guide for the future direction of the University's research function. The Plan is expected to play a significant role in the types of research projects undertaken by the University as an institution and the way that the University directs and supports that research.

The University also recognizes the value of the more traditional research programs based on the interests of individual faculty members. The University will continue to encourage and to do all it can to foster this type of research.

III. The Nature of the University: Its Mission, Objectives and Strategic Research Vision

The role of the new University is to provide an "anchor institution", a publicly funded university, which could play a significant role in supporting Canada's traditional industries and in attracting new knowledge-intensive industries to Canada.

The seven "Schools" teaching programs are organized around the industries located in Ontario's Durham Region and the Greater Toronto Area and have been designed with a view to meeting the skill training and requirements of those industries.

The University is unique as a result of its commitment to:

- closely match the knowledge creation and training delivered the University with the advanced technology and skills required by Canadian industries;

- provide both students and faculty with access to the most advanced technologies in research and in the "learning experience" delivered by the University;

- take advantage of the efficiencies and synergies available through working with the existing Durham College, a College of Applied Arts and Technology with which the university shares common facilities and a common campus;

- develop innovative research proposals which are responsive to the market-driven needs of Ontario employers "in the Canadian and global context";

- achieve the highest quality or "international excellence" in its research activities;

- structure its institutional research priorities in such a way as to:

    - maximize the economic and social benefits of the University's research results to Canada, Ontario and the local region;

    - transform the way in which the University's researchers conduct their research and the University directs and supports that research.

IV. Recognizing the New Paradigm for Research Funding in Canada

The University's Strategic Research Plan reflects the new framework for federal and provincial funding of university-based research.

The recent expansion in financial support for university-based research and the new framework for eligibility is based on government concerns relating to:

1. the globalization of regional economies;

2. the emergence of the knowledge-based economy as the primary source of relatively high incomes and regional standards of living;

3. the emergence of highly-specialized and interrelated clusters of economic activity which utilize university-based research as a primary source of innovation and sustained global competitiveness.

In future, the allocation of research funding will be, more and more, based on demonstrated performance and excellence.

For this reason, the University's institutional research directions will focus on unique research fields, 'niche areas' in which the university can excel and/or develop innovative research programs.

V. Focused Research

The University's "Strategic Research Vision" is to integrate inquiry, discovery and applied research to achieve "the highest quality" research and research results.

As a new university, however, the University of Ontario Institute of Technology will need time to achieve this Vision.

In these circumstances, the University has focused its selection of institutional research directions and related research proposals to a strategic few.

The University's institutional research directions are identified below. These opportunities have been selected through an intensive process of consultation involving the University's Deans, the Associate Provost (Learning Technologies) the University Provost and the President of the University. Again, the selected directions reflect the nature of the University, its mission and objectives and its strengths and advantages.

VI. Research Directions

The University of Ontario Institute of Technology's institutional directions for research comprise of six areas of focus:

A. Energy: Production, Processes and Sustainability

1. The Research Direction

The conversion of primary energy sources into useful forms is essential to society's needs and is a fundamentally important driver of the economy.

Electricity produced through the conversion of primary energy sources, including hydroelectric and fossil fuel combustion, has been a useful and primary form of energy during the twentieth century, and continues to be important. In the future, alternative primary sources for the generation of electricity are expected to increase in importance, including biomass and terrestrial-based (wind, wave, solar, geothermal).

New technologies also are being developed for the production of hydrogen and for its use as an energy storage medium, an energy carrier and a direct source of energy fuel.

The University's research in *Energy: Production, Processes and Sustainability* will focus on the development of energy sources and technologies for energy conversion, storage and distribution, and the development and enhancement of enabling materials and energy processes. An intrinsic part of this focus is the need to develop energy sources which are sustainable, defined as the use of resources by the current generation in a manner that will not adversely affect the ability of future generations to have access to the same or equivalent resources.

The availability of raw materials and the energy required to convert these raw materials into usable forms of energy are key factors in the determination of sustainability.

The environmental impacts of the emission of hazardous materials and greenhouse gases are well recognized. Alternative energy systems such as wind and solar technologies for producing electricity and hydrogen are usually described as sustainable and non-polluting. While this view is correct if one only considers the operating phase of these energy converters, the impacts of the generators themselves throughout their product life-times should also be assessed.

Similarly, energy-efficiency assessments of equipment, buildings and processes rarely consider full life-cycle effects.

The University's research in *Energy: Production Processes and Sustainability* will address these issues and will have three specific foci:

> (1) evaluating and improving existing energy production and delivery processes and systems, accounting for financial costs and environmental impacts;
>
> (2) investigating new processes and systems, technologies and source materials with the potential of enhancing energy production, conservation and sustainability; and
>
> (3) utilizing life-cycle and sustainability analysis to ensure that all the economic and environmental effects of energy production and processes are taken into account.

A variety of energy sources, carriers and technologies will be considered.

2. Rationale

The energy industry in Canada is very large and has undergone significant changes in recent years. The research to be conducted by the University will aim to help the energy industry adapt in an efficient and effective manner to its present and evolving circumstances.

The University is well suited to undertake this research. In addition to its present and planned teaching programs in Nuclear Engineering, Energy Systems Engineering, Energy and Environment Science, and Mechanical Engineering (with an Energy Engineering option), the University has established strong research capabilities in field of electricity, nuclear energy, hydrogen and the environmental and life cycle effects of different energy sources and systems.

Recruitment and hiring has been and continues to be undertaken to strengthen the University's research cluster in energy and sustainable energy systems.

The University is also provides an ideal location for energy research. Energy issues are of particular importance in the Greater Toronto Area, due to its population density, the range of industrial activity that it supports and its unique dependence on nuclear energy. Ties to these industries will facilitate the development of effective research consortia in the energy field. Finally, the University is the site of one of 5 Research Chairs supported by the *Ontario Centre of Excellence in Electricity and Alternative Energy* along with four other Ontario universities. The University's Research Chair will focus on nuclear energy, while the 5 Chairs, as a group, will help to co-ordinate the energy research activities of the 5 universities, increasing the efficiency and effectiveness of their research.

3. Excellence and Innovation

The multi-disciplinary and collaborative approach to research in *Energy: Production, Processes and Sustainability* will enable innovative and effective research into the science and engineering of materials, products and processes involved in the generation, storage, transmission and use of energy.

The research will rely extensively on the development of fundamental scientific theoretical and experimental tools (from the molecular to the system level) and on mathematical modeling tools (both deterministic and probabilistic), and on the applications of such tools in engineered devices and systems. Implementation of these approaches will involve sophisticated computer applications, involving access to on-line databases that contain current and future projections regarding the availability and rates of depletion of different resources. An important emphasis will be on the life-cycle of energy processes, materials, products and systems, including their economic and environmental impacts.

The research results are expected to be of use to the private and public sector and to business and policy decision-makers, and will provide a more rational basis for making choices involving energy production and use than is currently available.

B. Engineering, Manufacturing and the Automotive Industry

1. The Research Direction

Engineering is concerned with the application of science and technology, and focuses on innovative design while addressing related concerns such as productivity, product quality and environmental and social impacts. Engineering

research advances are at the heart of improving standards of living, the quality of life and the creation of new wealth.

Manufacturing engineering is a particular field of engineering that focuses on the processes, methods and technologies involved in manufacturing. Research advances in manufacturing focus on improving the operations involved in manufacturing goods.

The automotive industry includes automotive manufacturing, parts supply and servicing. This manufacturing industry is particularly important to the Canadian economy and relies heavily on a range of engineering disciplines (mechanical, electrical, energy, components, software, chemical, materials) as well as manufacturing engineering.

2. Rationale

The University has a 'core' set of research capabilities in manufacturing, engineering and the engineering disciplines relied upon by the automotive industry in both its current operations and in developing the next generation of automotive products.

Recently, the University has developed engineering research strength in the following fields:

- *Manufacturing and materials;*
- *Mechanical and automotive systems;*
- *Energy and environment;*
- *Electrical, computer and telecommunications;*
- *Business and management engineering.*

The University provides an ideal locus for focused research in engineering, manufacturing and the automotive sector. Within the University, there is great complementarity among research capabilities and opportunities for multi-disciplinary research, particularly between the Schools of Manufacturing Engineering, Energy Engineering, Science and Business and Information Technology.

Engineering, manufacturing and the automotive sector are important to both Ontario and Canada. In Ontario, manufacturing is a $300 billion industry which accounts for approximately 25 percent of the Province's gross domestic product, and some two million direct and indirect jobs. Much of this activity occurs in the greater Toronto area, where the University is located. More locally,

manufacturing will remain the key to the economic performance of Durham Region for the foreseeable future.

3. Excellence and Innovation

The University will enhance and expand its research expertise and capacity by pursuing innovative research in the following three fields:

Engineering: The University will develop and disseminate new knowledge in a range of engineering fields that will benefit manufacturing businesses and the automotive industry. *This research will include:*

- advanced energy technologies and systems, hydrogen energy systems, and improved energy efficiency and management in various engineering applications;

- advanced materials (including plastics, polymers and metals) and related processing technologies;

- intelligent control systems for various applications, and advanced robotic and mechatronic technologies;

- advanced computer and software systems to support engineering innovations for various fields and applications;

- computational methods for solving engineering problems and for engineering design;

- efficiency and environmental impacts of engineering systems, with a focus on improving energy use.

Manufacturing Engineering: The University's research will focus on improvements in manufacturing processes, technologies and operations. Particular areas of research include:

- manufacturing technologies which enable rapid, flexible and precision manufacturing;

- simulation, control and design of manufacturing processes and operations.

The Automotive Industry: The University's research will focus on engineering and manufacturing processes, technologies and operational processes which will benefit the automotive industry and improve the international competitiveness of this industry. Particular areas of research include:

- advanced automotive power plant including fuel cells and other engines that utilize hydrogen;

- improved automotive controls for automotive applications;

- intelligent controls for automotive applications;

- improved technologies, operations and processes for automotive manufacturing;

- improved automotive design.

C. Information Technology, Teaching and Learning

1. The Research Direction

Changes in information technology are altering the fundamental relationship between people and knowledge. In particular, these changes are creating new ways in which knowledge may be obtained, transferred or taught and in the ways that individuals learn. With the advent of the "knowledge" economy, it is imperative that Canada take advantage of the potential improvements in teaching and learning that the new technologies offer.

The University will conduct research in the area of information technology, communications and technological innovations and their application to learning, the transfer of knowledge and teaching.

2. Rationale

The University is physically designed and equipped to provide teaching and learning environments that enable the use of new information and communications' technology hardware and software [e.g. wireless networks and teaching/learning based on laptop computers] in its teaching programs.

This environment offers opportunities for investigating innovative teaching and learning techniques based on these technologies. The "web-centric" environment around which the University operates utilizes the latest information and communication technologies to support traditional face-to-face teaching while expanding Internet-based learning and collaborative learning.

In keeping with this vision, teaching and learning at the University is not bound by place or by time. The technology-rich environment also positions the University to act as a catalyst for collaborative research between research institutions, industry and government in the use of new information and communications technologies to improve methods, learning and the dissemination of new knowledge.

3. Excellence and Innovation

The University's research in *Information Technology, Teaching and Learning* will involve not only production and utilization of new technological hardware and software, but also research on the effectiveness of the new technologies or combinations of technologies in improving student learning and assisting faculty in their teaching and research.

