



RYERSON UNIVERSITY

ENVIRONMENTAL APPLIED SCIENCE AND
MANAGEMENT AT RYERSON:
A Seven Year Retrospective

ENSCIMAN OCCASIONAL PAPER 08-01

September 2008

**ENVIRONMENTAL APPLIED SCIENCE AND
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Michal Bardecki and Ron Pushchak

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<http://www.ryerson.ca/ensciman>

Introduction

In the year 2000 the Masters of Applied Science program in Environmental Applied Science and Management (ENSCIMAN) began offering a multi-disciplinary degree in the areas of applied environmental science and environmental management as Ryerson's first independent graduate program. It was established through the combined efforts of faculty members in schools and departments across Ryerson University with teaching and on-going research in the two core environmental areas of concentration. At that time, faculty members in eight schools and departments (three engineering departments, chemistry and biology, geography, public health, urban and regional planning, and economics) cooperated in developing the MASc program as a cooperative and multi-disciplinary degree.

The program was a response to a clear societal need for graduates at the masters level with expertise in the areas of practice in the Canadian environment industry. It was developed to clearly link the environmental sciences and the management and decision-making disciplines in order to provide students the opportunity to integrate the two areas of study in the classroom and in their research. The emphasis was focused on applied research for resolving problems in environmental protection, conservation and sustainable development.

Since that time, the ENSCIMAN program has continued to foster research and training in the environmental sciences and in environmental management and has been successful in preparing graduates for professional careers in the environment industry, as well as for doctoral studies. As of September 2008, 95 MASc students have successfully completed the program.

The Canadian Environmental Industry

Since the beginning of the ENSCIMAN program in 2000, Canada and Ontario have continued to experience considerable growth in the environment industry, and a demand for highly-trained professional personnel. Expanding activities in environmental

technology, services and management have increased demands for individuals trained to pursue research in environmental applied science and management, and to develop and apply management systems to air, water and waste problems to improve human health and promote the sustainability of environmental systems.

The Canadian environmental industry has grown at a relatively constant pace over the last few years, in part because of increases in demand for environmental services and technologies, but also because a number of pressures have been exerted on industry to achieve higher levels of environmental performance. Governments have continued to regulate the environmental practices of industry. Additional corporate policy requirements have called for improved environmental technologies and environmentally-responsive management from suppliers and associated businesses. Moreover, industries have experienced pressures from clients and investors to develop and implement environmental policies, as well as from consumers and employees for environmentally-acceptable products and production methods. These include considerations of ethical investment, the introduction of recognized environmental management systems and emissions trading schemes, and changing interpretations of environmental liability. The International Organization for Standardization (ISO) 14000 requirements for audited environmental management systems have now been in place in Canada for ten years requiring companies to implement, monitor and improve the performance of their environmental management systems by applying international standards. In 1999, there were 90 companies certified under ISO 14001;¹ by December 2004, there were 1,492 certified industries in Canada.² Current industry responses suggest the proportion of firms seeking certification is higher, approximately 25 percent of firms sampled.³

Eco Canada's assessment is that, "Overall, it is anticipated that growth in environmental employment in Canada will be slightly above the projected increase in total

¹ Corbyn, P. 1999. Raising the Bar: Environmental Performance in the Auto Parts Industry. *Engineering Dimensions*, March/April 1999; 34-37

² Industry Canada, 2005. The Sustainability Report: Sustainability Context for Canadian Industry. On-line <http://strategis.ic.gc.ca/epic/site/sd-dd.nsf.html>

³ Statistics Canada. 2007. Use of Environmental Management Practices by Businesses: 2004. Environmental Accounts and Statistics Division, Statistics Canada.

employment”.⁴ They project a growth of 34,900 new jobs nationally in the environmental sector from 2005 to 2010, building on 45,900 new jobs created in 2001 to 2005.⁵ Currently, the environmental sector is one of the five top industry sectors in the Canadian economy and includes 7,414 companies, many of which are small to medium-sized enterprises. It includes an expanding number of environmental service industries providing consulting, planning, management and engineering services. In 2007, there were 530,414 people employed in the environment industry, a considerable increase from the 221,000 in the 1998 period when the ENSCIMAN program was being developed.⁶ Overall, roughly 3.2 percent of the Canadian workforce is engaged in environmentally-related work and 10 percent of all organizations in Canada have one or more environmental employees.⁷ With the continued growth in the environment industry, there is some concern at the national level and in Ontario that skilled human resources will not be available to meet present and future needs.⁸ In a recent survey of industries attempting to reduce greenhouse gas emissions, 31 percent reported lack of information as an obstacle, and 15 percent cited a lack of skilled personnel.⁹

While studies have identified shortages in technical skill areas such as hydrogeology, toxicology, environmental science and air quality analysis, many employers have also pointed to a significant shortage in environmental management skills including project management, environmental assessment, risk assessment, legal compliance and environmental auditing and management systems. The CCHREI suggested in 1995 that for the environment industry, the work was clearly multi-disciplinary and multi-sectoral, and training in several disciplines had become a necessity for employment.¹⁰ Consistent with that observation, the 2006 survey of Canadian environmental practitioners suggests

⁴ Eco-Canada. 2007. Profile of Canadian Environmental Employment. Calgary, Environmental Careers Organization, Canada. p. 25

⁵ Ibid.

⁶ Ibid.; CCHREI. 1999. Human Resources in the Canadian Environmental Sectors. Calgary, Canadian Council for Human Resources in the Environment Industry. Profile of Canadian Environmental Employment. Calgary, Environmental Careers Organization, Canada.

⁷ Eco-Canada op cit. p.6

⁸ CCHREI. 1999. Environmental Certification for Competitiveness; Conference Proceedings. Calgary, Canadian Council for Human Resources in the Environment Industry, p.23

⁹ Statistics Canada. 2006. Proportion of Establishments in Fossil Fuel-related Industries that Reported Green House Gas Reductions, 2004. Environmental Accounts and Statistics Division, Statistics Canada.

¹⁰ Andre Rollin, Insights From Universities, Environmental Certification for Competitiveness, CCHREI Conference Proceedings, 1996, p.164

that the field continues to be strongly multi-disciplinary with practitioners engaged in environmental protection (air, water, waste and health), conservation and preservation of natural resources, and environmental sustainability (education, research and development, policy and legislation and communications).¹¹

Internationally, there is substantial growth in the environment field. Currently, the world markets for environmental goods and services have increased at 10 percent a year or more over the last decade, and rapid increases in environmental markets have been reported in a number of regions including Latin America, Asia and Africa.

The ENSCIMAN Student

Admission to the ENSCIMAN program requires an honours undergraduate degree in a discipline broadly related to the environment. Purposefully, students have come from a wide range of academic backgrounds (Table 1; Table 2). Philosophically, the program has been based on a multi-disciplinary approach that integrates the two areas of competence: applied environmental science and environmental management. The range of students' backgrounds has added to the program and allowed all to be exposed to a variety of perspectives, not only through the faculty and the structure of the curriculum, but also from the diversity among fellow students.

