RYERSON UNIVERSITY

# SCHOOL OF GRADUATE STUDIES CALENDAR
# WINTER 2007

## ***ALL GRADUATE PROGRAMS***

**ACADEMIC DEFINITIONS**

**Prerequisite:** Student must pass Course A before taking Course B.

**Corequisite:** Student must take Course A prior to or concurrently with Course B.

**Course Credits:** One course credit is equivalent to a one-term course taken for one term. It has a course weight of 1.00 for the purpose of GPA calculations. One module is equivalent to half of a one-term course and is normally taught in a 6 week session.

**Course Antirequisite:** Students may not enroll in a course which lists, as an Antirequisite, one which they are also taking or in which they have already obtained standing.

**Course Numbering:** if the second digit of the four digit course number is "1 to 9", then the course is a one-term credit; if it is a "0" , then the course is a multi-term credit. For example, CC8900 is a one credit course, CC8020 is a two credit course.

**Antirequisite:** Students may not enrol in a course which lists, as an Antirequisite, one which they are also taking or in which they have already obtained standing.

**Pass/Fail Courses:** Are not included in GPA calculations unless otherwise stated, but are included in promotion status.

The following course descriptions are a guide to courses offered through the program from time to time. Not all courses will be offered every year. Courses are offered subject to faculty availability and are subject to change without notice.

Courses followed by a second course number in brackets indicate that the course is offered through a joint program with another university. For example: *CC8900 (CMCT 6000 3.0) Commun. and Culture: Core Issues in Cultural Studies*, indicates that the bracketed number is used at York University in the joint Ryerson/York Communication and Culture Program.

## BIOMEDICAL PHYSICS

### CURRICULUM

### Master of Science

**First Offered Fall 2006**

**DEGREE REQUIREMENTS**

Master's Thesis
Five credits from elective list*

***ELECTIVES***

| | | *Credits* |
|---|---|---|
| BP8101 | Stats for the Health Sciences | 1 |
| BP8102 | Medical Diagnostics Techniques | 1 |
| BP8103 | Fndamntls of Radiation Physics | 1 |
| BP8104 | Radiation Therapy | 1 |
| BP8105 | Compl Methods in Biomed Phys | 1 |
| BP8106 | Optcl, Acstc and Thrmal Phys | 1 |
| BP8107 | Rad Protection and Dosimetry | 1 |

* With permission, students may use one graduate course from a relevant program in place of one elective.

### COURSE LISTING

**Master's Thesis**
This is a "Milestone." Pass/Fail

**BP8101 Stats for the Health Sciences**
This course is designed as a first course in biostatistics with emphasis on relevance in biomedical physics applications. Topics include nonparametric statistics, linear regression, errors and structural analysis of linear relationships between variables, nonlinear estimation, survival analysis and multivariate analysis of data. A statistics computer package will be used. 1 Credit

**BP8102 Medical Diagnostics Techniques**
This course will cover a wide variety of contemporary topics in medical imaging including x-ray Imaging (production, planar x-ray, fluoroscopy, dual x-ray absorptiometry), computed tomography (CT), functional CT, magnetic resonance imaging (temperature mapping, functional MRI), ultrasound, Doppler techniques, positron emission tomography, bone densitometry, trace element detection and nuclear medicine. 1 Credit

**BP8103 Fndmntls of Radiation Physics**
This course is designed for students with an undergraduate background in radiation physics. Topics include the Bohr atomic model, Rutherford scattering, emission of photons, X-ray spectra, Bremsstrahlung and characteristic radiation, homogeneous and heterogeneous photon beams, thin and thick x-ray targets, absorption and scatter of photon beams, beam attenuation, Thomson scattering, Photoelectric effect, Rayleigh scattering, Compton effect, pair production, interaction of neutrons with matter, radiation quantities and units, radiation decay, exposure, kerma, dose, and dose equivalent. 1 Credit

**BP8104 Radiation Therapy**
This course is an introduction to radiation therapy physics, including topics such as radiation teletherapy units; iteraction of radiation with tissue; dosimetry of a single beam of x-ray; beam calibration and patient dose calculation; comination of beams and treatment planning, brachytherapy; radiation detection. 1 Credit

**BP8105 Comp Methods in Biomed Phys**
This course will focus on the use of advanced computer-based techniques for the modeling and visualization of biophysical systems. Emphasis is placed on simulation methods such as Monte Carlo methods, numerical integration of differential equations, and finite element and finite difference techniques. 1 Credit

**BP8106 Optcl, Acstc and Thrml Phys**
The course will begin with basic optical, acoustic and thermal propagation in biomaterials. This will be followed by the presentation of the principles of photodynamic therapy, optical sensing, ultrasound biomicroscopy, optoacoustics imaging, thermal therapy and thermography. 1 Credit

**BP8107 Rad Protection and Dosimetry**
The first half of the course reviews microdosimetry; the second half focuses on biological effects of radiation and radiation safety, basic radiation physics, radioactive decay, radiation producing devices, characteristics of the different types of

radiation and their interactions with materials. Students will learn essentials of determining absorbed doses from ionizing radiation sources used in clinical situations and for health physics purposes. A survey of sources, applications, risks, and control of environmental radiation will be presented. 1 Credit