Research in this area will include:

- examination and evaluation of the social patterning of interaction in and around information and communications technology;
- how individuals may best interact with and utilize information technology in the process of structured and informal learning;
- how best to integrate information technology to create highly effective learning and teaching systems.

D. Computational Science and High-Performance Computing

1. The Research Direction

The new discipline of "*computational science*" applies the techniques of mathematics and computer science in a particular domain of application such as solving engineering problems or developing new knowledge regarding the physical or biological phenomena. It is a newly emerging area of scientific investigation which complements the traditional approaches of theory and experiment.

More specifically, computational science involves the development of mathematical models of phenomena and their programming into computer applications which provides both qualitative and quantitative insights into the phenomena being researched. Many phenomena are too complex to be dealt with by traditional analytical methods, too expensive or dangerous to research through experimentation or impossible to investigate within known research methodologies. Computational science offers an innovative, new approach for conducting scientific investigations in such circumstances.

Computational science is an interdisciplinary field, linking many disciplines that use related mathematical, computational, and visualization tools. A critical factor in the development of effective research tools derived from computational

science is the availability of high-performance computing hardware and associated system software because this technology extends the breadth and complexity of the phenomena which can be researched.

2. Rationale

The University is well-positioned to undertake computational science-based research. The University is a member of the southern-Ontario-based SHARCNET (Shared Hierarchical Academic Research Computing Network), a high-performance computing network involving 14 universities, research institutes, and colleges in southern Ontario. This innovative initiative physically links its members via the high-speed ORION research computing network to shared computing power installed at its member institutions.

In addition, Undergraduate programs in the School of Science emphasizing Computational Science across various disciplines, the interdisciplinary focus of the School, collaborative research with other Schools, and corresponding strategic faculty hiring, all provide unique opportunities for the University to be a leader in this field.

3. Excellence and Innovation

The University's research in computational science will be collaborative and inter-disciplinary in nature, involving the Schools of Science, Manufacturing Engineering, Energy Engineering and Nuclear Science and Business and Information Technology and will include the following research areas;

- optical properties of solids;
- fluid property prediction in environmental and industrial applications;
- computational fluid dynamics;
- computational finance;
- simulation of business and production processes; and
- radiation dosimetry modeling.

The University intends to build on these research activities to include additional research which intersects with the above fields, such as biocomputing, pharmaceutical and other aspects of computational chemistry and high-performance computing tools in computer science.

D. Business Processes, Commercialization of Technology and Information System Security

1. The Research Direction

Efficient and effective processes are essential components of innovative, financially viable and internationally competitive businesses in the dynamic and

globalized economy of the 21st Century. Efficient and effective business processes, combined with the development of intellectual property, can increase the likelihood of successfully commercializing technological innovations in engineering, the sciences and human health. These outcomes are critical to a high standard of living and the quality of life in Canada.

The 21st Century has also witnessed the break-down in a number of business processes, including:

- increasing episodes of workplace violence;
- breaches of commercial and government information security systems;
- scandals relating to financial reporting by major corporations.

The University's research in *Business Processes, Commercialization of Technology and Information System Security* will address these issues and will have two foci:

(1) the process of commercializing new discoveries and technologies based on basic and applied research in engineering, the sciences, and human health; and

(2) applied research relating to the optimization of business processes, the development of intellectual property and information system security.

2. Rationale

As a result of innovations in the wireless and Internet technology fields, telecommunications in Canada has experienced a revolution over the last decade, with major impacts on business, on government, on the delivery of public/community health care services and on individual users. Future developments in telecommunications will involve the further integration of the Internet with wireless communications in the form of highly intelligent multimedia devices and improved networking facilities.

Research into the integration of information system technology and business processes, the new security requirements associated with advances in telecommunications technology and the commercialization of new intellectual property will help Canada's businesses improve their productivity and international competitiveness and will strengthen the overall reliability of information systems in Canada.

The University is developing research capabilities in the field of information technology in its Schools of Manufacturing Engineering, Energy Engineering and Nuclear Science and Business and Information Technology.

Complementary research capability in information system security and the commercialization of intellectual property is being developed in the Schools of Criminology and Justice and the School of Business and Information Technology.

The University's combined engineering and management undergraduate programs will provide an effective interactive environment for the training of highly qualified personnel and for research consortia on information security issues.

3. Excellence and Innovation

The University plans to become the first Canadian university to offer an MBA with a specialization in Information Technology Security. As well, it will be the first university in Canada to maintain an Information System Security Laboratory, offering students the opportunity to integrate the disciplines of computer science, risk management and ethics. Finally, the University plans to expand its undergraduate program to include a Bachelor degree in Software Engineering and a Bachelor degree in Telecommunications Engineering.

The University's research in Business Processes, Commercialization of Technology and Information System Security will include:

- Broadband wireless systems and standards;
- High speed transmission technologies;
- User standards;
- Wireless mobile Internet systems;
- Mobile security and payment systems, involving public key infrastructure and cryptography;
- Software infrastructure and middleware for secure mobile applications;
- Security systems in application software;
- Network, transport, and application layer security protocols;
- Emerging mobile-commerce applications, threats, and countermeasures;
- Intellectual property rights and ethical business practices;
- Roles and issues in forensic accounting.

E. Community/Public Health and Safety

1. The Research Direction

The health and safety of Canadians depends on a diverse range of factors, including protection from infection and disease, access to information regarding

health issues, the delivery of specific health services, counseling and law enforcement.

Improved health and safety in Canada, in turn, will depend on innovative and effective research relating to these factors.

The University's research will focus on targeted areas of health and safety related to *Community/ Public Health and Safety***.** In particular, the University's research will focus on:

1. toxicological and chemical aspects of public health;
2. individual "vulnerability" to illness and disease;
3. social, medical and environmental factors that lead to crime.

Toxicology is the scientific study and investigation of poisonous substances. Public health may be adversely affected or endangered by the presence of toxins that affect water, air or personal health directly. The monitoring of eco-systems and living organisms, such as fish, can provide early-warning signs of imminent dangers to human health and well-being.

Scientific research in pharmaceutical chemistry and related fields of chemistry, using molecular-based computational tools and advanced analytical chemistry methodologies can lead to the formulation of novel drug formulations. Research in biology and nutrition can lead to major improvements in human health.

Research into "vulnerability" involves investigations of the relationship between human health and some combination of an individual's:

a. biological characteristics;
b. personal resources;
c. social, material and cultural supports.

Policies and measures which reduce "vulnerability" are important since "vulnerability" is a primary determinant of a person's health and resulting need for health services. Vulnerability also extends into the workplace and influences the costs of work-related injuries and disease.

The University's research relating to vulnerability will investigate how improved health and lower costs might be achieved by providing improved community-based services to people who exhibit signs of vulnerability.

Community health and safety is also greatly influenced by the urban environment, living conditions, social norms and culture and access to appropriate medical services. These factors have been shown to affect the incidence of crime and the number of Canadians subject to criminal victimization.

The University will investigate these factors with a view to developing appropriate policies for public safety.

2. Rationale

The School of Science has significant research expertise in the field of toxicology, as witnessed by its teaching program in toxicology and its participation in the *Canadian Rivers Institute*, a research institute established to investigate the impact of human land use practices on groundwater, watersheds and rivers in Canada.

Strategic hiring of new faculty with expertise in pharmaceutical chemistry in the School of Science has also provided a foundation for research in the chemical aspects of human health.

The Schools of Health Science and Justice both have significant experience and expertise in the conduct of community-based research. In the former case, this expertise involves the factors that contribute to higher levels of vulnerability and the relationship between individual "vulnerability", human heath and the need for community and medical services. The School of Justice retains expertise in relation to environmental factors (e.g. urban design, living conditions and cultural attitudes) that contribute to a higher incidence of crime.

3. Excellence and Innovation

The University will enhance and expand its research capabilities in the field of *Community/Public Health and Safety* by pursuing innovative research into factors which affect health and safety including:

- water supply safety and atmospheric toxicology;
- biological systems;
- pharmaceutical chemistry;
- community-based research into the relations between human health and:
    . social and cultural conditions;
    . the environment;
    . the economy;
    . urban settings; and
    . the incidence of crime.
- community-based research into measures and public policies which reduce "vulnerabilities" and the incidence of crime.

VI. Measuring Success

The University will employ various measures to evaluate how it is achieving the objectives of its Strategic Research Plan. These measures include:

A. The Growth and Transformation of its Research Capabilities

Increases in the University's faculty, research staff and research infrastructure and the international recognition of its research results will indicate that the University is progressing towards the realization of its Strategic Research Plan.

B. Scholarship

The number and quality of journal articles, books, papers and other publications reflect the scholarly achievements of the University's faculty and research staff. Similarly, the prestige of awards and other forms of recognition attest to the quality of the University's research work.

C. "Ground-breaking" Discoveries

The discovery of new knowledge and/or "know-how' resulting from the University's research which makes a substantial contribution to human understanding in a particular field or which leads to significant advances in technology, production processes and/or new products and services would be a primary indicator that the University is achieving its Strategic Research Plan.

D. Knowledge and Technology Transfer and Commercialization

The extent to which new knowledge and technology resulting from the University's research is transferred to industry, incorporated into public services or used in the development of new public policies will be another indicator of the success of the University's institutional research. The creation of new intellectual property, the licensing of researchers' patents, royalties received by the University's researchers and the creation of spin-off businesses attributable to the University's research would also indicate that the University is successfully moving toward the realization of its Strategic Research Plan.

E. The Training of Highly-Qualified Personnel

Finally, the success of the University's institutional research will be measured by the quality of the training experiences that its research provides to undergraduate and graduate students and the degree to which it equips such students to become leading researchers in their own right or highly skilled employees in industry and in the public sector.

Appendix 2

Mission Statement

Of the

School of Business and Information Technology

School of Business and Information Technology

Mission Statement

- To promote research excellence in the areas of business processes, commercialization of technology, information systems, and information technology security.
- To develop critical thinking and interpersonal skills through educational excellence in management and information technology at home and abroad.
- To provide educational opportunities in management and information technology to managers and business leaders in the public and private sectors.

Adopted by the Founding Faculty on August 21, 2003.

November 10, 2003

Appendix 3

University of Ontario Institute of Technology

LIBRARY ASSESSMENT FOR MASTER OF BUSINESS ADMINISTRATION (INFORMATION TECHNOLOGY SECURITY) PROGRAM
(Following the Report of the Ontario Council of University Librarians (OCUL) Task Force on Library Evaluation, October 25, 1996)

Compiled by
Carol Mittlestead, B.A., M.L.S.
Associate Librarian
University of Ontario Institute of Technology Library

Introduction:

With respect to the University of Ontario Institute of Technology's Master of Information Technology Security (MIST) Program, the following document discusses the Campus Library in terms of the collection and the accessibility of resources and services. 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. 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.

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 Professors, 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 Campus Library offers a small but comprehensive collection. At present, there are approximately 53,000 volumes on the shelves, but when the new Library (described below) is available for occupancy in late 2004, this number will quickly triple to over 160,000. Currently there are over 6,200 business and business-related (e.g. cultural interaction, proposal writing) books on the shelves, and this collection will increase to 7,700 by 2004 or by an additional 24%. The cost of this initiative is estimated at $180,000. The Library also houses over 500 annual reports. The plan is to make a continued investment in maintaining and increasing paper-based business materials while acknowledging the importance and impact of the laptop university.