Table 1: Academic Background of ENSCIMAN Students		
Sciences	121	39.1%
Environmental Specializations	45	26.6%
Engineering	26	15.4%
Social Sciences	22	13.0%
Resource Studies (Forestry, Water Mgt.)	4	2.4%
Others (Commerce, Education, Nursing)	5	3.0%

¹¹ Eco-Canada. 2006. Characteristics of Canadian Environmental Practitioners. Calgary, Environmental Careers Organization, Canada, p.22

**Table 2: Top 10 Previous Areas of Study
Among ENSCIMAN Students**

1. Biology
2. Environmental Science
3. Applied Chemistry and Biology
4. Environmental Studies
5. Occupational and Public Health
6. Geography
7. Urban Planning
8. Chemical Engineering
9. Civil Engineering
10. Chemistry

The largest number of ENSCIMAN Students come into the program with a BSc degree. Nine students have entered the ENSCIMAN program with a graduate degree (Masters or doctorate).

**Table 3: Previous Degree Earned by ENSCIMAN
Students**

	Female	Male	Total
BSc	63	27	90
BASc	15	7	22
BEng	6	6	12
BA	6	5	11
BES	7	3	10
BAA	2	5	7
BComm	2	1	3
BAgric	1	0	1
BNSc	1	0	1
Other undergraduate	3	0	3
MSc	2	3	5
MASc	0	1	1
MEng	0	1	1
MAgric	0	1	1
PhD	0	1	1
Total	108	61	169

Although most ENSCIMAN students undertook their undergraduate education in Ontario, almost one in six received their undergraduate degree from a university outside Canada (Table 4; Table 5). All told, graduates of ENSCIMAN and current students have graduated from universities in 17 different countries.

Table 4: Location of Prior University Education

Ontario	72.8%
Other Canada	11.2%
Other Countries	16.0%

Table 5: Country of Previous Degree: Top Five

1. China
2. Iran
3. United States
4. Japan
5. Romania

ENSCIMAN students have come from a wide range of universities. Ryerson has provided the greatest number of students: typically each year 4-5 incoming students, from a variety of programs, have chosen to remain at the university for their graduate studies in ENSCIMAN. Ontario universities dominate the “top ten” list (Table 6).

The data indicate that the program has been a strong choice for female applicants, particularly those with undergraduate backgrounds in environmental sciences and engineering as well as those from environmental studies and related disciplines (Table 3).

Table 6: ENSCIMAN's Top Ten "Feeder" Universities

1. Ryerson
2. Toronto
3. Guelph
4. Waterloo
5. York
6. Queen's
7. McMaster
8. McGill
9. Ottawa
10. Dalhousie

Less than 40 percent of incoming ENSCIMAN students have come directly from their undergraduate studies; a further 29 percent spent 1-2 years away from school; but 16 percent entered ENSCIMAN five or more years after completing their degree (Table 7).

Table 7: Time Between Last Degree and ENSCIMAN Entry

Less than 1 year	37.9%
1 academic year	17.8%
2 academic years	11.2%
3 academic years	9.5%
4 academic years	3.0%
5 academic years	4.7%
Between 5 and 10 academic years	11.9%
Over 10 academic years	4.1%

The Program

To earn the MASc degree, students must complete a total of 12 course credits, including credits for either a thesis or a professional research project. All program students must complete three required courses; ES8901, ES8921 and ES8930. In addition, students who elect the professional project option must complete a minimum of two environmental applied science courses, a minimum of two environmental management

courses, three electives and a research project (ES8080) for two course credits. Students in the thesis option, in addition to the three required courses, must complete a minimum of one environmental applied science course, a minimum of one environmental management course, two electives and a research thesis (ES8090) for five course credits.

To enable students with related science and non-science backgrounds to take courses in the applied science area of competence, the program provides a number of platform courses in the environmental applied science area. Five platform courses are designed to expand, broaden and provide more in-depth information beyond the student's initial discipline. Platform courses include sufficient introductory information to allow basic understanding of the course material and, as in all graduate courses, instruction is given at an advanced level. For students entering the program without sufficient science background, preparatory undergraduate course work or independent study can be required.

Before admission to the program, each student is assigned a graduate faculty supervisor who advises the student on the balance of courses from both areas of competence to be taken by entering students, and who approves the Program of Study that is reported to the Director in the student's first month in the program. Students are advised to take courses in either the environmental applied science or management areas that complement their undergraduate training, and that advance the student's thesis or research project objectives.

The program does strive to accommodate both full and part-time students—most notably in offering core and elective courses in alternating day and evening sessions each semester to permit part-time students to complete the program in a timely manner. Over the years the ENSCIMAN program has attracted a growing number of full-time applicants and has experienced a modest increase in full-time admissions, whereas the number of part-time admissions has declined somewhat. The number of full-time admissions for Fall 2008 is 19 with 6 part-time admissions, and 22 of 72 current students (as of September 2008) are enrolled on a part-time basis. Cumulatively (up to September 2008), 78 full-time and 17 part-time students have graduated—the average full-time

student taking 2.0 years; the part-time student, 3.2 years. The vast majority of students have completed their degrees on time.

Not surprisingly, there is a relationship between the number of years that have passed since a student's last degree and enrolling at Ryerson, and the choice of whether to study full- or part-time. Full-time students have spent an average of two years between their studies; part-time students, almost twice as long. Withdrawals have been limited, albeit higher among part-time students.

The level of financial support for full-time graduate students in the Environmental Applied Science and Management program has increased gradually as the number of students enrolled in the program has more than doubled from its initial entry class. Part-time students are assumed to be self-supporting through their employment and do not receive financial support.

The average level of support for each student in 2006-07 was \$13,750 with approximately 15 percent of student funding from external scholarships and 20 percent from faculty research grants (Table 8). A significant level of student funding (33 percent) has come from teaching and research assistantships, with the remainder funded from the university's scholarship resources. The funding policy for the program has been to support full-time program students at an average level greater than \$12,000 a year over two years of study through a combination of external and internal scholarships, teaching assistantships and research stipends.

Given the multi-disciplinary nature of the program, the involvements of participating schools and departments continues to be substantial including the offering of graduate courses in several areas of study, a large commitment to the supervision of graduate students, and in some cases the development of joint research projects (Table 9).

Table 8: Financial Support for ENSCIMAN Full-Time Students

Year	\$ Amount of Support From						Students Funded	
	External Scholarship (#)	Univ Scholarship (#)	TAs (#)	RAs (#)	Other* (#)	Total	N (%) ¹	Mean \$ ²
2000-01	5,000 (1)	35,300 (4)	27,300 (6)	4,200 (1)	88,000 (7)	159,800	12 (100%)	13,317
2001-02	20,000 (2)	64,703 (9)	78,064 (18)	16,866 (2)	122,835 (16)	302,468	26 (100%)	11,633
2002-03	35,000 (2)	80,400 (12)	49,200 (9)	4,200 (1)	128,326 (11)	297,126	25 (96%)	11,885
2003-04	59,750 (4)	132,500 (20)	57,068 (14)	10,947 (4)	72,000 (9)	332,265	26 (96%)	12,779
2004-05	62,171 (5)	123,501 (23)	110,687 (24)	0	61,087 (12)	357,446	31 (100%)	11,531
2005-06	78,452 (6)	125,033 (20)	112,003 (19)	6,525 (2)	83,215 (12)	405,228	29 (100%)	13,973
2006-07	65,788 (5)	154,545 (26)	135,746 (5)	9,830 (3)	74,215 (9)	440,124	32 (100%)	13,754

¹ % = number of funded students divided by the number of full-time students eligible to receive funding in the year.