## BUSINESS ADMINISTRATION

### CURRICULUM

### Master of Business Administration

First Offered Fall 2006

**DEGREE REQUIREMENTS***

| **Foundation Courses*** | | Credits |
|---|---|---|
| MB8001 | Intl Bus Issues and Functions | 1 |
| MB8002 | Quan Mthds and Info Sys | 1 |
| MB8003 | Marketing in an Intl Environ | 1 |
| MB8004 | Acctng in an Intl Environ | 1 |
| MB8005 | Intl Finance for Mgrs | 1 |
| MB8006 | Economics in an Intl Environ | 1 |
| **Core Courses** | | |
| MB8101 | Law, Regulatory and Gov Issues | 0.5 |
| MB8102 | Socially Rsp and Ethical Mgmt | 0.5 |
| MB8103 | Strategy in Intl Bus Environ | 1 |
| MB8104 | Acctg and Finc for Todays Mgrs | 1 |
| MB8105 | Wrld Lgstcs and Spply Chn Mgmt | 1 |
| MB8106 | Diversity in HR Mgmt | 1 |
| MB8107 | Adv Intl Mktng | 1 |
| Three credits from one Field of Study | | 3 |
| Two credits from Fields of Studies and Elective Lists | | 2 |
| AND one of the following options: | | |
| | Master's Thesis | |
| | Master's Research Project | |
| | International Exchange | |
| | Language and Cultural Training | |

* Students with an undergraduate degree in business may apply for advanced standing in the Foundation courses.

***FIELDS OF STUDY***

| ***Field I: International Business*** | | |
|---|---|---|
| MB8201 | Intl Strategic Mgmt Challenges | 1 |
| MB8202 | Intl Environ Fincl Dcsn-Mkg | 1 |
| MB8203 | Intl Trade in Goods and Servs | 1 |
| MB8204 | Intl Negs, Contrg and Rsk Mgmt | 1 |
| MB8205 | Intl Econ and Social Dev | 1 |
| MB8206 | Internatztn of Retailing | 1 |
| ***Field II: Human Resources Management*** | | |
| MB8301 | Strategic HR Mgmt | 1 |
| MB8302 | Comp and Labour Mrkts | 1 |
| MB8303 | Comparative Emplymt Relations | 1 |
| MB8304 | Organizational Change | 1 |
| MB8305 | Organizational Dsgn and Theory | 1 |
| MB8306 | Special Topics in HR | 1 |
| ***Field III - Marketing*** | | |
| MB8401 | Marketing Management | 1 |
| MB8402 | Brand Management | 1 |
| MB8403 | Competitive and Mrkt Analysis | 1 |
| MB8404 | Managing Customer Relations | 1 |

| | | |
|---|---|---|
| MB8405 | Mktg in Theory and Practice | 1 |
| MB8406 | Spec Tpcs: Sport and Evnt Mktg | 1 |
| ***Field IV - Retail and Commercial Development*** | | |
| MB8501 | Geo-demographics | 1 |
| MB8502 | Retail and Commercial Dev | 1 |
| MB8503 | Business Geomatics | 1 |
| MB8504 | Rtl Location and Dev Strats | 1 |
| MB8505 | Lgl Asps of Rtl and Comm Dev | 1 |
| MB8506 | Real Estate Finance | 1 |

***ELECTIVES***

*The following electives may be used in place of any the courses in a student's Field of Study, to a maximum of two credits.*

| | | |
|---|---|---|
| CC8842 | Public Affairs Media | 1 |
| CC8942 | Cross-Cult and Internat Commun | 1 |
| MB8601 | Intro Project Management | 0.5 |
| MT8202 | Aligning Tech and Org Strategy | 0.5 |
| MT8203 | Tech Diffusion and Innovation | 0.5 |
| MT8205 | Adv Project Management I | 0.5 |
| MT8206 | Adv Project Management II | 0.5 |
| MT8208 | Entre/Intrapreneurship Innovtn | 0.5 |
| MT8211 | Globl Mrkts and Trends in Tech | 0.5 |
| MT8404 | Media Ind Product/Serv Innov | 0.5 |
| MT8405 | Media Ind: Consumer Behaviour | 0.5 |
| MT8501 | Adv Supply Netwrk Mgmt Tech I | 0.5 |
| MT8502 | Adv Supply Netwrk Mgmt Tech II | 0.5 |
| MT8503 | Implementing ERP Systems I | 0.5 |
| MT8504 | Implementing ERP Systems II | 0.5 |
| MT8803 | Leadership in a PMO Context | 0.5 |
| MT8804 | Contracts and Negotiations I | 0.5 |
| MT8805 | Contracts and Negotiations II | 0.5 |

**COURSE LISTING**

**Master's Thesis**
This option is appropriate for students considering a career in Academia or research. Students choosing this option must take the research methods elective, and produce a formal proposal for approval. Original research can be undertaken at one of the Faculty's centres or institutes. Standard thesis format is required and there will be an oral defense. This is a "Milestone". Pass/Fail

**Master's Research Project**
This major research project is normally tied to a work placement or contract with an organization. These projects usually focus on the application of theory to practice and the analysis of a particular market, organizational or management issue. Where appropriate, these projects can be undertaken in small groups. A proposal for this project must be approved in advance. An oral defense may be part of the requirements. This is a "Milestone". Pass/Fail