Additional IT security books are being acquired. Book topics include such issues as mobile commerce, web hacking, intellectual property, risk assessment and management, fraud, wired and wireless networking, cryptography, firewalls and intrusion, and smart card technology. Amongst the more mainstream publishers supplying quality materials are Prentice-Hall, Addison-Wesley, McGraw-Hill (including Osborne and Irwin Business), John Wiley, Springer-Verlag, Amacom (American Management Association), Harvard Business School Publishing, and Carswell. Arrangements were finalized in November 2002 with Blackwell's Book Services allowing for the simultaneous purchases of books from a wide array of publishers. Meetings with Coutts and Midwest, two other companies that also

represent a number of book dealers, have also been held with the possibility of extending and accelerating the Library's collection building activities.

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 and computer-oriented organizations. Examples include the SANS (SysAdmin, Audit, Network, Security) Institute, CISTI (Canada Institute for Scientific and Technical Information), CERT (Computer Emergency Response Team – Software Engineering Institute, Carnegie Mellon University) and CanCERT (Canadian Computer Emergency Response Team).

With over 8,500 titles (not included in the total above), e-books are an integral part of the UOIT library collection. Currently, NetLibrary, Books 24x7, and Access Science are the databases most likely to interest MIST students. Especially given UOIT's commitment to the laptop university concept, the Library's e-book collection is destined to grow.

Periodicals:

Currently, there are over 6,000 business and 700 computer-related periodicals in fulltext in either paper or electronic format available through the Library. As a recent member of the OCUL (Ontario Council of University Libraries) and CNSLP (Canadian National Site Licensing Project) consortia, these numbers will increase substantially over the next academic year. Subscriptions to electronic journals are through database and indexing services that offer full-text information or through direct links to the publishers. The Campus Library is already an active participant in the Ontario Scholars Portal (OSP or sometimes referred to as scholarsportal.info), an OCUL initiative that consolidates the electronic periodical holdings of several well-respected academic publishers (e.g. Springer-Verlag, Academic Press/Ideal) to provide a single-access search gateway to the electronic full-text of over 5 million articles found in 3,800+ journals.

Following the mandate of the University of Ontario Institute of Technology as a laptop university with "round the clock" accessibility to resources, whenever possible, the Library will purchase significant holdings to a journal in electronic format. For example, Harvard Business Review is available in full-text from 1922 to the present through the EBSCOhost Academic Premier database. It is, however, acknowledged that not all journals are available electronically, and as necessary, the Library will purchase paper copies.

Examples of indexing and fulltext journal databases relevant to the Master of Information Technology Security Program include: ACM (American Computing Machinery) Digital Library; CBCA's (Canadian Business and Current Affairs) Fulltext Business and Fulltext Reference; EBSCOhost's Academic Search

Premier, Business Source Premier, Econlit, Regional Business, and Inspec; IEEE (Institute of Electrical and Electronics Engineers) Xplore, Kluwer, Wiley Interscience, LexisNexis, Web of Science, and Emerald Management Research and Reviews. Amongst the individual journal titles relevant to the Program are Journal of Computer Security, Journal of Business Ethics, Electronic Commerce Research, Design, Codes and Cryptography, Journal of Management Information Systems, Information Processing and Management, and International Review of Law, Computers and Technology.

Statistical Resources:

The relevance of statistics to a Masters program is acknowledged. Federal, provincial, and international government documents are catalogued and integrated into the collection according to their subject area. Faculty and students will also have access to Statistics Canada databases such as E-Stat, the Data Liberation Initiative, and CANSIM.

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 program. This will be no different for the Information Technology Security offering. Listings of recommended web sites are part of the Library School Guides that are prepared with each UOIT program in mind. Posted on the Campus Library web site www.uoit.ca/library, these School Guides are discussed in detail under “Accessibility”. For example, amongst the MIST sites already identified for addition to the existing Business/IT list are the NIST (National Institute of Standards and Technology) Computer Security Resource Center, the International Association for Cryptologic Research, the Center for Internet Security, and TechWeb: The Business Technology Network.

Accessibility:

The Building:

A new state-of-the-art, 55,000 square foot Library building is scheduled to be ready for occupancy by late 2004. The intent of the design is to create a print/electronic library which will accommodate 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

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. Both staff and students are also welcome to make individual or small group appointments with Librarians.

Campus Library Web Page:

The Campus Library web page is available at www.uoit.ca/library and is accessible 24 hours a day, seven days a week. A Library e-mail address is provided as well as telephone information so individuals can leave messages at any time. In collaboration with other Ontario University Libraries, the Campus 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 Campus 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 School Guides. Prepared with each program in mind for a particular Faculty, every School 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. As discussed above, collection material for the MIST program is already

being consolidated and the construction of this specialized UOIT Library web page section within the School of Business and Information Technology is well underway. These School Guides are indeed resource portals.

Interlibrary Loan and Document Delivery:

Interlibrary Loan is available free of charge to students 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 currently being implemented in OCUL member libraries. Students and faculty can search the catalogues of all Ontario university libraries and place immediate online requests for any available item. The system populates the request automatically with the bibliographic information from the record chosen, and a patron name, i.d. number, and e-mail address are all that need to be added to the online form. As part of OCUL and the IUTS (Inter University Transit System), the Campus Library now receives loans in a very reasonable amount of time, but RACER will significantly lessen the wait.

Faculty and students from UOIT may also visit any of Ontario's university libraries and may borrow books 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 Campus Library with the option of returning them to the Campus Library. Since Information Technology Security is a postgraduate degree, the borrowing restrictions that the University of Toronto Libraries have on undergraduates are obviously not applicable. Interlibrary Loans and document delivery are also available from other lending institutions (e.g. CISTI or libraries outside the province of Ontario) as required.

The Campus Library welcomes Information Technology Security, the University of Ontario Institute of Technology's first postgraduate program, and lends its support to the resource and research needs of both faculty and students.

Carol Mittlestead
September 2003

Appendix 4

Faculty Citation Reference

The following was taken from Citation Index reflecting the cited reference of faculty publication. The left column indicated the number of times an article was cited. The right column is the title of the journal where the article was published.

Fong, Wilfred

Nos. of times cited	Article Cited
1	Fong, Wilfred; Aman, Mohammed; and Diodato, Virgil. "Selecting a Local Area Network for an Academic Environment." The Electronic Library. Vol. 8, No. 4 (August 1990), pp. 249-253.

Friedlan, John

Nos. of times cited	Article Cited
1	Friedlan, John. "Accounting Choices by Issuers of Initial Public Offerings." Contemporary Accounting Research. Vol. 11, No. 1-I, Summer 1994, pp. 2-6.

Grami, Ali

Nos. of times cited	Title of Journal Cited
1	IEEE Transactions on Communications (1989)
7	IEEE Transactions on Communications (1987)
1	IEEE Transactions on Communications (1987)
1	Proceedings of IEEE International Conference on Communications (1987)
1	Proceedings of IEEE International Conference on Communications (1986)
2	Proceedings of IEEE International Conference on Communications (1984)
1	Proceedings of IEEE International Conference on Communications (1995)
3	Proceedings of IEEE International Conference on Communications (1982)
1	Proceedings of IEEE Electronicom (1983)

Lewis, Gregory M.

Nos. of times cited	Title of Journal Cited
1	Masters Thesis. McGill University (1993)
3	Lewis, G.M. S. Lovejoy, D. Schertzer, and S. Pecknold. "The Scale Invariant Generator Technique for Quantifying Scale Invariant Anisotropy." Computers and Geosciences 25:9 (1999), 963-978.

Schell, Bernadette

Nos. of times cited	Article Cited
11	Schell, B., & Bonin, L. Factors affecting censorship by Canadian librarians. The Journal of Psychology, l23, 4, 1988, 357-367.
1	Schell, B.H., & McGillis, S. How Type A Franchisees Cope with Failed Businesses: An Analysis of Micro- and Macro-System Factors. Journal of Small Business and Entrepreneurship, 12, 4, 1995, 27-48.
1	Schell, B., & McGillis, S. Franchise Legislation Disclosure Information: Views From Franchisors and Franchisees on its Impact on Franchisees' Satisfaction and Commitment Levels. Journal of Small Business & Entrepreneurship, 11, 1, 1993, 83-104.
3	Schell, B., McGillis, S., & Morrison, K. Type 'A' traits, innovativeness, cognitive complexity and attitudinal predictors affecting franchisees' job-involvement levels. Journal of Small Business and Entrepreneurship, 9, 3, 1992, 47-59.
1	Schell, B., & McGillis, S. Personality and attitudinal predictors of commitment for franchisees. Journal of Small Business and Entrepreneurship, 7, 3, 1990, 40-63.
2	Schell, B., Hunt, J., & Lloyd, C. An investigation of future market opportunities for sport psychologists. Journal of Sport Psychology, 6, l984, 335-350.
1	Davey, A., Schell, B., & Morrison, K. The Myers-Briggs personality indicator and its usefulness for problem-solving by mining industry personnel. Group and Organization Management, l992.
4	Schell, B., & Loeb, A. An investigation of general happiness level, collective bargaining attitudes, job satisfaction, and

university and union commitment of faculty members in Canada. Journal of Social Behavior and Personality, I, 4, l986, 537-556.

1 Management in the Mirror: Stress and Emotional Dysfunction in Lives at the Top (Book) (1999)

5 Schell, B.H., Paine-Mantha, V.A., Markham, M.E., & Morrison, K. Stress-coping styles and personality descriptors of ice arena workers: Indicators of "victims" or "copers" of on- the-job stresssors? Journal of Vocational Behavior. 41, 1992, 270f.

3 Schell, B.H., & Deluca, V.M. Task-achievement, obsessive-compulsive, type A traits, and job satisfaction of professionals in public practice accounting. Psychological Reports, 69, 1991, 611-630.

4 Schell, B., & Zinger, J. T. An investigation of self-actualization, job satisfaction, and commitment for Ontario funeral directors. Psychological Reports, 57, l985, 455-464.

8 Schell, B., & Zinger, J. T. Death anxiety scale means and standard deviations for Ontario undergraduates and funeral directors. Psychological Reports, 54, l984, 439-444.

1 Schell, B., Sherritt, H., Lewis, M., & Mansfield, P. An investigation of worldmindedness, satisfaction, and commitment for hirers of foreign student exchanges. Psychological Reports, 59, l986, 9ll-920.

1 A Self-Diagnostic Approach to Understanding Organizational and Personal Stressors: The C-O-P-E Model for Stress Reduction (Book) (1997

1 Stalking Harassment (Book) (2000)

Waller, Ed

Nos. of times cited	Article Cited
3	Hussein, E.M.A, and Waller, E.J., "Landmine detection: the problem and the challenge." Applied Radiation and Isotopes. 53 (4-5): 557-563, Oct-Nov 2000.
3	Hussein, E.M.A, and Waller, E.J., "Aller EJ A Neutron Steam-Qaulity Meter for a Fluidized-Bed Plant." Applied Radiatin and Isotopes. 41 (10-11): 1049-1055, 1990
2	Cousins T, Jones TA, Brisson JR, McFee JE, Jamieson TJ, Waller EJ, LeMay FJ, Ing H, Clifford ET, Selkirk EB, "The development of a thermal neutron activation (TNA) system as a confirmatory non-metallic land mine detector", Journal of Radioanalytical and Nuclear Chemistry. 235 (1-2): 53-58 September 1998
2	E.J. Waller and E.M.A. Hussein, "A Portable Neutron Device for Void Fraction Measurement in a Small Diameter Pipe", Nuc. Inst. Meth., A299, 670-673, 1990.
7	E.M.A. Hussein and E.J. Waller, "A Review of One-Side Approaches to Radiographic Imaging with Emphasis on Explosives, Contraband, and Land Mines.", , Radiation Measurements, Vol. 29/6, pp. 581-591, 1998.