² Amount of funding in the "Total" column divided by the # of full-time students eligible to receive funding in the year.

The 2006-07 TA amount includes payment to students up to June 2007.

The 2006-07 "Other" amount is the total amount of Stipend funding to students for the period of September 2006 to August 2007.

ENSCIMAN has supported a substantial number of Masters' thesis and project co-supervisions across disciplines. Of the 95 students that have graduated, 27 have been co-supervised by two faculty members with many co-supervisions bridging departments and faculties: biology and public health, engineering and spatial analysis, biology and planning, and economics and public health. The number of co-supervisions points to the success of multi-disciplinary research in the program. In addition, the collaborations have given rise to areas of cooperative multi-disciplinary research among faculty members including green roof technology and policy, policy analysis for Greenbelt environmental protection, research in source water protection policy, and pathogen contamination control in water.

Table 9: Participating Academic Units at Ryerson

Faculty of Arts

- Department of Economics
- Department of Geography
- Department of Philosophy
- Department of Politics and Governance

Faculty of Business

- School of Hospitality and Tourism Management
- Ted Rogers School of Business Management

Faculty of Community Services

- School of Occupational and Public Health
- School of Urban and Regional Planning

Faculty of Engineering, Architecture and Science

- Department of Chemical Engineering
- Department of Chemistry and Biology
- Department of Civil Engineering
- Department of Mechanical and Industrial Engineering

ENSCIMAN and Student Research

One of the specific objectives of the program is to offer students an opportunity to engage in research and critical analysis through independent thesis research and professional project studies.

Laboratory resources to support graduate research Environmental Applied Science and Management are located in several of the participating departments: Civil and Chemical Engineering, Chemistry and Biology, Geographic Analysis, and the School of Occupational and Public Health. Masters students in Environmental Applied Science and Management have been supported in their research in these laboratories together with students from other graduate programs (e.g., Molecular Biology, Chemical Engineering, Spatial Analysis).

As of September 2008, 95 ENSCIMAN students completed their studies (Appendix A).

As a result of their research at Ryerson, ENSCIMAN students have produced a significant number of scholarly publications (Table 10).

Table 10: Papers Authored and Co-Authored by ENSCIMAN Students

- Allen, B., J. Wu and H. Doan 2003 "Inactivation of fungi associated with barley grain by gaseous ozone" *Journal of Environmental Science and Health. Part B. Pesticides, Food Contaminants, and Agricultural Wastes* B38(5) 617-630
- Bykova, O., A. Laursen, V. Bostan, J. Bautista and L. McCarthy 2006 "Do zebra mussels (*Dreissena polymorpha*) alter lake water chemistry in a way that favours *Microcystis* growth?" *Science of the Total Environment* 371(1-3), 362-372
- Daiz, R. and M.A. Warith 2005 "Life cycle assessment of municipal solid waste: development of WASTED model" *Waste Management Journal* 25, 1-8
- Des Lauriers, A., J. Li, K. Sze, S.L. Baker, G. Gris and J. Chan 2006 "A field study of the use of methoprine for West Nile Virus mosquito control" *Journal of Environmental Engineering and Science* 5(6): 517-527
- Dinca-Panaitescu, M., J. Li and S. Dinca-Panaitescu 2007 "Simulation of the cumulative effects of chemical spills using a spatial-temporal dynamics analysis algorithm" *Journal of Hazardous Materials* 149, 707-719
- Gilbride, K. and L. Levinson 2008 "Waste water management and emerging pollutants in the environment" in L.N. Robinson ed *Water Resources Research Progress* (Commack, NY: Nova Science) 127-148
- Khan, N., M.A. Warith and G. Luk 2007 "A comparison of acute toxicity of biodiesel, biodiesel blends, and diesel on aquatic organisms" *Journal of the Air and Waste Management Association* 57(3) 286-96
- King, S. and R. Pushchak, R. 2008 "Incorporating cumulative effects into environmental assessments of mariculture: limitations and failures of current siting methods" *Environmental Impact Assessment Review* 28; 572-586
- Liao, B.Q., D.M. Bagley, H.E. Kraemer, G.G. Leppard and S.N. Liss 2004 "A Review of biofouling and its control in membrane separation bioreactors" *Water Environment Research* 76(5) 425-38
- Lim, J. and P. Missios 2007 "Does size really matter? Landfill scale impacts on property values" *Applied Economic Letters* 14, 719-723
- Luk G.K. and W.C. Au-Yeung 2006 "Modeling human exposure of methyl mercury from fish consumption" *Water Quality Research Journal of Canada* 41(1) 1-15
- Magness, V. and N. Tang Kai 2007 "Study evaluates link between environmental performance, profits of Canadian refiners" *Oil & Gas Journal* 105(4), 45-49
- Pogue, A. and K.A. Gilbride 2007 "Impact of protozoan grazing on nitrification and the ammonia and nitrite-oxidizing bacterial communities in activated sludge" *Canadian Journal of Microbiology* 53, 559-571
- Pushchak, R and A.M. Farrugia 2005 "Social impact assessment and high level radioactive waste disposal: the Canadian concept and aboriginal responses" in K. Hanna ed *Environmental Impact Assessment: Practice and Participation* (Toronto, Oxford) 118-144

Venhuis, S.H. and M. Mehrvar 2005 "Photolytic treatment of aqueous linear alkylbenzene sulfonate" *Journal of Environmental Science & Health, Part A: Toxic/Hazardous Substances & Environmental Engineering* 40(9) 1731-1739,

Venhuis, S.H. and M. Mehrvar 2005 "Photocatalytic Treatment of Linear Alkylbenzene Sulfonate (LAS) in Water" *Journal of Environmental Science & Health, Part A: Toxic/Hazardous Substances & Environmental Engineering* 40(5) 1003-1012

Venhuis, S.H. and M. Mehrvar 2004 "Health effects, environmental impacts, and photochemical degradation of selected surfactants in water" *International Journal of Photoenergy* 6(3) 115-125

Vincent, J., D. Kolozsvari, W.S. Roberts, P.F. Bolton, H.M.D. Gurling and S.W. Scherer 2004 "Mutation screening of X-chromosomal neuroligin genes: no mutations in 196 autism probands" *American Journal of Medical Genetics Part B (Neuropsychiatric Genetics)* 129B. 82-84

Warith, M.A. and G. Takata 2004 "Effect of aeration on fresh and aged municipal solid waste in a simulated landfill bioreactor" *Water Quality Research Journal of Canada* 39(3) 225-231

In addition, ENSCIMAN students have presented or co-authored papers presented at a number of scholarly conferences such as:

- General Meeting of the American Society for Microbiology
- Society for Conservation Biology Annual Conference
- Annual Conference of the Canadian Society for Civil Engineering
- Canadian Chemical Engineering Conference
- Canadian Society for Ecological Economics
- Canadian Geotechnical Conference

ENSCIMAN Faculty

When established, the Environmental Applied Science and Management program had a core of fifteen faculty members. In the intervening years, while there have been retirements, transfers to other graduate programs and faculty members who have left Ryerson University for other academic positions, the total number of faculty members in the program has grown to 32 (Appendix B). Many ENSCIMAN faculty also participate in other graduate programs at the University. As well, there are now four adjunct faculty members from government laboratories and industry that have supervisory privileges in the program.