**International Exchange**
Students choosing this option must have advanced approval. Two approved graduate courses are taken in an approved university. Students may undertake research under the direction a faculty member on an approved topic and are required to produce a reflective paper that incorporates theory and practice (eg. Cross-cultural comparisons, case studies, organizational analyses). This is a "Milestone". Pass/Fail

**Language and Cultural Training**
Language training must be approved in advance and may focus on either improving existing fluency or developing fluency in a second language. Students take a minimum of a two credit course and produce a project paper based on a literature review and data collection in the second language. This is a "Milestone". Pass/Fail

**MB8001 Intl Bus Issues and Functions**
This integrated course provides the knowledge and cultural sensitivity to manage effectively in the International environment. Topics include national cultures, geographic regions, international institutions, regional integration agreements, world economics, political history and ethical norms, as well as business fundamentals including strategic planning, management functions and inter-relationships. Current issues such as corporate social responsibility, accountability and transparency, security concerns, terrorism and privacy protection are introduced. 1 Credit

**MB8002 Quan Mthds and Info Sys**
This course equips students with basic tools needed to support business decision making as well as an understanding of the ways in which information technology can more broadly support business goals. Students learn to apply computer-based tools to statistical analysis of business problems. In addition, students develop a broader understanding of the role of information technology to support analysis, management and strategy in business organizations. 1 Credit

**MB8003 Marketing in an Intl Environ**
This course demonstrates the role of marketing, its relationship to and integration with other business functions, and how it creates value for customers, marketers and society. Fundamental marketing concepts, such as environmental, consumer and competitor analysis, targeting, positioning, segmenting and the four Ps, and their application to global marketing challenges and opportunities are reviewed, with special attention to issues encountered in marketing across cultures. 1 Credit

**MB8004 Acctng in an Intl Environ**
Topics include the role of GAAP, balance sheet, income statements and cash flow statements, the concepts of retained earnings, depreciation, receivables, inventory, amortization, deferred taxes and goodwill. It examines accounting models to improve managerial decision making including the Cost-Volume Profit model, Activity Based Costing, Economic Value Added, transfer pricing, overhead allocation and Balanced Scorecard. Strategic issues such as organizational learning, control systems and open-book management are examined with a global perspective. 1 Credit

**MB8005 Intl Finance for Mgrs**
This course provides the necessary principles of finance for the manager of an enterprise in the global environment. This course examines from a global perspective, shareholder wealth maximization, the analysis and interpretation of financial statements, ratio analysis, the time value of money, discounted cash flow analysis, valuation of different financial assets, value of equity, interest rate analysis, the value of debt, and bond valuation. 1 Credit

**MB8006 Economics in an Intl Environ**
This course develops the fundamental tools of economic analysis that are essential for understanding global markets and making managerial decisions. The economic relationships between growth and inflation are examined as well as credit, interest rates, and government fiscal and monetary policy. International input and product markets, foreign direct investment, multinationals, mergers and acquisitions, as well as the market determination of exchange rates and interest rates are considered. 1 Credit

**MB8101 Law, Regulatory and Gov Issues**
This course examines the law and regulation relevant to business in the global environment. Topics examined include the civil and common law approach to contract and tort, and the legal aspects of different forms of market entry, as well as the basics of corporate law. The influence of international trade agreements and conventions on global and domestic business are considered. 0.5 Credit

**MB8102 Socially Rsp and Ethical Mgmt**
This is an interdisciplinary course in which students examine the challenges of ethics and responsibility in the global environment. Issues of corporate governance are considered from a legal and ethical perspective. This case-based course examines responsible environmental and labour standards, human rights, privacy, intercultural sensitivity, corporate codes of conduct, issues of bribery and corruption, as well as issues relating to global outsourcing and brand integrity. 0.5 Credit

**MB8103 Strategy in Intl Bus Environ**
This course examines a global firm's choice of strategy, scope and organization. Topics include industry and competitive analysis, building competitive advantage, ethics and social responsibility versus corporate aims, governance, corporate culture and leadership and designing an appropriate structure for strategy implementation. Students analyze the demands of different competitive environments and become familiar with potential strategy alternatives from import/export to foreign direct investment. 1 Credit

**MB8104 Acctg and Finc for Todays Mgrs**
Building on the foundation in Accounting and Finance, this course further develops an understanding of the challenges for sound financial planning and management in a global environment. Students learn the risk return characteristics of various international financial markets and financial instruments. Topics include financial instrument valuation (stocks, bonds and derivative securities), going public decisions, initial and seasonal equity offerings, joint venture, venture capital firms and international entry decisions. 1 Credit

**MB8105 Wrld Lgstcs and Spply Chn Mgmt**
This course provides students with the knowledge of supply chain and operational management necessary for effective managerial decision making. Problem solving topics include leveraging corporate resources on a worldwide basis to deliver goods and services to particular markets, aligning rapidly evolving information and communication technologies to

corporate operating plans, and working effectively within the constraints imposed by a variety of host governments and business cultures. 1 Credit

**MB8106 Diversity in HR Mgmt**
This course develops competencies in managing a global workforce. Specific topics include the behavioural impact of cultural differences, alternative approaches to organizational structure, cross cultural communication challenges, management of diverse groups, leadership and employee motivation techniques for global managers, conflict resolution across cultures, approaches to ethics and social responsibility in different cultures, global recruitment, selection and employee repatriation issues. 1 Credit