Wu, Terry

Nos. of times cited	Title of Journal Cited
1	Terry Wu and Ross Fetterly, "Canadian Defence Policy: An Analysis;" Canadian Public Policy, Vol. 16, No. 2, pp. 161-173, 1990.
4	Terry Wu and Neil Longley, "The U.S.-Canada Free Trade Agreement: A Model for a U.S.-Mexico Free Trade Pact?", Columbia Journal of World Business, Vol.26, No. 2, pp. 60-71, 1991.
3	Neil Longley and Terry Wu, "Negotiating Chile's Accession to the North American Free Trade Agreement: Antidumping and Countervailing Duty Issues", Journal of World Trade, Vol. 30, No. 1, pp. 53-65, 1996.
1	Terry Wu, "Provincial Funding of Post-Secondary Education Under the Established Programs Financing", Canadian Journal of Higher Education, Vol. 15, No. 3, pp 39-49, 1985.
1	Terry Wu, "Federal Contributions to Post-Secondary Education Under the Established Programs Financing: Trends and Implications", Canadian Journal of Higher Education, Vol. 15, No. 1, pp. 11-23, 1985.

Volume II

THE CURRICULA VITAE OF THE FACULTY

Fong **1 of 5**

Program: Master of Information Technology Security October 2003

CURRICULUM VITAE

a) NAME:

Fong, Wilfred, Assistant Dean, Continuing Appointment
Member of the Graduate Faculty: N/A

b) DEGREES:

MLIS, University of Wisconsin-Milwaukee, School of Information Studies, 1985
B.Sc., University of Western Ontario, Department of Computer Science, 1981

c) EMPLOYMENT HISTORY:

July 2003 –	Founding Faculty Member and Assistant Dean, School of Business and Information Technology, University of Ontario Institute of Technology
September 1988 – June 2003	Assistant Dean, School of Information Studies, University of Wisconsin-Milwaukee
2001 – 2003	Interim Development Director School of Information Studies, University of Wisconsin-Milwaukee
March 1988 – August 1988	Acting Assistant Dean, School of Library and Information Science, University of Wisconsin-Milwaukee
November 1985 - August 1987	Resource Center/Business Manager, School of Library and Information Science, University of Wisconsin-Milwaukee
June 1985 - October 1985	Acting Resource Center Librarian, School of Library and Information Science, University of Wisconsin-Milwaukee
August 1984 - May 1985	Research Project Assistant, School of Library and Information Science, University of Wisconsin-Milwaukee

Fong **2 of 5**

d) HONOURS:

University of Wisconsin-Milwaukee School of Information Studies Alumni Association Honorary Award, 2003
University of Wisconsin-Milwaukee Academic Staff Outstanding Performance Award, 1994
International Book of Honor, 1992
International Dictionary of Biography, 1992
Personalities of America, 1990
Who's Who in Education, 1990
Who's Who in Religion, 1989

e) SCHOLARLY AND PROFESSIONAL ACTIVITIES:

2002	Board Member, American Library Association Institute of Spectrum Initiative for Diversity
2001 – 2003	Board Member, Morine Park Technical College Advisory Board
2000 – 2003	Board Member, Milwaukee Area Technical College Computer/Business Graphics Program Advisory Board
2000 – 2002 & 1993 – 1994	Editor, *Asian-Pacific American Librarian Association Newsletter*.
1999 – 2003	Board of Trustees (Elected for 2 consecutive terms), University of Wisconsin-Milwaukee Alumni Association
1999 – 2002	Program Co-Director, IT 2000 Project – High School Student Training Program on Information Technology with Private Industry Council of Milwaukee County and INROADS, Inc. of Wisconsin
1998 – 1999	Treasurer (Elected), Asian-Pacific American Librarian Association
1997 –	Book Review Editor, *Journal of Library and Information Science*
1995 – 1996	President (Elected), Chinese American Librarians Association
1990 –	Executive Editor, *Journal of Library and Information Science*

Fong **3 of 5**

f) GRADUATE SUPERVISIONS:

Completed: 4 MA, 0 PhD.
In progress: 0 MA, 0 PhD.

Frankie Taylor, Windows 2000 Security, 2001 (Master's Project)
Daniel J. Cook, Securing Windows and Exchange Servers, 2000 (Master's Project)
Desiree Hawkins, Management of Information Centers and Libraries (Master's Project), 2000
Twyla McGhee, African American Heritage – A Multimedia Documentary (Master's Project), 1999

g) GRADUATE COURSES:

Courses:

2001-2003	Technology Training and eLearning
2000-2003	PC Technology Management and Maintenance
1999-2001	Internetworking with Windows 2000 Professional
1999-2001	Internetworking with Windows 2000 Server
1998-1999	Internetworking with Windows NT Professional
1998-1999	Internetworking with Windows NT Server
1996-2003	Microcomputers for Information Resources Management
1996-2002	Production and Utilization of Instructional Technology
1996-2002	Multimedia Technology

Seminar:

1998	Seminar in International Information Services

Directed Studies:

Windows 2000 Security (2001)
Multimedia Technology (1999)

Fong **4 of 5**

h) EXTERNAL RESEARCH FUNDING:

Year	Source	Type*	Amount per year (US$)	Purpose**
2001-2003	Bader Foundation	F	$100,000	Research Project
1999	Private Industry Council of Milwaukee County (Wisconsin)	C	$50,000	Computer Training Project
1998	Staff Development Grant	O	$1,500	Professional Development

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

i) PUBLICATIONS:

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

- Books authored 2
- Books edited 1
- Chapters in books..... 1
- Papers in <u>refereed</u> journal..... 4
- Papers in refereed conference proceedings 6
- Technical reports..... 2
- Others (workshops presented) 34

2) Details for past seven (7) years same categories as above: books, chapters in books, papers in <u>refereed</u> journals.

<u>Books authored:</u>

1. <u>Maintaining and Upgrading Your PC</u>. Lanham, Maryland. Scarecrow Press, Inc. (To be published in December 2003.)

2. <u>Information Resources on the Information Superhighway.</u> Dubuque, Iowa: Kendall/Hunt Publishing Company, 1998. 168 pp. (ISBN: 0787255378)

Fong **5 of 5**

Books edited:

Information Services and Technology, Edited by Professors Wilfred Fong and Joannes Britz. (Scheduled to be published in October 2004)

Chapters in Books:

"The Evolution of Distance Learning at the School of Information Studies University of Wisconsin—Milwaukee" (Wilfred Fong, Judith Senkevitch, and Dietmar Wolfram) in Dan Barron, ed. Creating Alternatives for Learning: Models of Distance Education in Library and Information Studies. Englewood, CO: Libraries Unlimited, 2003.

Papers in refereed Journals:

1. "Library and Information Technology in Southeast Asia." Information Technology and Libraries. (March 1997), 255-261.

2. "Searching the World Wide Web." Journal of Library and Information Science. 22:1 (April 1996), 14-38.

Papers in Refereed Conference Proceedings:

"Distance Learning in Information Science Education." With Dr. Mohammed Aman, International Conference on International Education, January 2-4, 2004. (Accepted)

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Signature

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Date

November 10, 2003

Friedlan **1 of 3**

Program: Master of Information Technology Security October 2003

CURRICULUM VITAE

a) Friedlan, John, Associate Professor, Tenured
Member of the Graduate Faculty: N/A

b) DEGREES:

PhD University of Washington, School of Business,1990
CA (Chartered Accountant), 1980
MBA York University, School of Business, 1978
B.Sc. McGill University 1976

c) EMPLOYMENT HISTORY:

May 2003 – Present	Associate Professor, School of Business and Information Technology, University of Ontario Institute of Technology
1990-2003	Associate professor, Schulich School of Business, York University
1983-1985	Manager of examinations, Canadian Institute of Chartered Accountants
1982-1983	Manager of planning, Senior financial analyst, Nabisco Brands Inc.
1980-1982	Sessional Lecturer, School of Business, York University
1978-1980.	Deloitte, Haskins and Sells, Chartered Accountants

d) HONOURS:

Institute of Chartered Accountants of Ontario Doctoral Fellow, 1993

Friedlan **2 of 3**

e) SCHOLARLY AND PROFESSIONAL ACTIVITIES:

1997-99	Canadian Academic Accounting Association—Education Committee Chair
1996-2001	Board Member, National Insolvency Practioners Qualifications Board
1994-present	Consultant to the Board of Examiners of the Canadian Institute of Chartered Accountants

f) GRADUATE SUPERVISIONS:

Completed: 10 MA, 0 PhD.
In progress: 0 MA, 0 PhD.

Notes:
MBA Thesis (company analysis) —approximately 10 in last seven years. (Note: these MBA these are not traditional research thesis but are group strategy analyses of a real entity)

g) GRADUATE COURSES: *past 7 years, by year*

Courses:

1996 – 2003	Financial Accounting for managers
1999 – 2003	Contemporary Issues in Accounting
2000 – 2003	Independent Study courses in Accounting

Seminars:

N/A

Directed Studies:

N/A

h) EXTERNAL RESEARCH FUNDING: N/A

Friedlan **3 of 3**

i) PUBLICATIONS:

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

- Books authored 3
- Papers in refereed journal 3
- Abstracts and/or papers read 1

2) Details for past seven (7) years same categories as above: books, chapters in books, papers in refereed journals.

Books authored:

1. Financial Accounting: A Critical Approach, John Friedlan, Prentice-Hall 2003 (ISBN: 0130193720)
2. Study Guide to accompany Financial Accounting: A Critical Approach, John Friedlan, Prentice-Hall, 2003
3. Instructors manual to accompany Financial Accounting: A Critical Approach, John Friedlan, Prentice-Hall, 2003

Papers in refereed Journals:

1. "Accounting Choices by Issuers of Initial Public Offerings." Contemporary Accounting Research, Vol. 11, No. 1-I, Summer 1994
2. "The Effects of Alternate Pedagogies on Students' Perceptions of the Skills Needed for Success in Accounting Courses and by Practicing Accountants." Issues in Accounting Education, Spring, 1995
3. "Steeped in Tradition" CA Magazine, 1996

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Signature

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Date

November 10, 2003

Goodman 1 of 4

Program: Master of Information Technology Security October 2003

CURRICULUM VITAE

a) NAME:

Goodman, William Martin, Associate Professor, Tenure-track
Member of the Graduate Faculty: N/A

b) DEGREES:

Ph.D., University of Waterloo, Philosophy, 1989
(Specializations included Decision Theory, Logic, and Educational Computing.)
M.A., University of Waterloo, Philosophy, 1983
B.A. (Honours), University of Waterloo, Philosophy, 1977

c) EMPLOYMENT HISTORY:

July 2003 –	Associate Professor, School of Business and Information Technology, University of Ontario Institute of Technology
2002 – 2003	Acting Dean, School of Business, Durham College, Ontario
1985 – 2002	Professor, School of Business, Durham College, Ontario *Secondments:* Fall 1996, Researcher, Instructional Technology 1990 – 1992, Consultant, Health and Safety Sciences and Technology, Ontario Hydro (*a 2-year, off-campus secondment*) 1989 – 1990, Curriculum Associate, Office of Vice President, Academic Planning 1988 – 1989, Consultant, Management Centre 1986 – 1988, Manager, Learning Access Centre / Distance Learning
1984 – 1985	Instructor (Part-time), Decision Theory and Logic, University of Waterloo
1982 – 1984	Teaching Assistant, Decision Theory and Logic, University of Waterloo
1981 – 1982	National Manager, Service and Software Support, Texas Instruments Canada.