Several ENSCIMAN faculty members are working in leading areas of environmental research such as green roof technologies, biological assays for toxic contaminant detection in the environment, environmental biotechnology for water and waste water treatment, modeling of contaminant fates, environmental biology, health risk assessment and the health effects of environmental contaminants, urban reforestation, environmental policy, and protection of source waters from pathogenic threats. Over the time of the program's operation, research by ENSCIMAN faculty has resulted in publication of 432 scholarly papers and reports (Figure 1; Figure 2).

External research funding among ENSCIMAN faculty from the granting councils has achieved an annual average of approximately \$500,000 dollars over the last seven years. With other grants and contracts having averaged approximately \$243,000 dollars each year including an annual average of \$60,000 dollars in external contracts, the ENSCIMAN program has demonstrated a reasonable level of funding support for the program.

Figure 1: Annual Number of Publications by ENSCIMAN Faculty, 2000-2008

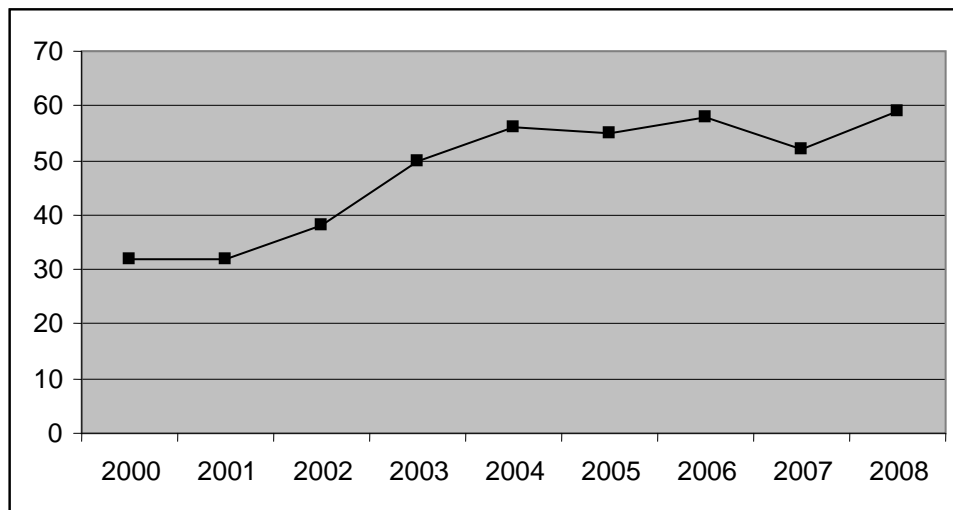
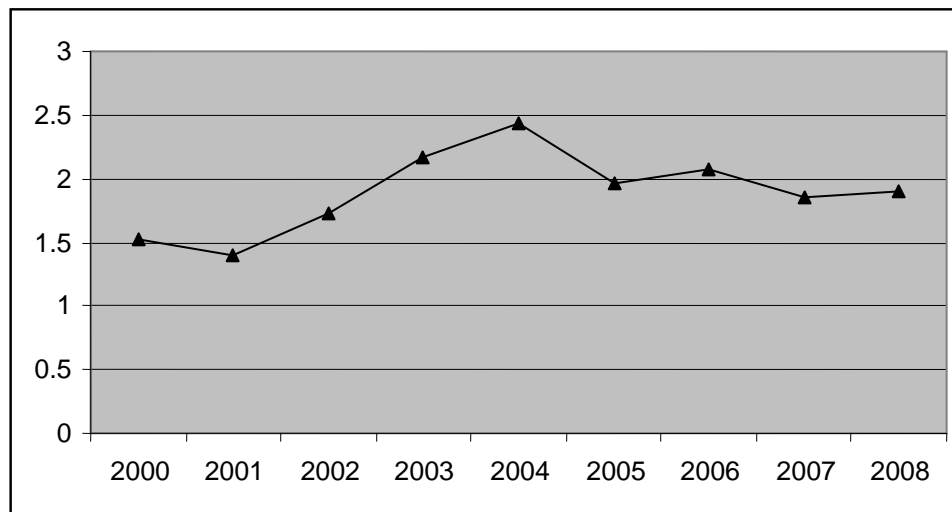


Figure 2: Average Annual Publication Rate per ENSCIMAN Faculty Member, 2000-2008



Further, infrastructure funding for other graduate programs at Ryerson University, in particular, those in the departments of Chemistry and Biology, Chemical, Civil, and Mechanical Engineering, and Geography provide support for student research in the ENSCIMAN program since those programs participate in the MASc program and provide laboratory space and equipment access for the students in ENSCIMAN whose research is supervised by faculty members in the participating programs (Table 11).

Table 11: Operating Research Funding by ENSCIMAN Faculty by Source and Year, 2000-2007 (\$)

Year ¹	Granting Councils ²	Contracts	Others ³
2000-01	379,177	34,500	140,100
2001-02	942,969	50,600	320,968
2002-03	346,173	26,795	121,840
2003-04	404,116	90,779	135,773
2004-05	422,941	111,566	212,140
2005-06	731,765	66,270	247,080
2006-07	622,422	41,625	100,775
Totals	3,477,995	422,135	1,278,676

¹ The year refers to the academic year at Ryerson University.

2. *Granting Council grants do not include equipment grants, conference grants, or grants allocated by the university such as SSHRC minor grants.*
3. *Others include University allocated grants (such as SSHRC minor grants).*

The program's applied focus has been supported by the association of external adjunct faculty to facilitate professional projects for graduate students in private and public sector research facilities and other non-governmental applied settings for environmental research (Appendix B). The program has emphasized applied research in collaboration with agencies: the Ministry of the Environment, Ontario, CRESTech, Environmental Defence Canada and other research institutions in industry and government.

After ENSCIMAN

The initial employment experiences of students graduating from the ENSCIMAN program reflect a relatively rapid uptake in the environment industry in Ontario and Canada in a wide variety of positions (Table 12).