**MB8107 Adv Intl Mktng**
This course examines the processes used by marketers to produce, communicate and deliver value to customers, shareholders and society. It focuses on the management of relationships across the spectrum of marketing interactions that benefit the organization, its stakeholders and the community in which it operates. The course provides insight into marketing actions and their impact on customers, markets, firm value and community development including socio-economic well being and sustainability. 1 Credit

**MB8201 Intl Strategic Mgmt Challenges**
This course addresses the challenges of developing effective global management strategies. It examines the role of business intelligence, the use of technology, global supply chains and networks, the tensions between localization and standardization, centralization and de-centralization, the importance of entrepreneurial strategies in complex organizations and family enterprises, various forms of business entry into international markets and the importance of sensitive and informed global leadership. 1 Credit

**MB8202 Intl Environ Fincl Dcsn-Mkg**
This course examines corporate financial issues from a more in-depth managerial and strategic perspective including internationally diversified portfolios and asset allocation decision making, financial instrument valuation, going public as well as multinational fund transfers; identifying and measuring and managing foreign exchange and interest rate risk; multinational tax planning; hedging instruments, including forward contracts, options and swaps. 1 Credit

**MB8203 Intl Trade in Goods and Servs**
This course examines the importance of the global expansion of trade in goods and services to the Canadian economy. Topics include entrepreneurial to global product development, global and multi market perspectives of branding, competitors, alliances and supply chain integration, the role of representatives, agents and sales offices in foreign markets, the importance of e-marketing, the language of international trade, documentation, insurance and international transport. 1 Credit

**MB8204 Intl Negs, Contrg and Rsk Mgmt**
This course addresses the importance of recognizing and managing risk exposure in the global environment. It examines risk issues including political or economic instability, non-performance of contract, corporate and industrial espionage, security, emergency and disaster planning, global health threats, environmental risk auditing, cyber risk management, risk exposure of expatriates, payment and collection, trade barriers and specific contractual requirements and safeguards and international dispute settlement. 1 Credit

**MB8205 Intl Econ and Social Dev**
This course addresses the complex problems of international organizations including private companies, government agencies and non-governmental organizations. It examines issues including trade, investment, foreign aid, social investment, international debt, technology transfer, poverty, environment, social development and sustainable development, the roles of international and regional organizations, government policy and domestic and foreign corporations. 1 Credit

**MB8206 Internatztn of Retailing**
This course examines the challenges and opportunities that exist in world wide retailing. Using spatial analysis, students examine the growth of retail concentration and the reach of world wide retailers and compare retailing across international borders. Students are exposed to fast turnaround global supply chain and logistics systems. Topics include geographic, global, city and company perspectives, and necessary approaches to logistics including accessing, assessing and interpretation of market data. 1 Credit

**MB8301 Strategic HR Mgmt**
This course offers a framework for strategic human resources management that prepares line managers and HR professionals to align the goals and strategy of the organization with its people management strategies – the most critical sources of sustainable competitive advantages. Topics include the strategic management of human capital, the transformational impact of emerging markets and quantifying the impact of HR on business performance. 1 Credit

**MB8302 Comp and Labour Mrkts**
Compensation comprises an average of 70% of the total costs of an organization. This course focuses on the processes, issues and techniques for understanding the labour markets and establishing compensation and reward programs within a framework of productivity, equity and economics limitations. Issues include legislation, principles of equity and fairness, job analysis, job evaluation, compensation surveys, benefits and incentives, and international comparisons. 1 Credit

**MB8303 Comparative Emplymt Relations**

This course provides an understanding of the range of issues pertinent to different industrial relations and employment systems using Canada as a base-line for comparison. It is designed to provide a general background in the subject with particular emphasis on the role of the state, employers, trade unions and workers in a variety of settings and covers a range of topics including collective bargaining, negotiations, grievance and arbitration. 1 Credit

**MB8304 Organizational Change**
This course provides an overview of the theory and practice of organizational change focusing on the tension between the organization's need for stability and the pressures for change. It focuses on the stages of the change process concentrating on the importance of altering individual attitudes and behaviours, group relationships, and organizational cultures necessary for effective and sustained change. 1 Credit

**MB8305 Organizational Dsgn and Theory**
This course provides a basic understanding of organizations as entities in the broader social system, what makes them work and how they can be altered to meet the challenges of a changing world. Current perspectives in organizational theory and design are explored with an emphasis on how organizations are affected by their environments, how they are designed and structured, and why they are effective or ineffective in achieving their goals. 1 Credit

**MB8306 Special Topics in HR**
This course provides students with the opportunity to pursue advanced studies on issues and themes of immediate and current significance in the fields of Human Resources Management. It allows students to access leading-edge research and to explore new and emerging models of practice. The particular theme, topic and structure of the course vary in response to changes and trends in the field, availability of specialists and student interest. 1 Credit

**MB8401 Marketing Management**
This course uses an integrated approach to marketing management and makes use of economic, quantitative and behavioural concepts to understand the analysis, planning, implementation and control of marketing decisions. The course develops the marketing principles by which products and services are designed to meet customer needs, priced, promoted, and distributed to the end user. The focus is on the application of these marketing principles to a wide range of customers, both internal and external. 1 Credit