Goodman **2 of 4**

d) HONOURS:

Social Sciences and Humanities Research Council of Canada, Doctoral Fellowship, 1983-5.
Masters Gold Medal, University of Waterloo, 1983

e) SCHOLARLY AND PROFESSIONAL ACTIVITIES:

Principal, Decision Opportunities, Oshawa, Ontario
- Private consulting in risk assessment, statistical analysis, and expert systems. Have conducted research on data for:
  Human Resources Development Canada, University of Waterloo Institute for Risk Research, Ontario Hydro/Ontario Power Generation, Atomic Energy Control Board of Canada, Ault Foods, Beak Consultants, Health Canada, Science Applications International Canada, Certified General Accountants Association, CANDU Owners Group (COG).)

Senior Associate for W&W Radiological and Environmental Consultant Services Inc.
Writing for paid publication.

f) GRADUATE SUPERVISIONS: (N/A)

g) GRADUATE COURSES: (N/A)

h) EXTERNAL RESEARCH FUNDING:

For all of the applied research listed under (e), the outcomes have included formal reports, of a proprietary nature.

Funding for the research was provided by the final client. In some of these cases, funding was paid to Beak Consultants, Science Applications International Canada, or W&W Radiological and Environmental Consultant Services, with which firms I subcontracted to perform specific portions of the research requirements.

Goodman **3 of 4**

i) PUBLICATIONS:

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

- Books authored 4
- Chapters in books 1
- Papers in refereed journal 1
- Technical reports 10
- Abstracts and/or papers read 26
- Others (workshops presented) 18

2) Details for past seven (7) years same categories as above: books, chapters in books, papers in refereed journals.

Books authored:

1. Mario F. Triola, William M. Goodman, Richard Law. Elementary Statistics. *First* and *Second Canadian Editions*. Don Mills, Ontario: Addison Wesley Longman, 2002; 1999. (ISBN: 0201752093)

2. Instructor's Guide and Solutions Manual to Accompany Elementary Statistics. *Second Canadian Edition*. Don Mills, Ontario: Addison Wesley Longman, 2002.

3. Instructor's Guide and Solutions Manual to Accompany Elementary Statistics. (*First Canadian Edition*). Co-authored with Milton Loyer, Richard Law, and Ken MacKenzie. Don Mills, Ontario: Addison Wesley Longman, 1999.

Chapters/Software in books:

CD supplement of educational-simulation software, sole authored to accompany a textbook, with corresponding tie-ins written into the text book: "Interactive Graphics". In Hird, H. Richard, Working With Economics (*sixth edition*), Toronto, Ontario: Prentice Hall, 2002.

Goodman **4 of 4**

Papers in refereed Journals: N/A

Papers in Refereed Conference Proceedings: N/A

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Signature

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Date

Grami **1 of 2**

Program: Master of Information Technology Security October 2003

CURRICULUM VITAE

a) NAME:

Grami, Ali, Associate Professor, tenure-track
Member of the Graduate Faculty: N/A

b) DEGREES:

Ph.D., University of Toronto, Electrical Engineering, 1986
M.Eng., McGill University, Electrical Engineering, 1980
B.Sc., University of Manitoba, Electrical Engineering, 1978

c) EMPLOYMENT HISTORY:

April 2003 –	Associate Professor, School of Business and Information Technology & School of Manufacturing Engineering, University of Ontario Institute of Technology
1989 – 2002	Senior Advanced Systems Specialist, Future Technology Development Division, Telesat Canada
1992 – 2002	Part-Time Professor, Department of Electrical Engineering, University of Ottawa
1986 – 1989	Member of Scientific Staff, Wireless Communications Department, Nortel Networks
1987 – 1993	Adjunct Assistant Professor, Department of Electrical Engineering, Concordia University

d) HONOURS:

United Nation TOKTEN Award, 1995
Nortel Award of Excellence, 1989

e) SCHOLARLY AND PROFESSIONAL ACTIVITIES:

2003 –	Professional Engineer, PEO Member
1985 –	IEEE Member

f) GRADUATE SUPERVISIONS: N/A

Grami **2 of 2**

g) GRADUATE COURSES: N/A

h) EXTERNAL RESEARCH FUNDING: N/A

i) PUBLICATIONS:

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

- Papers in refereed journal..... 2
- Papers in refereed conference proceedings ... 13

2) Details for past seven (7) years

Papers in Refereed Conference Proceedings:

1. Grami and K. Gordon, "Next-Generation Ka-Band Satellite Concept to Extend the Reach of Canada's Broadband Infrastructure," in Proceedings of IEEE Global Telecommunications Conference (GlobeCom 2001), San Antonio, November 2001.

2. Grami *et al.* "Anik F2 Ka-Band System: High-Speed Internet Access," in Proceedings of 18-th AIAA International Communication Satellite Systems Conference (ICSSC), Oakland, April 2000.

3. Grami *et al.* "An Advanced Satellite Providing Local and National DBS and Interactive Multimedia Services," in Proceedings of IEEE Wireless Communications and Networking Conference (WCNC'99), New Orleans, September 1999.

4. Grami and K. Gordon, "Multimedia Satellites: A High-Level Assessment," in Proceedings of International Workshop on Satellite Communications in Global Information Infrastructure, JPL, June 1997.

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Signature

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Date

Lewis **1 of 3**

Program: Master of Information Technology Security October 2003

CURRICULUM VITAE

a) NAME:

Lewis, Gregory M., Assistant Professor, Tenure-Track
Member of the Graduate Faculty: N/A

b) DEGREES:

Ph.D., University of British Columbia, Vancouver, BC, 2000.
M.Sc., McGill University, Montréal, PQ, 1993.
B.Sc., McGill University, Montréal, PQ, 1991.

c) EMPLOYMENT HISTORY:

July 2003 –	Assistant Professor, University of Ontario Institute of Technology, School of Science
2001 – 2003	Postdoctoral Fellow, The Fields Institute for Research in Mathematical Sciences, Toronto, Ontario.
2000 – 2001	Postdoctoral Fellow, Department of Mathematics and Earth and Ocean Sciences, University of British Columbia, Vancover, BC.
1993 – 1996	Research/Teaching Assistant, Mathematics Department, University of British Columbia, Vancover, BC.
1991 – 1996	Research/Teaching Assistant, Physics Department, McGill University, Montréal, PQ.
1990	Summer Research Assistant, Orika Inc., McMasterville, PQ.

Lewis **2 of 3**

d) HONOURS:

2002-2003	NSERC Postdoctoral Fellowship
2001-2002	Jerrold E. Marsden Distinguished Postdoctoral Fellowship and Fields Institute Postdoctoral Fellowship
2000-2001	Peter Wall Institute Postdoctoral Fellowship
1998-2000	Crisis Points Graduate Fellowship
1999	Canadian Airlines Travel Award
1999	Killam Travel Grant
1997-1999	Killam Predoctoral Fellowship
1996-1997	University of British Columbia Graduate Fellowship

e) SCHOLARLY AND PROFESSIONAL ACTIVITIES: N/A

f) GRADUATE SUPERVISIONS: N/A

g) GRADUATE COURSES: *past 7 years, by year*

Courses: N/A

Seminars: N/A

Directed Studies: N/A

h) EXTERNAL RESEARCH FUNDING:

Year	Source	Type*	Amount per year	Purpose**

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

Lewis **3 of 3**

i) PUBLICATIONS:

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

- Papers in refereed journal..... 2
- Papers in refereed conference proceedings 3

2) Details for past seven (7) years same categories as above: books, chapters in books, papers in refereed journals.

Papers in refereed Journals:

Lewis, G.M. and W. Nagata. "Double Hopf Bifurcations in the Differentially Heated Rotating Annulus." SIAM Journal on Applied Mathematics, 2003, pp. 1029-1055.

Lewis, G.M. S. Lovejoy, D. Schertzer, and S. Pecknold. "The Scale Invariant Generator Technique for Quantifying Scale Invariant Anisotropy." Computers and Geosciences 25:9 (1999), 963-978.

Papers in Refereed Conference Proceedings: N/A

Lewis, G.M. and W. Nagata. "Numerical Computation of Bifurcations in a Simple Baroclinic Flow. Discrete and Impulsive Systems, Proceedings of the 3rd Conference on Engineering Applications and Computational Algorithms, (2003).

Lewis, G.M. and P.H. Austin. "An Iterative Method for Generating Scaling Log-Normal Simulations. Proceedings of the American Meteorological Society's 11th Conference on Atmospheric Radiation. (2002), 123-126.

Austin, P.H., M. Szczodrak, G.M. Lewis. "Spatial Variability of Satellite-Retrieved Optical Depth and Effective Radius in Marine Stratocumulus Clouds. Proceedings of the American Meteorological Society's 10th Conference on Atmospheric Radiation, (2002), 237-240.

Martin **1 of 5**

Program: Master of Information Technology Security October 2003

CURRICULUM VITAE

a) NAME:

Martin, Clemens, Assistant Professor, Tenure-Track
Member of the Graduate Faculty: N/A

b) DEGREES:

Dr.-Ing. (Ph.D.), Munich University of Technology (TUM), Institute of Machine Tools and Industrial Management (iwb), Germany, 1991
Dipl-Ing. (Master), Master´s Certificate Electrical Engineering and Information Technology, TU Munich Germany, 1991
Vordiplom (Bachelor) Electrical Engineering and Information Technology, TU Munich Germany, 1988

c) EMPLOYMENT HISTORY:

March 2003 –	Assistant Professor, University of Ontario Institute of Technology, School of Business and Information Technology and School of Manufacturing Engineering
July 1995 - March 03	President, ebner & martin informationssysteme gmbh, an Internet Service and IT-Consulting Company, (www.arkaden.net)
April 2002 – October 2002	Senior Project Manager and Systems Architect, Card Personalization Project in the Taiwan Health Care Card Project for Giesecke & Devrient, Munich, and TECO, Taipei
Sep 2001 – April 2002	Assistant Professor, Faculty of Information Technology, TechBC, Surrey, B.C.
October 1996 – November 1998	Information Manager, Joh. Vaillant GmbH u. Co. in Remscheid, Germany
June 1991 - August 1996	Assistant Professor, Institut für Werkzeugmaschinen und Betriebswissenschaften der TU München (iwb) (Institute for Machine Tools and Industrial Management), Munich, Germany

Martin **2 of 5**

d) HONOURS: N/A

e) SCHOLARLY AND PROFESSIONAL ACTIVITIES: N/A

Member of Program Advisory Committee, School of Science, University of Ontario Institute of Technology
Member of Small Business Forum, Neuss, Germany
Certified Educator for Information Technology Professions, Chamber of Commerce, Lower Rhine Area, Germany

f) GRADUATE SUPERVISIONS: N/A

Name	Type of HQP Training and Status	Years Supervised or Co-supervised	Title of Project or Thesis	Present Position
Philipp Stinauer	Master's (In Progress)	Supervised 1997 -	Rule based exp. syst. and message bus for household control	Head Research & Technology, ebner & martin
Benjamin Kolbe	Undergraduate (Completed)	Supervised 1999 - 2003	Database Modelling	continuing on in a Master's program
Andreas Kalytta	Technician (Completed)	Supervised 1999 - 2003	System Security Analysis in an Oracle DB environment	System Security Manager, Vodafone
Norbert Pillmayer	Res. Associate (Completed)	Supervised 1992 - 1996	Modelling and Control of complex manufacturing facilities	VP Research & Technology, Consol GmbH, Munich
Oliver Kluge	Master's (Completed)	Supervised 1995 - 1995	Concept and Implem. of a Continouusly Usable, automated	continued on for 2nd Master's in Business Admin
Dipl.Ing.Andrea Stellwag	Master's (Completed)	Supervised 1994 - 1995	Sequence planning for Simulation Based Production Control	Managing Director, Consol GmbH, Munich Germany