Table 12: ENSCIMAN Graduate Employment

Analyst, Facilities, Ontario Energy Board
 Analyst, Innovest Strategic Value Advisors
 Aquatic Systems Research, Stantec Consultants
 Assistant Planner, Policy Development, Ontario Ministry of Municipal Affairs and Housing
 Atmospheric Impact Assessment, Transport Canada
 Building Plan Reviewer, City of Toronto
 CEO, Toronto Recycling Ltd.
 COA Great Lakes Scientist, Ontario Ministry of the Environment
 Engineer, Transportation Department, City of Toronto
 Environment, Health and Safety Coordinator, Urban Space Property Group
 Environmental Audit Professional, Office of the Auditor General of Canada
 Environmental Campaign Officer, Oceans Project, Greenpeace Canada
 Environmental Consultant, Environmental Auditing and Site Assessment, Integrated Management Solutions
 Environmental Consultant, RSK Environment Ltd.
 Environmental Health and Safety Coordinator, Compass Group
 Environmental Health and Safety Officer, Magna International
 Environmental Health Officer, Hamilton-Wentworth Health Unit.
 Environmental Manager, Energy, Nuclear and Environmental Sciences, Senes Consultants Ltd.
 Environmental Manager, Sony Canada
 Environmental Officer, Transport Canada
 Environmental Planner, Ecoplans Ltd.
 Environmental Planner, Elecsar Engineering

Environmental Planner, Planning and Building Dept., City of Mississauga
 Environmental Planner, Town of Richmond Hill
 Environmental Policy Analyst, Ontario Ministry of Environment
 Environmental Resource Planner and Environmental Assessment Coordinator, Ontario Ministry of the Environment
 Environmental Scientist, Catox Environmental
 Environmental Scientist, Golders & Associates
 Environmental Scientist, Knight Piesold Consulting Engineers
 Health and Safety Coordinator, IMT Corporation - Forge Group
 Instructor, Environmental Health, Ryerson University
 Manufacturing Project Manager, Canac Kitchens (a Kohler Company)
 Parks Planner, Environmental Stewardship Division, BC Ministry of Environment
 Pilot Project Administrator, Zenon Waste Water Treatment
 Planner, Town of Vaughan
 Planning Analyst, Ontario Power Authority
 Policy Analyst, Ontario Ministry of Municipal Affairs
 Policy Analyst, Ontario Ministry of the Environment
 Project Engineer, ABTECH Scientific Inc.
 Project Engineer, B.M. Ross and Associates Limited
 Project Engineer, R.J. Burnside & Associates Ltd.
 Project Engineer, Wastewater Division, Esolar Applied Research
 Project Manager, Golder and Associates
 Research Analyst, Environmental Social and Governance, Innovest Strategic Advisors
 Research Associate, Environment Canada
 Research Associate, Nutrient Management, George Morris Centre
 Research Associate, University of Toronto
 Research Chemist, 3XR Research Inc.
 Research Health and Safety Officer, Environment, Health and Safety, Brock University
 Scientist, Manitoba Health
 Senior Drinking Water Adviser, Ontario Ministry of the Environment
 Senior Project Engineer, Ontario Ministry of Environment
 Senior Wastewater Engineering Adviser, Water Standards, Ontario Ministry of the Environment
 Strategic Services Department, Town of Markham
 Supervisor, Service Programs, Toronto Water
 Water Resources and Stormwater Operations Coordinator, Engineering and Public Works Department, Town of Richmond Hill
 Water Resources Engineer, Aquafor Engineering Inc.
 Water Resources Engineer, UMA Engineering Inc.
 Water Technician, Ontario Ministry of the Environment
 Watershed Coordinator, Ontario Ministry of Environment
 Watershed Monitoring Coordinator, Toronto Region Conservation Authority

A number of other students have chosen to continue on the doctoral studies.

ENSCIMAN students enrolled in PhD programs including:

- Chemical Engineering and Applied Chemistry, University of Toronto
- Civil Engineering, Ryerson University
- Civil Engineering, University of Ottawa
- Ecology and Evolutional Biology, University of Toronto
- Environmental and Occupational Health and Safety, University of Waterloo

- Geography, Queens University
- Health Sciences and Gerontology, University of Waterloo
- Natural Resources Management, University of Arizona

The Future

The strength exhibited by the faculty and students of the ENSCIMAN program has translated into the approval of a Ph.D. program in environmental applied science and management. The first cohort of doctoral students will arrive at the University in Fall 2009.

The University has a continuing commitment to the MASc program. In the foreseeable future, increased enrolment numbers are not anticipated. However, innovations in pedagogy (new courses in Environmental Policy and Applied Ecology) and in research will continue to be hallmarks of the ENSCIMAN program.

New faculty members with an interest in environmental issues and from an ever-broadening breadth of disciplines continue to be attracted to Ryerson University. Adding to this is the overall growth in enrolments at Ryerson University and the need for expansion of faculty numbers in existing academic units. One anticipated outfall will be the continuing growth in the number and diversity of ENSCIMAN faculty into the coming academic years.

Contacts and Information

<http://www.ryerson.ca/ensciman>

Appendix A: ENSCIMAN Graduates' Theses and Research Papers

Name	Year	Thesis or Project Title	Research Supervisor(s)
Allen, Brent	2002	Ozone Inactivation of Fungi Associated with Barley Grain	Wu, J.
Amernic, David	2003	An Examination of Drinking Water Quality Management in Ontario using the Australian Framework as a Benchmark	Pushchak, R. / Liss, S.
Au, Amy	2007	Simulation of the Stormwater Reduction and Energy Saving Benefits of Urban Greenroofs	Li, James
Au-Yeung, Wai Ching	2002	Methylmercury Bioaccumulation in Sport Fish and the Relation to Human Exposure	Luk, G.
Bamfo, Eli	2007	'Sustainable but Just on the Edge': The Strength and Fragility of the Commercial Whale-watching Industry in the Lower Bay of Fundy, New Brunswick, Canada	Bardecki, M.
Bandelj, Emil	2004	Assessment of Androgenic Response Potential of Effluents Using <i>in vitro</i> and <i>in vivo</i> Methods	McCarthy, L. / van den Heuvel, R.
Berhe, Entehabu	2002	Post Environmental Assessment (EA) Audit of Municipal Solid Waste Landfills	Pushchak, R.
Botticella, Lisa-Anne	2006	Examining the Contribution of Toronto's Press in Maintaining an Environmentally-Detrimental Social Paradigm, 2003-2006	Bardecki, M.
Bowler, Renee	2006	Evaluating Municipal Wastewater Treatment Plant Impacts on Surface Water Quality Using the Canadian Water Quality Index: A Case Study of the Nith River, Ontario	Pushchak, R.
Brei, Elena	2006	Isolation, Separation and Identification of the Extracellular Polymeric Substance (EPS) Protein Fraction from the Activated Sludge Flocc (2006)	Liss, S.
Burley, Caitlin	2007	Drinking Water Quality and Trust: Communities and Risk Information	Pushchak, R.
Bykova, Olga	2006	Do Zebra Mussels (<i>Dreissena polymorpha</i>) Alter the Water Chemistry in a Way that Favours Microcystis	Laursen, A. / McCarthy, L.
Camacho, Rosanne	2005	Public Participation in Nuclear Waste Management: A Comparative Analysis of the Swedish and Canadian Processes	Pushchak, R.
Campbell, Cheryl	2004	Using Six Sigma to Design an Environmental Management System	Strahlendorf, P.
Capotorto, Tonia	2008	An Ecological Assessment of Invasive Plant Species in a Constructed Wetland in Markham, Ontario, Canada	Bardecki, M.
Carmichael, Stephen	2003	Residential Energy Efficiency and Home Construction and Renovation: How Much Progress?	Mars, J.
Charron, Christopher	2004	Ontario's Drinking Water Supply System: A Framework For a Preventive Management Strategy	Fang, L.
Chen, Elaine	2008	Enzyme-linked Immunosorbant Assay (ELISA) for the Screening of Dioxins in Fish Samples	Li, J. / C. Lo
Cheng, Irene	2008	Studies of Potential Sources that Contribute to Atmospheric Mercury in Toronto, Canada	Lu, J.
Chmakova, Alexandra	2007	Environmental Assessment of Storm Water Ponds: Impacts on a Rouge River Tributary	Bostan, V.
Chui, Jenny King Lai	2002	Control of Oil Spills in Urban Areas	Li, J.