**MB8402 Brand Management**
A brand name, and its associated brand equity, is one of the most valuable assets of any firm. The course is designed to increase student understanding of the important issues in planning, implementing and evaluating brand strategies; to provide relevant theories, models and tools for the making of brand decisions, and to enable students to apply these principles to real life cases. 1 Credit

**MB8403 Competitive and Mrkt Analysis**
This course provides a comprehensive framework, for analyzing the competitive scope of an industry, the industry itself, and the market space that a company occupies within an industry. The course provides students with the necessary analytical tools to evaluate the environment within which a company operates, and an opportunity to apply these analytical skills in a practical situation. The course centres on developing the platform on which a company builds a marketing strategy. 1 Credit

**MB8404 Managing Customer Relations**
This course analyzes how successful organizations achieve a sustainable competitive advantage by satisfying their customers. In addition to explaining how consumers determine their levels of satisfaction with their purchases, this course explores the strategies and tactics that marketing managers can employ to maximize customer loyalty. Special emphasis is placed on the optimal procedures for developing and implementing customer satisfaction measurement systems in organizations. 1 Credit

**MB8405 Mktg in Theory and Practice**
This seminar course reviews writings on contemporary marketing thought, strategy and practice with particular attention to the macro impact of marketing in society. The course is an introduction to the most recent academic thinking in the field of marketing as it applies to current marketing discourse and behaviour. The topics include marketing history, theory, strategy, organization, and tactics in terms of the traditional 4-P's. 1 Credit

**MB8406 Spec Tpcs: Sport and Evnt Mktg**
This course applies marketing principles and processes to sport and event products and ancillary products and services. Topics include consumer (fan) behaviour, creating a high level of customer service, developing loyalty or relationship marketing programs, collecting and using marketing research data, segmenting markets, and branding. 1 Credit

**MB8501 Geo-demographics**
This course examines the conceptual, methodological and practical issues associated with the application of mulitvariate spatial techniques to market area analysis and geo-segmentation. Topics include data sources; geo-demographic market segmentation in theory and practice; marketing projects and future directions in data, technology and applications. 1 Credit

**MB8502 Retail and Commercial Dev**
This course examines retail and commercial development from the perspective of both North American and international markets. Topics include understanding the retail/commercial structure; the dynamics of retail developments; the future role of downtowns, the challenges of the shopping centre format, the emergence of big box/power centre development

and mixed use developments and emerging, high growth economies (e.g., Eastern Europe, China, India, the Middle East and South America). 1 Credit

**MB8503 Business Geomatics**
This course provides a working knowledge of GIS (Geographic Information Systems); the use of spatially referenced information, and applications of various geo-visualization methodologies to both the planning and management of major retail/commercial developments. The student is trained in the use of GIS software programs (MapInfo; ArcGIS); and given access to the relational databases and spatial information available from the Centre for the Study of Commercial Activity. 1 Credit

**MB8504 Rtl Location and Dev Strats**
This course examines retail and commercial development from a variety of perspectives. Topics include the principles of store location research; understanding the drivers of the retail economy; creating a retail location database; developing sales forecasting models for the corporation; measuring market saturation and store cannibalization; selecting the appropriate location strategy; closing the deal and portfolio management. 1 Credit

**MB8505 Lgl Asps of Rtl and Comm Dev**
This course examines the relevant legal implications of retail and commercial property development. Topics include a review of basic contract law concepts, property law in Canada and the United States, a brief overview of property law in other locations, forms of title such as qualified, shared and conditional ownership; air, water and surface rights; restrictions such as easements, covenants and adverse possession, planning and zoning law, and foreclosure. 1 Credit

**MB8506 Real Estate Finance**
This course explores the foundations of real estate mathematics, capitalization rates; property appraisal process and issues related to real property assessment. It also focuses on specific types of real estate development, understanding the pro forma, the effect of leases on value, the role of pension funds and real estate investment trusts and private equity markets in the Canadian real estate industry, and the relation between land value and land use. 1 Credit

**MB8601 Intro Project Management**
This course provides an understanding of the tools and techniques for project management. Project management utilises specific techniques in human resource, quality and risk management to achieve client objectives within those boundaries. Concepts introduced in this course provide a useful foundation for students who wish to either further their education in this particular area in order to participate in projects, or those who may wish to consider this as a career option. 0.5 Credit