Martin **3 of 5**

Christian Lichtner	Master's (Completed)	Supervised 1994 - 1995	Monitoring and Decision Support in sim based control system	
Ralph Laessig	Master's (Completed)	Supervised 1993 - 1994	Automatisation of Planning and Optimization in prod. contr.	Senior Consultant in major consulting company
Arnulf Stangelmaier	Master's (Completed)	Supervised 1993 - 1994	Simulation Based Layout and Process Optimization in Laundry	Director of Industrial Laundry Service Company
Dr.Dipl-Phys. Thomas Taut	Master's (Completed)	Supervised 1992 - 1993	Optimization Strategies for VERY complex Job Shop Re-Schedul	
Reiner Dunstheimer	Master's (Completed)	Supervised 1992 - 1993	Sequencing Strategies for simulation based control system	unknown
Wolfram Becker	Master's (Completed)	Co-supervised 1992 - 1993	Concept and Implementation of a Planning/Optimization Module	Senior System Analyst and Planner in IT company

*Graduate Supervision over last 10 years included because C. Martin spent majority of last 10 years in industry.

g) GRADUATE COURSES: *past 7 years, by year*

Courses:

- Introduction to programming languages
- Operating systems
- System administration and management
- Introduction to the Unix Operating Environment
- Internet technologies
- MRP and Production Planning systems
- Computer Simulation

Seminars: N/A

Directed Studies: N/A

Martin **4 of 5**

h) EXTERNAL RESEARCH FUNDING:

Year	Source	Type*	Amount per year	Purpose**
2002	NSERC grant:	G	$10,000	"Modeling and Control of Busines-To-Business Processes"
1996	Bavarian Research Foundation (Forschungsverbund Systemtechnik)	F/G	$250,000	Simulation and Closed Loop Control of Production Environments

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

i) PUBLICATIONS:

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

- Chapters in books..... 2
- Papers in refereed journal..... 9
- Papers in refereed conference proceedings 1
- Technical reports..... 9
- Others (workshops presented) 10

2) Details for past seven (7) years same categories as above: books, chapters in books, papers in refereed journals.

Books authored:

Martin, C.: Produktionsregelung – ein modellbasierter, modularer Ansatz. Dissertation TU – München. Berlin, Springer 1998.

Books edited: N/A

Martin **5 of 5**

Books on Contract (2003-2004):

1. Schell, B.H., Martin, C. Reference Handbook: Cybercrime. ABC-CLIO Publishers

2. Schell, B.H., Martin, C., Hinch, R. Encyclopedia of Hacking. Greenwood Publishing Group.

Chapters in Books:

1. Martin, C. "Der Zugang zum Internet, Aspekte bei der Auswahl." In: Reinhart, G.; Milberg, J.: Das Unternehmen im Internet, Chancen für produzierende Unternehmen. Augsburg, Herbert Utz Verlag Wissenschaft 1996, S. 147- 164.

2. Martin, C.; Heitmann, K. "Verfahren und Systeme zur Produktionsregelung bei komplexen Produktionsstrukturen." In: Forschungsverbund Systemtechnik, Abschlußbericht 95, München 1996.

Papers in refereed Journals: N/A

Papers in Refereed Conference Proceedings: N/A

Several publications were published older than 7 years.

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Signature

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Date

Schell **1 of 5**

Program: Master of Information Technology Security October 2003

CURRICULUM VITAE

a) NAME:

Schell, Bernadette, Professor and Dean, Tenured
Member of the Graduate Faculty: N/A

b) DEGREES:

Ph.D., Rensselaer Polytechnic Institute, Communication Research/Human Resources/Industrial Psychology, 1977
M.Sc., Rensselaer Polytechnic Institute, Communication, 1975
B.A., Rutgers University, Communication, 1974

c) EMPLOYMENT HISTORY:

2002 –	Full Professor and Dean, School of Business and Information Technology, University of Ontario Institute of Technology
1988-2002	Full Professor, School of Commerce & Administration, Laurentian University
1983-1988	Associate Professor, School of Commerce & Administration, Laurentian University
1978-1983	Assistant Professor, School of Commerce & Administration, Laurentian University
1975-1976	Teaching Fellow, Communication, Rensselaer Polytechnic Institute

d) HONOURS:

Merit Award for Exceptional Performance (Laurentian University), 1989
Merit Award for Exceptional Performance (Laurentian University), 1984
Research Excellence Award ($23,000 Award) (Laurentian University), 1999-2000
The Presidential Advisory Committee on the Status of Women Award (Laurentian University), 2000
1st runner-up, ASAC Case Track, The Friendly Boss (with K. Cawsey and T. Cawsey, Wilfrid Laurier University), 2001

Schell **2 of 5**

e) SCHOLARLY AND PROFESSIONAL ACTIVITIES:

1991-1992, Special Readers, Journal of Social and Administrative Pharmacy
1992, Reviewer, Fitness & Lifestyle Research Institute (Publication)
1987-1992, Special Reader, Psychological Reports
1987-1992, Consulting Editor, Journal of Social Behavior and Personality
1988-1992, Consulting Editor, Psychology & Marketing
1997-1999, Consulting Reader, Journal of Vocational Behavior

f) GRADUATE SUPERVISIONS:

Completed: 5 MA, 1 PhD.

Doctoral Committee Member: S. Knox, University of New Mexico (1990)

MBA Research:
D. Larose, How Corporate Leaders Cope With Stress; Development of a Manic-Depression Hypothesis (1997);
E. Salmoni and P. Gilchrist, Stalking and Harassment Incidents in Industry (2000);
E. Salmoni, S. Dafoe, and P. Gilchrist, Marketing Oral Contraceptives (Janssen-Ortho sponsorship, 2001);
K. Ellis, Demysterifying Hacker Myth (2000-2001)
K. Ellis, Hacker Profiling (2002)

g) GRADUATE COURSES:

Courses:

- Advanced Research
- Communication Theory for Managers
- Organizational Behaviour
- Organizational Processes
- Management & Minorities
- Marketing Research
- Personnel Management
- Consumer Behavior

Seminars: N/A

Schell **3 of 5**

Directed Studies:

Major Faculty Supervisor for Students in Commerce 6916, Commerce 6905, Commerce 4916, Commerce 4905

h) EXTERNAL RESEARCH FUNDING:

Year	Source	Type*	Amount per year	Purpose**
1997	Private Corporate Donor	O	15,000	CEO Study

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

i) PUBLICATIONS:

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

- Books authored 5
- Papers in refereed journal 33
- Others (workshops presented) 45

2) Details for past seven (7) years same categories as above: books, chapters in books, papers in refereed journals.

Books authored:

1. Schell, B.H., Dodge, J.L., & Moutsatsos, S. The Hacking of America: Who's Doing It, Why, and How. Westport, CT: Quorum Books. Imprint of Greenwood Publishing Group, 2002 (ISBN: 1567204600)

2. Schell, B.H., & Lanteigne, N.M. Stalking, Harassment, and Murder in Organizations: Guidelines for Protection and Prevention. Westport, CT: Quorum Books. Imprint of Greenwood Publishing Group, 2002 (ISBN: 1567203221)

Schell **4 of 5**

3. Schell, B. Management in the Mirror: Stress and Emotional Dysfunction in Lives at the Top. Westport, CT: Quorum Books. Imprint of Greenwood Publishing Group, 1999 (ISBN: 1567201970)

4. Schell, B. A Self-Diagnostic Approach to Understanding Organizational and Personal Stressors: The C-O-P-E Model for Stress Reduction. Westport, CT: Quorum Books. Imprint of Greenwood Publishing Group, 1997 (ISBN: 0899309380

Book in Press:

Collaborative Leadership. McGraw Hill-Ryerson. (To be published in December 2003)

Books on Contract (2003-2004):

3. Schell, B.H., Martin, C. Reference Handbook: Cybercrime. ABC-CLIO Publishers

4. Schell, B.H., Martin, C., Hinch, R. Encyclopedia of Hacking. Greenwood Publishing Group.

Books edited: N/A

Chapters in Books:

1. Cawsey, Deszca, & Templer (2002). Case 19: The friendly boss. In Canadian Cases in Human Resource Management. Toronto: Prentice-Hall

2. Schell, Cawsey, T., & Cawsey, K. (2001). ASAC Case Publication, May 26.

3. Schell et al. (1997) I. The Usefulness of Franchise Legislation: Perceptions of Franchisees and Franchisors in Canada. II. Franchise Legislation Disclosure Information: Views From Franchisors and Franchisees on its Impact on Franchisees' Satisfaction and Commitment Levels. In F. Zaid (Ed.) Franchising in Canada.

Schell **5 of 5**

Papers in refereed Journals:

Schell, B.H., & Corbiere, M.. Values, Self-Esteem, and Perceptual Factors Associated with Positive Business Management Attitudes in Native College and University Students. Small Business & Entrepreneurship., 15, 1998, 2-33.

Schell, B.H. The prevalence of sexual harassment, stalking, and false victimization syndrome (fvs) cases in a crossection of Canadian companies from January 1995 through January 2000. Journal of Family Violence (December 2003).

Papers in Refereed Conference Proceedings: N/A

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Signature

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Date

Siddiqui **1 of 4**

Program: Master of Information Technology Security October 2003

CURRICULUM VITAE

a) NAME:

Siddiqui, Anjum, Assistant Professor, Tenure-Track
Member of the Graduate Faculty: N/A

b) DEGREES:

Ph.D., Simon Fraser University, Department of Economics, 1988
M.A. (Economics), University of Ottawa, Department of Economics, 1981

c) EMPLOYMENT HISTORY:

June 2003 –	Assistant Professor, School of Business and Information Technology, University of Ontario Institute of Technology
2001-2003	Part Time Faculty member at University of Toronto, Wilfrid Laurier University, and Schulich School of Business, York University
January – December 2001	Group Head, Strategic Corporate Planning & Chief Economist, National Bank of Pakistan
1998 – 2000	Company Spokesperson & Senior Advisor, Risk Management, The Hub Power Company (Hubco), Karachi, Pakistan
1995 – 2000	Visiting Professor, Institute of Business Administration (IBA), Karachi, Pakistan and College of Business Management (now University of Business Management)
1988 – 1994	Lecturer, Graduate School of Business & Economics, University of Auckland, New Zealand (had been granted tenure)
1995 – 1998	Business Planning Advisor, Strategic Planning Department, Exxon Chemicals (now, Engro Chemical Pakistan Ltd.)

Siddiqui **1 of 4**

d) HONOURS:

The University of Auckland Research Grant for Research Excellence Award, 1990
Dean of Commerce Research Grant for Research Excellence Award, 1989
Simon Fraser University Open Bursary Award, 1987

e) SCHOLARLY AND PROFESSIONAL ACTIVITIES:

Expert Referee for International Economic Journal, New Zealand Economics Papers and Pakistan Journal of Applied Economics.