Currie, Beth Anne	2005	Estimates of Air Pollution Mitigation with Green Roofs Using the UFORE Model	Pushchak, R.
Des Lauriers, Angelune	2004	The Fate and Transport of Methoprene in an Urban West Nile Virus Mosquito	Banting, D. / Li, J.
Diaz, Rodrigo	2004	Life Cycle Assessment of Municipal Solid Wastes: Development of "Wasted" Software	Warith, M.
Dinca-Panaitescu, Mihaela	2004	Cumulative Effects of Chemical Spills Using Spatial-Temporal Dynamics Analysis Algorithm	Li, J.
Earl, Rebecca	2006	Biosecurity in Agriculture: A Suggested Strategy for the Protection of Source Water Against Pathogenic Contamination	Pushchak, R. / Johns, C.
Esmail, Karima	2005	Environmental and Ethno-cultural Groups Working Together: An Examination of Toronto-based Environmental Programs	Milroy, B.
Farkh, Ruba	2006	Removal of Tetracyclines in Wastewater: Accumulation and Distribution of Chlortetracycline in Bulk Water and Biomass Compartments in Activated Sludge	Liss, S. / Mehrvar M.
Farrugia-Uhalde, Ann Marie	2003	Nuclear Fuel Waste and Aboriginal Concerns. Canada's Nuclear Fuel Waste Management Concept Public Hearings: A Content Analysis	Pushchak, R.
Fowler, Amanda	2006	A Comparison of the Waste Diversion Legislation, Practices, Enforcement and Efficiency in Select Jurisdictions Across North America and Europe	Missios, P. / Warith, M.
Fromme-Marcellin, Michelle	2007	Analysing Prediction Methods for Atmospheric Dispersion of Pollutants from Incineration: Three Canadian Case Studies	Banting, D.
Ghadakpour, Matahb	2007	Survival and Proliferation of an Opportunistic Pathogen in Mixed Community Biofilms	Wolfaardt, G.
Haffar, Miriam	2007	Comparative Detection and Enumeration Strengths of Quantitative, Real-time PCR and Fish for Water-borne Bacterial Pathogens in Municipal Waste Water	Gilbride, K.
Hatfield Venhuis, Sarah	2004	Photolytic and Photocatalytic Treatment of Linear Alkylbenzene Sulfonate in Water	Mehrvar, M.
Holmes, Alison	2007	Trends in Public Attention to the Environment from 1956 to 2005	Pushchak, R.
Holt, Leigh	2007	Ecological Impacts of Biosolids Application on Nitrogen-fixing Bacteria	Laursen, A. / McCarthy, L.
House, Belinda	2006	The Impact of Acid Stress on <i>Escherichia coli</i> O157:H7 Virulence	Foster, D.
Ji, Changhai (Kevin)	2003	Deleterious Effect of Mercuric Chloride on Human Epithelial Cells	Lu, J. / Foster, D.
Johnson, Wendy	2007	Managing threats to small drinking water systems in Ontario: a risk-based approach	Sly, T.
Kalt, Stephanie	2004	An Assessment of Municipal Capacity for Human-Wildlife Conflict Management in Selected Urban Areas of Southern Ontario	Milroy, B.
Kanetani, Mitsuko	2005	Association of <i>Escherichia coli</i> O157:H7 in Flocs: Role of Extracellular Polymeric Substances and Fate of Pathogenic Organisms	Foster, D. / Liss, S.
Katic, Sofija	2008	A Polymer to Detect Explosives: Towards an Effective Sensor Material	Evans, C.
Kelly, Alicia	2005	The Characterization of Significant Direct Threats to Source Watersheds: A Risk-based Approach	Pushchak, R. / Sly, T.

Khan, Nalissa	2005	Acute Toxicity of Biodiesel and Biodiesel Blends	Warith, M.
King, Sarah	2006	Incorporating Cumulative Environmental Effects of Finfish Mariculture into Canadian Environmental Assessment	Pushchak, R.
Kitano, Yoshiki	2005	Conditions of Hydrolysis with a Specific Pair of Endo- and Exo-Cellulases	Turcotte, G.
Kolozsvari, Debbie	2005	Integration and Persistence of <i>Escherichia coli</i> 0157:H7 86-24 in a Naturally-Occurring Water Well Biofilm	Liss, S.
Komarova, Karina	2008	Tentative Immobilization of a Cellulase Via Its Active Site Domain	Heyd, D. / Turcotte, G.
Kraemer, Heather	2002	Characterization of Microbial Aggregates in Relation to Membrane Biofouling in Submerged Membrane Bioreactors	Liss, S.
Krasnova, Renata	2004	Hydrologic Modeling of Construction Site Sediment Control Pond Using SWMM	Li, J.
Lee, Timothy	2002	Urban Growth Management in Two North American Cities	Pushchak, R. / Lister, N.
Levin, Maina	2004	Voluntary Environmental Initiatives Promoted by the Canadian Manufacturing Association	Strahlendorf, P.
Levinson, Lawrence	2008	Nitrogen-bearing Toxins and the Environment: Food Safety Monitoring Systems for the Quality Assurance of Vegetable Protein Production	Gilbride, K. / Pushchak, R.
Lim, Jason (Jong-Seok)	2003	Identifying the Variance in the Magnitude of Landfill Impacts on Residential Property Values Using Multiple Regression Analysis	Pushchak, R. / Missios, P.
Liu, Christopher	2004	Detection of Homoserine Lactones (Quorum Sensing Molecules) in Wastewater Microbial Floc	Liss, S.
Liu, Zhong	2005	Magnetic Coagulation for Oily Waste Treatment	Luk, G. / Fang, L.
Luciani, Peter	2005	Distributed Urban Stormwater Modeling within GIS Integrating Analytical Probabilistic Hydrologic Models and Digital Imagery	Banting, D. / Li, J.
Luisser, Frank	2005	Opportunities for VOC Emissions Reductions in Manufacturing Office Furniture Partitions	Rosen, M.
Mandula, Melissa	2005	The Effects of ISO 14001 on Corporate Financial and Environmental Performance	Bardecki, M.
Manson, Harry	2003	Uncertainty and Sensitivity Analysis of GIS Based Continuous Hydrological Modeling	Li, J. / Banting, D
Masekoameng, Kolobe	2006	Modeling Ecotoxicity of Polybrominated Diphenyl Ethers in Aquatic Ecosystems	Bostan, V.
Maslo, Dennis	2007	Re-use and Recovery: Electronic Waste	Fang, L.
McComb, Stephen	2004	Measuring the Benefits of Remediating a Hazardous Waste Site in Sydney, Nova Scotia	Missios, P.
Mondal, Bibekananda	2006	Use of Shredded Tire Chips and Tire Crumbs as Packing Media in Trickling Filter System for Landfill Leachate Treatment	Warith, M.
Moszynski, Dorothy	2007	Municipal Progress in Conformity to Greenbelt Legislation: Challenges in Implementation and Toronto Green Belt Integrity	Pushchak, R. / Lister, N.
Nichols, Paul	2008	Environmental Policy Creation: Examining the Ontario Municipal Approach	Banting, D.
Norrie, Steven	2006	A Life-Cycle Based Decision-Making Framework for Electricity Generation System Planning	Fang, L.