## CHEMICAL ENGINEERING

**CURRICULUM**

### Master of Applied Science

**DEGREE REQUIREMENTS***

Master's Thesis

One Group A Core Elective

Three* credits from Elective Lists B,C,D

### Master of Engineering

**DEGREE REQUIREMENTS**

Master's Project**

Two Group A Core Electives

Six credits from Elective Lists B,C,D

** Students may apply to substitute two courses from Groups B, C or D for the Project

### Doctor of Philosophy

**DEGREE REQUIREMENTS**

Dissertation

Four Elective credits from Group A, B, or D

| | | |
|---|---|---|
| ***Group A - Core Electives*** | | *Credits* |
| CE8139 | Prob, Stat & Stochastic Proc | 1 |
| CE8213 | Advanced Numerical Methods | 1 |
| CE8301 | Advanced Transport Phenomena | 1 |
| ***Group B*** | | |
| CE8201 | Model & Simulation - Chem Engr | 1 |
| CE8202 | Advanced Process Control | 1 |
| CE8203 | Applied Optimal Control | 1 |
| CE8302 | Kinetic Theory  Multiphase Flow | 1 |
| CE8303 | Advanced Fluid Dynamics | 1 |
| CE8401 | Ind Catalysis & Biocatalysis | 1 |
| CE8402 | Applied Thermodynamics | 1 |
| CE8501 | Polymer Science | 1 |
| CE8502 | Polymerization Reaction Engr | 1 |
| CE8602 | Industrial Biotechnology | 1 |
| CE8701 | Solid Waste Engr & Processing | 1 |
| CE8702 | Dsgn & Op Sm Wtr Treat Plants | 1 |
| CE8703 | Adv Water Treatment Tech | 1 |
| CE8802 | Wastes from Food Processing | 1 |
| CE8803 | Advanced Food Process Engineering | 1 |
| ***Group  C - One of the following may be taken at the Master's level only:*** | | |
| CE8210 | Process & Engr Optimization | 1 |
| CE8310 | Fluidization Engineering | 1 |
| CE8331 | Membrane Technology | 1 |
| CE8510 | Plastic Technology | 1 |
| CE8710 | Air Pollution and Control | 1 |
| ***Group D - One of the following may be taken:*** | | |
| CE8100 | Directed St: Chem Eng (MASc) | 1 |
| CE9100 | Directed St: Chem Eng (PhD) | 1 |
| ES8901 | Chemical & Biological Pathways | 1 |

| | | |
|---|---|---|
| ES8905 | Air Pollution Science & Engr | 1 |
| ES8907 | Wastewater Engineering | 1 |
| ES8909 | Environmental Biotechnology | 1 |
| ES8910 | Energy and The Environment | 1 |

**If no group C credit is elected, then Master's students may take two Group D credits

## COURSE LISTING

**Master's Thesis**
The student is required to conduct advanced research on a topic related to chemical engineering mainly in the water-wastewater/food treatment and polymer/chemical processing areas. The research topic is selected in consultation with the student's supervisor(s), where the student presents an outline of the research plan in writing, and the research is carried out under the direction of a faculty supervisor(s) and monitored by a thesis supervisory committee. On completion, the student is required to give an oral presentation on the research results in the Graduate Research Seminar Series. The research results are then submitted in a thesis format to the supervisor(s) and to an examining committee, before which an oral presentation is made for the assessment and grading of the thesis. Through the thesis, the student is expected to provide evidence of competence in carrying out research and a sound understanding of the material associated with the research. This is a "Milestone." Pass/Fail

**Master's Project**
The student is required to conduct an applied advanced research project on a topic related to chemical engineering. The project topic is selected in consultation with the student's advisor, where the student presents an outline of the project plan in writing, and then is carried out under the direction of a faculty advisor and monitored by an advisory committee. On completion of the project, the results are submitted in a technical report format to the advisor and then to an examining committee, which an oral presentation is made for assessment and grading of the project and the report. The student is expected to provide evidence of competence in the carrying out of a technical project and present a sound understanding of the material associated with the research project. This is a "Milestone." Pass/Fail

**Doctoral Dissertation**
The PhD student is required to conduct advanced research on a topic related to chemical engineering, mainly in the water-wastewater/food treatment and polymer/chemical processing areas. The research topic is selected in consultation with the student's supervisor(s). The student presents a proposal of the research plan in writing to a supervisory committee, and orally in the Graduate Research Seminar Series prior to taking a candidacy exam. The research is carried out under the direction of a faculty supervisor(s) and monitored by a supervisory committee. On completion, the student is required to give an oral presentation on the research results in the Graduate Research Seminar Series. The research results are then submitted in a dissertation format to the supervisor(s) and to an examining committee, before which an oral presentation is made for the assessment and grading of the dissertation. Through the dissertation, the student is expected to provide evidence of competence in carrying out original and independent research and a sound understanding of the material associated with the research. Pass/Fail

**CE8100 Directed Studies in Chemical Engineering (MASc)**
This course is for master's students who wish to gain knowledge in a specific area for which no graduate level classes are offered. This course would involve a directed study for which the student(s) would be given credit. Students wishing to take the class would be assigned a suitable class advisor most familiar with the specific area of interest. Students would be required to present the work of one term (not less than 90 hours in the form of directed research, tutorials and individual study), in an organized publication format. 1 Credit

**CE8139 Probability, Stats. & Stochastic Processes**
This course is an introduction to stochastic processes and probabilistic models. Statistical interference techniques are also discussed. Topics covered include: probability and random variables, Bernoulli, Binomial, Markov, Poisson, Wiener and Gaussian models, stationarity and cyclostationarity, spectra of various signals, linear mean-square estimation, representation of random signals and Karhunen-Loeve expansion, Markov chains and processes, parameter estimation, mean variance, confidence intervals, Bayesian models, hypothesis testing. Antirequisite EN8910, ME8139. 1 Credit

**CE8201 Modelling & Simulation in Chemical Eng.**
Principles of process modeling; modeling of steady state, and unsteady state processes leading to problem formulation; numerical solutions of linear and non-linear algebraic equations, ordinary differential equations, and partial differential equations; analytical solutions of ordinary and partial differential equations; advanced techniques of computer programming; introduction to object-oriented paradigm; computer simulation of chemical engineering processes; examples from thermodynamics, fluid mechanics, heat transfer, mass transfer, and chemical reaction engineering. 1 Credit