Member of Board of Editors of the International Journal of Business Studies (Australia).

Associate Member of the Centre for Pacific Basin Studies, Federal Reserve Bank of San Francisco.

Examiner for Institute of Bankers, Pakistan.

Member of the Prime Minister's Committee on "Monetary Policy and Balance of Payments" at the State Bank of Pakistan.

f) GRADUATE SUPERVISIONS:

Completed: 2 MA, 0 PhD.
In progress: 0 MA, 0 PhD.

Abdul, Waheed. (MPhil), Debt Servicing and Growth, Applied Economics Research Center, University of Karachi, Pakistan.

Ahmad, Waheed. (MPhil), Monetary Aggregates in Pakistan, Applied Economics Research Center, University of Karachi, Pakistan.

(MA) Efficiency of New Zealand Share Market, University of Auckland, New Zealand. 1990.

(MA in Economics), Stock Market and Inflation, University of Auckland, New Zealand.

Siddiqui **3 of 4**

g) GRADUATE COURSES:

Courses:

- Monetary Economics
- Regional Economics of South & Southeast Asian
- Corporate Finance

Seminars: N/A

Directed Studies: N/A

h) EXTERNAL RESEARCH FUNDING: N/A

i) PUBLICATIONS:

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

- Chapters in books..... 1
- Papers in refereed journal..... 5

2) Details for past seven (7) years same categories as above: books, chapters in books, papers in refereed journals.

Books authored: N/A

Books edited: N/A

Chapters in Books:

"Corruptions in Parkistan" in Collaborative Leadership. McGraw-Hill Company, 2003.

Siddiqui **4 of 4**

Papers in refereed Journals:

1. "Hubco Shareholders' Returns: A Promise That Did Not Hold Out", Pakistan & Gulf Economist, Vol 29, No 38, Sept 18, 2000.

2. "Did Wapda Sign Expensive IPP Contracts? – A Special research Report and Economic Analysis of the IPP Tariff", Pakistan & Gulf Economist, Vol 28, No 38, September 20, 1999.

3. "Do Independent Power Producers Produce Expensive Power?", Investment & Marketing, August, 1999.

4. "Independent Power Projects: The Real Issues", Pakistan Development Review, Vol. 37, No. 4, Winter 1998.

5. "The Controllability of Monetary Aggregates in Pakistan" (co-author Ahmad Waheed), Pakistan Development Review, 1996.

Papers in Refereed Conference Proceedings: N/A

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Signature

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Date

Waller **1 of 7**

Program: Master of Information Technology Security October 2003

CURRICULUM VITAE

a) NAME:

Waller, Edward J., Associate Professor, Tenured
Member of the Graduate Faculty: N/A

b) DEGREES:

Ph.D. Nuclear Engineering and Science, Rensselaer Polytechnic Institute, 1997
M.Sc.E Chemical Engineering, University of New Brunswick, 1990
B.Sc. (Honors) Applied Physics, University of New Brunswick, 1988
Professional Engineers of Ontario (PEO)
Diplomat of the American Board of Health Physics; Certified Health Physicist (CHP)
Diplomat of the American Board of Industrial Hygiene, Certified Associate Industrial Hygienist (CAIH)

c) EMPLOYMENT HISTORY:

Present, Associate Professor, School of Energy Engineering and Nuclear Science (Also consulting Senior Scientist for SAIC Canada, holding a NATO SECRET security clearance); and Adjunct Professor in the Department of Mechanical Engineering, University of New Brunswick

Fall 1998 – Spring 2003, Coordinator, Laboratory for Threat-Material Detection, a Science Applications International Corporation (SAIC Canada) and University of New Brunswick collaboration; Senior Scientist, SAIC Canada Emergency and Safety Services Division (NATO SECRET security clearance.); Adjunct Professor, Department of Mechanical Engineering at the University of New Brunswick

Fall 1998 – Fall 2001, Adjunct Professor, Departments of Physics and Mechanical Engineering at the University of New Brunswick

Fall 1995 – Fall 1998, Senior Scientist, Science Applications International Corporation (SAIC Canada) in the Emergency and Safety Services Division. NATO SECRET security clearance.

Waller **2 of 7**

Fall 1991 - Fall 1995, Performed contractual work for SAIC Canada; Block, Harris and Associates (Westinghouse PWR Modeling), RADOS Technology, Inc. (Dose Monitoring Services Study); Teaching Assistant, senior level course entitled "Radiological Engineering", Rensselaer Polytechnic Institute

Spring 1990 - Fall 1991, Analyst, Science Applications International Corporation (SAIC Canada) , Radiation Effects Division. NATO SECRET security clearance; Instructor, Safety Net Inc., Nepean, Ontario; and Ottawa Branch Chairperson of the Canadian Nuclear Society

Fall 1988-Spring 1990, Researcher, Ecole Polytechnique, Universite de Montreal, Montreal, P.Q. on the thermo-hydraulic test facility located at the Institut de Genie Energetique; and Teaching assistant, University of News Brunswick.

Summer 1988, Research assistant, Medical Physics Division of the Cancer Treatment and Research Foundation of Nova Scotia, Halifax, N.S.

Fall 1987 - Spring 1988, Teaching Assistant, University of News Brunswick.

Summer 1987, Research Assistant, Department of Chemical Engineering, Energy Conversion Engineering Group, University of New Brunswick.

Summer 1986, Research Assistant, Department of Physics, University of New Brunswick.

d) HONOURS:

F.R.S., F.R.S.C., Governor Generals Award, honorary degree, etc...
J.S. Hewitt Team Achievement Award (CNS), 2000
(for the development of a thermal neutron activation system for the non-metallic land mine detection)
SAIC Technical Excellence Award, 1998
(for advances in the collection and statistical treatment of data in the detection of near-background levels of artificial radiation)
Alpha Nu Sigma Honor Society, 1993
Dr. Theodore Weiner Memorial Scholarship, 1987
UNB Special Undergraduate Scholarship, 1987
Lord Beaverbrook Flying Scholarship, 1983
Lord Beaverbrook Gliding Scholarship, 1982

Waller **3 of 7**

e) SCHOLARLY AND PROFESSIONAL ACTIVITIES:

2003, Manuscript reviewer for journal *Acta Astronautica* from the 14th Humans in Space Symposium.

2003, Controller (Health Physicist to the Field Technical Officer) at Exercise AS IS (CRTI sponsored radiological counter-terrorism exercise; cross agency: DND, AECL, CNSC, NRCan), Chalk River Laboratory.

2003, Health Physics observer at Exercise Prototype (NATO CBRN exercise), DRDC-Suffield.

2003 April , Speaker at NATO TTCP TP13 meeting 7-9 April 2003 in Gosport, United Kingdom.

2003 March , Reviewer for Professional Engineers Ontario (PEO) National Examination 98-Phys-B1 Radiation Physics, March 2003.

2002 July/August, Expert witness for DND Board of Inquiry (BOI TREX), Ottawa.

2002 May, Speaker at NATO TTCP CBR AG48 meeting 13-15 May 2002 in Melbourne, Australia.

2001, Reviewer for Department of National Defence (DND) Technology Investment Fund (TIF) proposals.

2001 November, Technical review for Defence Research Establishment Ottawa (DREO) Technical Note "Measuring dynamic multi-dimensional radiation fields using a plurality of nanotechnology-based radiation probes", Stodilka, R. and Cousins, T.

2001 May, Session Chair on Waste Issues at the Canadian Radiation Protection Association (CRPA) Annual Conference, Halifax, NS, 14 May 2001

2001 May, Invited Speaker to the Canadian Radiation Protection Association (CRPA) Annual Conference, Halifax, NS, 14 May 2001.

Waller **4 of 7**

f) GRADUATE SUPERVISIONS:

Completed: 2 MA, 0 PhD.
In progress: 0 MA, 0 PhD.

NAME OF STUDENTS:

Van Wart, J., MScE (Mechanical), "A Portable Device for Detecting Visually Obscured Objects Hidden within Extended Walls using Compton Scattering", (awarded 2001).

Mercer, J.A., MScE (Mechanical), "In-Situ Detection and Quantification of Petroleum Hydrocarbon Contamination in Soil using a Non-Intrusive Neutron Interrogation Technique", (awarded 2003)

g) GRADUATE COURSES:

Courses:
Mechanical Engineering Measurements, 2002
Occupational Health and Safety, 2001
Manufacturing Systems and Design – Part II – Occupational Health and Safety in Manufacturing and Industry, 2001
Non-Destructive Testing, 2000-2001

Seminars:
N/A

Directed Studies:
N/A

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

Year	Source	Type*	Amount per year	Purpose**
2000	SAIC Canada	O	$15,000	Graduate student support (Van Wart)

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

Waller **5 of 7**

i) PUBLICATIONS:

1) Life-time summary (count) according to the following categories:
- Chapters in books..... 1
- Papers in refereed journal..... 13
- Papers in refereed conference proceedings 5
- Technical reports..... 95
- Others (workshops presented) 23

2) Details for past seven (7) years same categories as above: books, chapters in books, papers in refereed journals.

Chapters in Books:

"Industrial Radiography Accident At The Yanango Hydroelectric Power Plant", Zaharia, M, Goans, R, Berger, M, Pinillos-Ashton, L, Picon, C, Waller, E, And Ricks, R, in The Medical Basis for Radiation Accident Preparedness - The Clinical Care of Victims, edited by Ricks, R.C., Berger, M.E., and O'Hara, F.M., Parthenon Publishing, New York, 2002. ISBN 1-84214-090-6.

Papers in refereed Journals:

1. "Experimental and Computational Determination of Neutron Dose Equivalent around Radiotherapy Accelerator", E.J. Waller, T.J. Jamieson et al., accepted for publication in Rad. Prot. Dos. *2002*.

2. "Effectiveness of Custom Neutron Shielding in the Maze of Radiatherapy Accelerators", E.J. Waller, T.J. Jamieson et al., accepted for publication in Rad. Prot. Dos. *2002*.

3. "Neutron Production Associated with Radiotherapy Linear Accelerators using Intensity Modulated Radiation Therapy Mode", E.J. Waller, accepted for publication in Occupational Radiation Safety, Health Physics, 2003.

4. "Using Thermal Neutron Activation to Detect Non-Metallic Land Mines", T. Cousins, T.A. Jones, J.R. Brisson, J.E. McFee, T.J. Jamieson, E.J. Waller, F.J. Lemay, H.Ing, E.T.H. Clifford and E.B. Selkirk, CNS Bulletin, Vol. 21, No. 2, pp. 40-44, August 2000.

5. "Chernobyl-4 Post Accident Radiation Monitoring in the Exclusion Zone", E.J. Waller and D. Cole, CNS Bulletin, Vol. 20, No. 4, pp. 31-34, 2000.

6. "Landmine Detection – The Problem and the Challenge", E.M.A. Hussein and E.J. Waller, Applied Radiat. Isot., Vol. 53, pp. 557-563, 2000.

7. "An Environmental Radionuclide Baseline Study (ERBS) Near Three Canadian Naval Ports", E.J. Waller and D. Cole, Health Physics, Vol. 77, No. 1, pp. 37, 1999.

8. "Modeling Beam Asymmetry of the AN/UDM-1A ^{137}Cs Calibration Source at a Radiac Calibration Facility", E.J. Waller, F.J. Lemay, T.Cousins and E. Horvath, Rad. Prot. Dos., Vol. 81, No. 4, pp. 301-304, 1999.