Nowak, Eva	2003	Characterization of Activated Sludge Floes by Confocal Laser Scanning Microscopy and Image Analysis	Liss, S.
Orfi, Mohammed	2008	Study of Transportation Strategies for Emission Control	Mehrvar, M. / S. Zolfaghari
Otke, Zachary	2008	Developing Habitat Suitability Index Models for the Wood Frog (<i>Rana sylvatica</i>) and Boreal Chorus Frog (<i>Pseudacris triseriata maculata</i>) in the Foothills Parkland Natural Sub-region and Bow River Basin	Bardecki, M.
Panagopoulos, Vicky	2003	ISO 14001 and Environmental Performance in an Automotive Manufacturing Plant	McCarthy, L. / Pushchak, R.
Parent, Deborah	2002	Evaluation of the Diffusion Gradient in Thin-Films (DGT) Technique for Measuring Trace Metal Concentrations in Freshwaters	Twiss, M.
Park, Heather	2007	The Role of P13K Signaling in Enteropathogenic <i>Escherichia coli</i> Induced Apoptosis in Epithelial Cells	Foster, D. / Marshall, J.
Pepin, Shane	2008	Water Resource Management in the Southern Ontario Region: Market Simulation under Scarcity Conditions	Missios, P.
Pileggi, Vincenzo	2007	Correlation of Selected Physicochemical Properties of Sludge Floes with Partitioning and Competitive Equilibrium Adsorption-Desorption Behaviour of Environmentally Relevant Trace Polycyclic Synthetic Musks During the Aerobic Activated Sludge Sewage Treatment	Liss, S.
Pogue, Amy	2004	Impact of Protozoan Grazing on Nitrification and the Ammonia- and Nitrite-Exidizing Bacterial Communities in Activated Sludge	Gilbride, K.
Pullenayegem, Anoushka	2008	Environmental Justice and Project Development: the Sri Lankan Experience	Bardecki, M.
Pyatt, Lindsay	2003	Performance Evaluation of a Sediment Control Pond	Li, James
Radisic, Sally	2004	Risk Communication: A Case Study in The City of Hamilton	Sly, T.
Rebellato, Steven	2004	Assessment of the Subsurface Pathogen Abatement Effects of Nutrient Management Policy in Ontario	Liss, S. / Pushchak, R.
Roberts, Andrew	2005	The Potential for Greenhouse Gas Emission Reduction through Small Distributed Cogeneration at Residential Sites	Pushchak, R.
Schroeder, Carl	2005	Health Effects of Hydrogen Fuel Substitution in Public and Private Vehicles in the GTA	Pushchak, R.
Smith, Derek	2003	A PCSWMM/GIS Based Water Balance Model for the Reesor Creek Watershed	Banting, D. / Li, J.
Spearin, Ashley	2003	Environmental Evaluation of Land-Applied Pulp Mill and Municipal Biosolids	McCarthy, L.
Stewart, Jennifer	2002	The Trophic Transfer of Pb and Cd from <i>Navicula pelliculosa</i> (Bacillariophyta) to <i>Hyaella azteca</i> (Amphipoda)	Twiss, M.
Stiefelmeyer, Kate	2003	The Pathogen Abatement Effects of Nutrient Management Policies: The Ontario Nutrient Management Act	Pushchak, R. / Liss, S.
Takata, Graham	2002	Effect of Aeration On Fresh and Aged Municipal Solid Waste	Warith, M.
Tang Kai, Natasha	2005	A Land-Based Oil Spill Management Planning Framework for the Petroleum Industry	Li, J.

Van Vliet, Ted	2003	The Use of Geographic Information Systems in the Development of a User-pay Stormwater Utility in the Mimico Creek Watershed	Li, J.
Vernon, Hayley	2006	Measuring the Effectiveness of Educational Instruments in Facilitating Environmentally Responsible Behaviour in Agriculture: The Canada-Ontario Environmental Farm Plan Program	Bardecki, M.
Vukomanovic, Jelena	2006	Effects of pH and Temperature on the Genotoxicity of Halogenated Disinfection By-Products in Chlorinated Water	Luk, G.
Wakefield, Charles	2004	Review of Landfill Groundwater Monitoring Requirements from an Ontario Perspective	Warith, M.
Welbourn, Rachel	2003	The Effect of Cu and Mn on Phytoplankton in Lake Erie, the Grand River and the Pacific Ocean	Twiss, M.
Wolek, Darren	2004	Estimating Light-Duty Vehicle Emissions in the Greater Toronto and Surrounding Area	Hicks, J.
Zheng, Wei	2008	Principles and Techniques Towards Successful Development of Enzyme-linked Immunosorbant Assay (ELISA) for Dioxin Analysis	Li, J. / C. Lo

Appendix B: ENSCIMAN Faculty and Research Interests

Dr. Douglas Banting, Professor, Department of Geography

PhD, University of Western Ontario, Geography

GIS in environmental management and facility siting, green roofs, applied spatial analysis in physical geography.

Dr. Michal Bardecki, Professor, Department of Geography

PhD, York University, Geography

Environmental assessment and decision-making, wetlands, economic valuation, cumulative impact management, media and the environment, environmental discourse.

Dr. Vadim Bostan, Assistant Professor, Department of Chemistry & Biology

PhD, University of Geneva, Earth Science

Environmental biology, aquatic ecotoxicology and geochemistry, assessment of antibiotic pollution on foodwebs, study of freshwater primary production community structure as a function of environmental changes.

Dr. Rachel Dodds, Assistant Professor, School of Hospitality and Tourism Management

PhD, University of Surrey, UK - sustainable tourism policy

Sustainable tourism, corporate social responsibility, environmental tourism, ecotourism, climate change and tourism, tourism planning, islands and tourism.

Dr. Farhad Ein-Mozaffari, Assistant Professor, Department of Chemical Engineering

Ph.D., University of British Columbia, Department of Chemical Engineering

Fluid mixing technology, flow visualization using tomography and ultrasonic velocimetry, mixing in water and wastewater treatment processes, computational fluid dynamics, non-Newtonian fluid mechanics, dynamic modeling and identification.

Dr. Mario Estable, Assistant Professor, Department of Chemistry and Biology

PhD, University of British Columbia

Biochemistry, molecular retrovirology, examination of the effects of environmental conditions on gene mutations and their role in human disease, gene transcription factors and DNA sequencing.

Dr. Liping Fang, Professor and Chair, Department of Mechanical and Industrial Engineering

PhD, University of Waterloo, Systems Design Engineering

Decision making and strategic planning in management, environmental management systems and operations research, environmental decision support systems, risk and reliability, bargaining and negotiations.