**CE8202 Advanced Process Control**
System identification. Review of linear control systems and state space. Design methods of multivariable control systems. Model Predictive Control: Internal Model Control (IMC) and Dynamic Matrix Control. Applications to chemical processes. 1 Credit

**CE8203 Applied Optimal Control**
Extreme values of functionals; theory of first variation; sufficient conditions for a strong relative extremum; Hamilton-Jacobi theory and Pontryagin's minimum principle; variational problems with constraints; Lagrange problem; Mayer problem; isoperimeter problem; fundamental theorem on undetermined systems; theory of second variation; formulation of optimal control problems; determination of optimal controls and trajectories with using numerical methods and computational techniques. 1 Credit

**CE8210 Process & Engineering Optimization**
The use of optimization methods is pervasive throughout the process industries. Thus, these techniques are an important part of a chemical engineer's tool set. This course will provide a blend of important theoretical concepts and practical implementation issues. The development of a student's ability to formulate optimization problems, select solution techniques and interpret results will be emphasized. Finally, through a series of industrially relevant problem sets, the students will gain exposure to popular optimization software. Extra project/assignments are required, weighing no less than 20-30% of the final grade. Antirequisite CHE425. 1 Credit

**CE8213 Advanced Numerical Methods**
Review of numerical analysis. Includes: solution of systems of linear and nonlinear algebraic equations, interpolation, least squares fitting, integral and derivative evaluations, and solution of ordinary and partial differential equations. Introduction to the numerical solution of systems of linear and nonlinear partial differential equations using finite difference and finite element methods. Includes: error analysis, non-uniqueness and stability in nonlinear systems, continuation, isoparametric mapping, time integration techniques, time step controller, and mesh refinement strategies. Includes practical applications to science and engineering. Programming is required throughout the course. Antirequisite EN891. 1 Credit

**CE8301 Advanced Transport Phenomena**
Differential and integral balances applied to isothermal and non-isothermal systems, interphase transport in non-isothermal, single component and multi-component systems. Heat and mass transfer in packed and fluidized beds. 1 Credit

**CE8302 Kinetic Theory of Multiphase Flow**
The classical theory of gases is applied to particulate flow and to fluidization by the introduction of a granular temperature concept. Equations of state for powders, viscosities of suspensions, and Navier-Stokes'-like equations of motion are derived. Applications to the design of industrial equipment, such as fluidized bed catalytic crackers, are shown using solutions of these equations with workstations. 1 Credit

**CE8303 Advanced Fluid Dynamics**
Vectors and tensors; introduction to fluid dynamics; kinematics; microscopic mass and momentum balances; exact solutions of the Navier-Stokes equations; dimensional analysis and similitude; flows with negligible acceleration; high Reynolds number flows; regions far from boundaries (the Boundary Layer Theory); hydrodynamic stability; turbulence; macroscopic balances for isothermal systems; non-Newtonian fluid behaviour. 1 Credit

**CE8310 Fluidization Engineering**
Introduction to the Unit Operation. The phenomenon and its industrial relevance. Determining variables. Intervals and their effect. Two-phase and three-phase fluid beds. Entrainment, Elutriation and TDH. Introduction to pneumatic transport. Gas-solid separators. Chemical reactors. Combustion in fluid beds. Circulating and pressurized fluid beds. Transport phenomena: Heat and mass transfer. Design of fluid bed processes and their components. Current fluid bed technology. Experimental innovations. Extra project/assignments are required, weighing no less than 20-30% of the final grade. Antirequisite CHE427 1 Credit

**CE8331 Membrane Technology**
A study of material transport in membranes and of the modes of operation. Modeling of mass transfer in membrane processes will also be discussed. Emphasis will be on the design and applications of various membrane processes in industry, such as: membrane filtration, reverse osmosis, gas permeation and pervaporation. Extra project/assignments are required, weighing no less than 20-30% of the final grade. Antirequisite CHE715. 1 Credit

**CE8401 Kinetics of Ind. Catalysis & Biocatalysis**
Homogeneous catalysis reactions such as acid-base catalyses, ion catalyses, enzyme catalyses, chain reactions and polymerization will be considered. Enzymatic and microbial heterogeneous catalyses will also be described. Studies of some important industrial reactions will be made. 1 Credit

**CE8402 Applied Thermodynamics.**
Definitions and basic principles; conservation of mass and energy; concept of entropy; equations of change with applications; thermodynamic properties and their determination based on the change of state of system; equilibrium and stability criteria, and their applications to single and multi-component systems; Gibbs free energy and the concept of fugacity; phase equilibrium and its calculation using various thermodynamic models, and computational algorithms; chemical equilibrium in single-phase systems; chemical equilibrium of reacting mixtures; combined phase and chemical equilibrium. 1 Credit

**CE8501 Polymer Science**
Definitions and basic principles; polymerization mechanisms; kinetics of polymerization reactions; thermodynamics of polymer-solvent phase equilibria; diffusion and mass transfer in polymer systems; heat transfer and non-isothermal effects

in polymer systems; polymer processing; mathematical modeling of mixing, extrusion, postdie processing, molding and forming. 1 Credit