9. "A Review of One-Side Approaches to Radiographic Imaging with Emphasis on Explosives, Contraband, and Land Mines.", E.M.A. Hussein and E.J. Waller, Radiation Measurements, Vol. 29/6, pp. 581-591, 1998.

10. "The Development of a Thermal Neutron Activation (TNA) System as a Confirmatory Non-metallic Land Mine Detector", T. Cousins, T. Jones, J.R. Brisson, J.E. McFee T.J. Jamieson, E.J. Waller, F.J. Lemay, H. Ing, C.E. Clifford, and B. Selkirk, Journal of Radioanalytical and Nuclear Chemistry, Vol. 235, No.1-2, pp.53-58, 1998.

11. "A Portable Neutron Device for Void Fraction Measurement in a Small Diameter Pipe", E.J. Waller and E.M.A. Hussein, Nuc. Inst. Meth., A299, 670-673, 1990.

12. "A Neutron Steam Quality Meter for a Fluidized Bed Plant", E.M.A. Hussein and E.J. Waller, International Journal of Appl. Radiat. Isot., Vol.41, No.10/11, 1049-1055, 1990.

13. "A Neutron Steam Quality Meter for a Fluidized Bed Plant", E.J. Waller and E.M.A. Hussein ANS Transactions., 56 (SUPPL-3),1988.

Papers in Refereed Conference Proceedings:

1. "Radiological Decontamination of Armored Personnel Carriers with Continuous and Pulsed Watersjets at Umea, Sweden", Yan, W., Tieu, A., Ren., B., Vijay, M., Haslip, D., Cousins, T., Estan, D., Jones, T., Waller, E., Sandstrom, B., Lidstrom, K., Ulvsand, T. and Agren, G., American Waterjet Conference Proceedings, Water Jet Technology Association (WJTA), Houston, Tx, August, 2003.

2. "Naturally Occurring Radioactive Material (NORM) and the Recycling Industry", E.J. Waller, Proc. CRPA Conf. 2001, Halifax, NS, May 2001.

3. "Direct Use of ^{252}Cf for Landmine Detection", Hussein, E.M.A. and Waller, E.J., Proc. American Nuclear Society, Vol. 83, pp. 318-319, Washington, D.C., November 2000.

4. "A Five Year Summary of Radiological Decommissioning Activities at Canadian Military Facilities", E.J. Waller and D. Cole, Proceedings of the ANS, Spokane, WA, September 2000.

5. "A Thermal Neutron Activation System for Confirmatory Non-metallic Land Mine Detectors", J.E. McFee, T. Cousins, T. Jones, J.R. Brisson, T.J. Jamieson, E.J. Waller, F.J. Lemay, H. Ing, C.E. Clifford, and B. Selkirk., Proceedings of SPIE Conference on Detection and Remediation Technologies for Mines and Mine-like Targets III, SPIE Volume 3392, April 1998.

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Signature

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Date

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Program: Master of Information Technology Security October 2003

CURRICULUM VITAE

a) NAME:

Wu, Terry, Full Professor, Tenured
Member of the Graduate Faculty: N/A

b) DEGREES:

Ph.D. University of Manitoba, Economics, 1986
M.A. University of Manitoba, Economics, 1980
B.A. University of Prince Edward Island, Economics, 1979

c) EMPLOYMENT HISTORY:

2003 -	Professor, School of Business and Information Technology, University of Ontario Institute of Technology
1997 - 2003	Professor, Faculty of Administration, University of Regina
1990 - 1997	Associate Professor, Faculty of Administration, University of Regina
1985 - 1990	Assistant Professor, Faculty of Administration, University of Regina
1982 - 1984	Sessional Lecturer, Department of Economics, University of Manitoba

d) HONOURS:

University Teaching Excellence Award - 1999
Saskatchewan Wheat Pool Professorship Award - 1996

e) SCHOLARLY AND PROFESSIONAL ACTIVITIES:

Advisory Board Member, The Ninth Annual Far Horizons Conference, Queen's University School of Business, 2000 and 2001

Reviewer, Journal of Business Research

WU **2 of 6**

Reviewer, Multinational Business Review

Reviewer, Review of Business

Reviewer, Academy of International Business

External Examiner, Master's Thesis (International Business), University of Auckland, New Zealand, 1997

f) GRADUATE SUPERVISIONS:

Completed: 11 MA/MBA/MPA 1 PhD.
In progress: 0 MA 0 PhD.

Lingyun Zhang, "EWMA Control Charts and Extended EWMA Control Charts", Ph.D. Thesis, University of Regina, 1999-2002.

Takahiko Ito, "The Impact of Employment Agencies on the Functioning of Labour Markets: The Case of Canada", M.A. Thesis, University of Regina, 1998-2001.

Pauline Rousseau, "Financing Health Care in Canada: Evolution and Devolution", MPA project, University of Regina, 1996.

g) GRADUATE COURSES:

Courses: International Business, 2002
International Trade Administration, 2001
Public Policy in Canada, 1999
International Trade Administration 1998

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h) EXTERNAL RESEARCH FUNDING:

Year	Source	Type*	Amount per year	Purpose**
2002	University of Calgary	0	$330.61	Travel
2002	Yokohama National U	0	130,000 Yen	Travel
1999	Yamaguchi University	0	350,000 Yen	Research
1999	Bureau of National Health Insurance, Taiwan	G	$1,300	Research
1998	Queen's University	O	$1,000	Research
1997	Saskatchewan Trade and Export Partnership	I	$2,500	Program Development

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

i) PUBLICATIONS:

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

- Conference Proceedings edited..... 1
- Chapters in books..... 4
- Papers in refereed journal. 13
- Papers in refereed conference proceedings.....7
- Technical reports..... 1
- Abstracts.....11
- Conference Presentations..... 30
- Others (workshops presented).....14

2) Details for past seven (7) years same categories as above: books, chapters in books, papers in refereed journals.

Chapters in Books:

1. Terry Wu, "Canada and Chile Eliminate Antidumping Duties", NAFTA Law and Business, Edited by Ralph Folsom and W. Davis Folsom, Hague: Kluwer Law International, 1999.

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2. Terry Wu, "Canada-Chile Free Trade Agreement", NAFTA Law and Business, Edited by Ralph Folsom and W. Davis Folsom, Hague: Kluwer Law International, 1999.

Papers in refereed Journals:

1. James Agarwal and Terry Wu, "China's Entry to WTO: Global Marketing Issues, Impact and Implications for China", International Marketing Review, forthcoming.

2. James Agarwal, Naresh K. Malhotra, Terry Wu, "Does NATFA Influence Mexico's Product Image? A Theoretical Framework and an Empirical Investigation in Two Countries", Management International Review, Vol. 42, No. 4, pp. 441-471, 2002.

3. Terry Wu, "Canada-Chile Free Trade Agreement: An Analysis", Latin American Business Review, Vol. 3, No. 3, pp. 59-73, 2002.

4. Terry Wu and Neil Longley, "Negotiating Chile's Entry to NAFTA: Trade and Investment Issues", International Journal of Public Administration, Vol. 23, No. 5-8, pp. 1415-1442, 2000.

5. Terry Wu, "East Asia: A Canadian Perspective", Asian Economic Review, Vol. 58, No. 2, pp. 97-106, 1999.

6. Neil Longley and Terry Wu, "Negotiating Chile's Accession to the North American Free Trade Agreement: Antidumping and Countervailing Duty Issues", Journal of World Trade, Vol. 30, No. 1, pp. 53-65, 1996.

Papers in Refereed Conference Proceedings:

1. John Chong and Terry Wu, "Planning for International Operations: A Fresh Look at Classical Management Principles", Proceedings of the Asia Pacific Decision Sciences Institute Conference, 1998.

2. Zhang Yi and Terry Wu, "Doing Business in China: Business Strategy for Potash Corporation of Saskatchewan", Proceedings of the Far Horizons Conference, 1998.

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Technical Reports:

Terry Wu, “The Globalization of the World Economy: Challenges Facing Canada”, Distinguished Scholars Lecture Series, Regina: University of Regina, 2000.

Conference Presentations:

1. Terry Wu and Doren Chadee, "Japanese New Trade Policy: A Free Trade Agreement with Singapore" presented at the 2003 Academy of International Business (AIB) Conference, Monterey, California, U.S.A., July 2003.

2. James Agarwal and Terry Wu, "The WTO Framework: Issues and Marketing-Mix Implications for Firms in China" presented at the Administrative Sciences Association of Canada (ASAC) Conference, Halifax, Nova Scotia, Canada, June 2003.

3. Terry Wu and Doren Chadee, "A New Approach to Japanese Trade Policy: An Analysis" presented at the Japan Studies Association of Canada Conference, Calgary, Alberta, Canada, October 2002.

4. Terry Wu and Doren Chadee, "Japanese Trade Policy: A Shift to Bilateralism?" presented at the Canadian Asian Studies Association Conference, Toronto, Ontario, Canada, May 2002.

5. Doren Chadee and Terry Wu, "Equity Joint Venture Characteristics and Their Influence on Foreign Direct Investment by Service and Manufacturing Firms in China" presented at the 2001 Academy of International Business (AIB) Conference, Sydney, Australia, November 2001.

6. Terry Wu and Doren Chadee, “Export Management Strategy: A Study of Small and Medium Sized Canadian Firm Exporting to the U.S." presented at the 2000 Academy of International Business (AIB) Conference, Phoenix, Arizona, U.S.A., November 2000.

7. Doren Chadee and Terry Wu, “Impacts of FDI on Economic Growth: Empirical Evidence from Selected APEC Countries," presented at the 2000 Academy of International Business (AIB) Conference, Phoenix, Arizona, U.S.A., November 2000.

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8. Terry Wu, “Foreign Business in China after China’s Joining WTO”. Invited plenary session speaker at the 2000 Academy of International Business (AIB) Southeast Asia Region Conference, Hong Kong, July 2000.

9. Terry Wu, “Canada-Asia Economic Relations: Trade and Investment Issues” presented at the 2000 Academy of International Business (AIB) Southeast Asia Region Conference, Hong Kong, July 2000.

10. Doren Chadee, Terry Wu, and Erika Kuoch, "Export Behaviour and Performance: An Empirical Investigation of the New Zealand Food and Beverage Exporters in Japan" presented at the 1998 Academy of International Business (AIB) Conference, Vienna, Austria, October 1998.

11. John Chong and Terry Wu, "Planning for International Operations: A Fresh Look at Classical Management Principles" presented at the Asia Pacific Decision Sciences Institute Conference, Taipei, Taiwan, June 1998.

12. Zhang Yi and Terry Wu, "Doing Business in China: Business Strategy for Potash Corporation of Saskatchewan" presented at the Far Horizons Conference, Queen's University, Kingston, Ontario, Canada, March 1998.

13. Terry Wu, "Canada-Chile Free Trade Agreement: Trade and Investment Issues", presented at the 1997 Academy of International Business (AIB) Conference, Monterrey, Mexico, October 1997.

14. James Agarwal, Terry Wu, and Naresh K. Malhotra, "The Impact of NAFTA on Mexico's Country Image: A Comparative Analysis of the United States and Canada" presented at the Twenty-Sixth Annual Meeting of the Western Decision Sciences Institute, Hawaii, U. S. A., March 1997.

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November 10, 2003

Vol. III THE LIST OF PROPOSED CONSULTANTS

[To be confirmed]

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