Dr. Debora Foster, Professor, Department of Chemistry and Biology

PhD, University of Toronto

Cellular microbiological and biochemical research on the molecular basis of pathogenesis for several gastrointestinal pathogens and on the impact of environmental stress on these organisms focused toward the development of treatment and prevention therapies and environmental strategies.

Dr. Kimberley Gilbride, Professor, Department of Chemistry and Biology

PhD, University of Toronto, Microbiology

Molecular Microbiology and Microbial Ecology. Assessment of microbial diversity with the use of molecular techniques, the role of microbes in the cycling of nutrients, and the effect microbial degradation of phytosterols in industrial waste water systems.

Dr. Christopher Gore, Assistant Professor, Department of Politics and Public Administration

Ph.D., University of Toronto, Political Science and Environmental Studies

Urban and environmental politics, policy, and administration, environmental policy processes and systems, global, national and local environmental governance, climate change, energy, electricity, Canada, Africa.

Dr. Aziz Guergachi, Associate Professor, Ted Rogers School of Management - Information Technology Management

Ph.D., University of Ottawa, Engineering

Mathematical modelling of systems, data mining and machine learning with applications to environmental engineering and management.

Dr. Martina Hausner, Assistant Professor, Department of Chemistry and Biology

Ph.D., Ludwig Maximilians University, Munich, Germany, Microbiology

Microbial Ecology, Environmental Microbiology and Biotechnology, Biofilms. Characterization of the structure, composition and function of biofilms and other bioaggregates. Fate of catabolic plasmids in biofilms, bioaugmentation. Drinking water biofilms.

Dr. Greg Kawall, Associate Professor, Department of Mechanical and Industrial Engineering

PhD, University of Toronto, Mechanical Engineering

Air pollution and noise control, turbulence, and the statistical analysis and design of engineering experiments.

Dr. Andrew E. Laursen, Assistant Professor, Department of Chemistry and Biology

Ph.D., University of Notre Dame, Biology

Ecosystem Ecology, Biogeochemistry, Limnology.

Dr. James Li, Associate Professor, Department of Civil Engineering

PhD, University of Toronto, Environmental Engineering

Water pollution control process, water pollution transport, storm water management models, GIS applications in environmental management, watershed management

planning, environmental hydraulics and hydrology.

Dr. Songnian Li , PEng, OLS/OLIP, Associate Professor, Department of Civil Engineering

PhD, University of New Brunswick, Geomatics Engineering

Geospatial information systems, environmental modeling with GIS, public-participated GIS and spatial decision-making in environmental impact assessment, geospatially-integrated environmental management systems, 3D GIS for land-surface-subsurface modeling.

Dr. Julia Lu, Associate Professor, Department of Chemistry and Biology

PhD, Carleton University, Analytical/Environmental Chemistry

Development, evaluation and applications of analytical method for environmental studies, identification and quantification of chemical pollutants in the natural environment, metal speciation in environmental samples, and pollutants in the Arctic.

Dr. Grace Luk, Professor and Graduate Program Director, Department of Civil Engineering

PhD, Queens's University, Civil Engineering

Water pollution transport, wastewater treatment, toxins bio-accumulation in fish, contaminant fate and effects models, bio-chemical treatment of waste water sludge, drinking water toxicity with bioassays.

Dr. Lynda McCarthy, Associate Professor, Department of Chemistry and Biology

PhD, University of Waterloo, Biology

Environmental biology and environmental biotechnology, aquatic ecotoxicology, assessment of pollution and remediation, particularly endocrine disruptors in Great Lakes aquatic systems, land applications of pulp mill bio-solids and their impacts.

Dr. Mehrab Mehrvar, Associate Professor, Department of Chemical Engineering

PhD, University of Waterloo, Chemical Engineering

Water and waste water treatment, desalinization, and air pollution control, biochemical engineering, integration of advanced chemical oxidation and biological process for waste water treatment, photo-catalytic technologies for waste water and air treatments.

Dr. Andrew A. Millward, Assistant Professor, Department of Geography

PhD, University of Waterloo, Geography

Application of geospatial methods to the study urban parks and nature in built environments. Principal investigator, Urban Forest Research & Ecological Disturbance (UFRED) Group.

Dr. Paul Missios, Associate Professor and Chair, Department of Economics

PhD, York University, Economics

Environmental economics (biodiversity, pollution, waste), environmental resource management and policy, natural resource economics, applied game theory, and international trade and the environment.

Dr. Ronald Pushchak, Professor, School of Occupational and Public Health and School of Urban and Regional Planning (joint appointment)

PhD, Princeton University, Urban Planning

Environmental impact assessment, siting of hazardous waste facilities, risk assessment and facility siting.

Dr. Pamela Robinson, Assistant Professor, School of Urban and Regional Planning

PhD, University of Toronto, Geography-Environmental Studies

Urban and Environmental Planning, Sustainable Development, Environmental Policy and Decision-making, Government Responses to Climate Change

Dr. Cory Searcy, Assistant Professor, Department of Mechanical and Industrial Engineering

PhD, University of Alberta

Corporate Sustainable Development, Environmental Management Systems, Quality and Integrated Management Systems, Industrial Ecology, Life-Cycle Assessment

Dr. Tim Sly, Professor, School of Occupational and Public Health

PhD, Teesside University, Risk Studies

Risk assessment for environmental management and public health, biostatistics, epidemiology of communicable diseases, risk perception and communication.

Dr. Ginette Turcotte, Professor, Department of Chemical Engineering

PhD, University of Western Ontario, Chemical/Biochemical Engineering

Biological processes in upgrading food wastes, biofuel ethanol, cellulose degradation of agricultural and food residues.

Dr. Mostafa Warith, Associate Professor, Department of Civil Engineering

PhD, McGill University, Geoenvironmental Engineering

Geotechnical soil properties, waste management, soil re-mediation, landfill leachate generation and treatment, municipal waste landfill design, modeling of contaminant transport, marshland soil attenuation assessment.

Dr. Kernaghan Webb, Associate Professor, Business Law, School of Business Management

LLD, University of Ottawa

International and Domestic Environmental Law, Corporate Environmental and Social Responsibility, Alternatives to Regulatory Approaches for Environmental Improvement, Business Ethics, Sustainable Governance

Dr. Alex Wellington, Assistant Professor, Department of Philosophy

PhD, York University, Philosophy; LLM, Osgoode Hall Law School, Law

Environmental law and policy, intellectual property law and policy, biotechnology and bioethics (including environmental ethics), professional ethics, research ethics

Dr. Gideon Wolfaardt, Associate Professor and Canada Research Chair in Environmental Interfaces and Biofilms, Department of Chemistry and Biology
PhD, University of Saskatchewan
Microbial Ecology, environmental Microbiology, biofilm research

Dr. Jiangning Wu, Associate Professor, Department of Chemical Engineering
Biomaterials, Surface Modification of Polymers, Wastewater Treatment, Catalytic Ozonation of Wastewater

ENSCIMAN Adjunct Faculty

Dr. Ian Droppo, Research Scientist, Environment Canada

Dr. John Hicks, CUPE Instructor, School of Occupational and Public Health

Dr. Steven Liss, Vice-President Research, University of Guelph

Dr. Ching Lo, Senior Bioassay Scientist, Ontario Ministry of the Environment