**CE8502 Polymerization Reaction Engineering**
Introduction to polymerization. Chain growth polymerization. Kinetic model of radical polymerization, gel effect, molecular weight distribution. Stereoregulation of polymerization by Ziegler-Natta catalysis. Kinetic models. Principles of polymer reactor modeling: Batch, semi-batch and continuous reactors. Population balance equation for molecular weight. Introduction to control of polymerization reactors. 1 Credit

**CE8510 Plastic Technology**
Materials: classification and general properties of plastics, thermosets, thermoplastics, commodity plastics, engineering plastics, fillers and reinforcements. Polymer manufacturing processes. Converting operations: injection moulding, compression moulding, extrusion, blow moulding, wire and cable coating, thermoforming. Extra project/assignments are required, weighing no less than 20-30% of the final grade. Antirequisite CHE451. 1 Credit

**CE8602 Industrial Biotechnology**
A lecture and assignment course on the chemical, physical and biological aspect of industrial processes; the newly-emerging DNA-based methods for the identification and classification of bacteria of environmental, medical, food and agricultural importance. Introduction to regulatory guidelines, licensing and safety issues for the biotechnology industry. Assignments include problem-solving, proposal and report writing, and oral presentations. 1 Credit

**CE8701 Solid Waste Engineering and Processing**
Evolution of solid waste management. Evolution of legislation-driven technologies. Sources, composition and properties of solid waste material. Materials processing and recovery. Introduction to conversion processes; for example, thermal, biological and chemical. Recycling and reuse of waste materials. Systematic procedures for the analysis of processing stages and their integration into efficient plants. Computer-aided techniques in evaluating the interaction between processing requirements, utility needs and associated capital and operating costs. 1 Credit

**CE8702 Design Operat.of Sm.Water Treat. Plants**
Small water treatment plants (less than 20,000 PE) for industrial and domestic effluents play a central role in the overall water treatment policies of both developed and developing countries. The characteristics of these plants differ from those of large urban plants. Biofilm technologies like Rotating Biological Contractors, and Three-phase Fluidized Beds as well as Extended Aeration will be discussed from the point of view of design and operation. Other separation and disinfection technologies will be presented in conjunction with the treatment units. 1 Credit

**CE8703 Adv. Water Treatment Technologies**
Covers the sources of water and wastewater, and analytical characterization of water and wastewater. It also covers advanced oxidation technologies such as UV, UV/hydrogen peroxide, photocatalysis, and other advanced oxidation processes. Biological treatment of water and wastewater will also be discussed . 1 Credit

**CE8710 Air Pollution and Control**
A study of air pollution and general control methods. Air pollution measurements and emission estimates will be discussed. Fixed-box and diffusion models for air pollutant concentration will be introduced. Emphasis will be given on design of typical air pollution control equipment for volatile organic compounds (VOC), sulphur dioxide, nitrogen oxides. Introduction to control of particulate pollutants will also be included. Extra project/assignments are required, weighing no less than 20-30% of the final grade. Antirequisite CHE615. 1 Credit

**CE8802 Wastes from Food Processing**
Sources, composition and properties of wastes in the food processing industry. Interaction between chemical components and microorganisms present in food wastes. Biotransformations. Introduction to regulatory guidelines. Systematic procedures for the design of waste process plants, process requirements, utility needs, and associated capital and operating costs. 1 Credit

**CE8803 Advanced Food Processing Engineering**
Modeling of food properties . Momentum, heat and mass transfer applied to the control of moisture, microbial population, and nutritive/organoleptic properties of foods during processing operations. Optimization and scale up design. Quality systems design. 1 Credit

**CE9100 Directed St in Chemical Engineering (PhD)**
This course is for PhD students who wish to gain knowledge in a specific area for which no graduate level class is offered. It would involve a directed study for which for which the student would be given credit. Students wishing to take the class would be assigned an advisor most familiar with the specific area of interest. Students would be required to present the work of one term (not less than 90 hours in the form of directed research, tutorials and individual study), in an organized publication format. 1 Credit

## CIVIL ENGINEERING

### CURRICULUM

### Master of Applied Science

**DEGREE REQUIREMENTS**

Master's Thesis

Five Elective credits (One may be a Directed Studies course)

### Master of Engineering

**DEGREE REQUIREMENTS**

Master's Project*

Eight Elective credits (One may be a Directed Studies couse)

*students may apply to substitute 2 courses for the project.

### Doctor of Philosophy

**DEGREE REQUIREMENTS**

Candidacy Examination
Dissertation

Four Elective credits (One may be a Directed Studies course)

| ***ELECTIVES*** | | *Credits* |
|---|---|---|
| CV8100 | Directed Studies: Engr | 1 |
| CV8101 | Civil Engr Research Seminar | 1 |
| CV8102 | Construction Project Mgmt | 1 |
| CV8103 | Research Methodology | 1 |
| CV8104 | Planning & Control of Construc | 1 |
| CV8105 | Construction Admin & Mgmt | 1 |
| CV8106 | Advances in Concrete Materials | 1 |
| CV8200 | Proc for Wtr Pollution Control | 1 |
| CV8201 | Surface Wtr Quality Modelling | 1 |
| CV8202 | Surface Wtr Pollution Analyses | 1 |
| CV8203 | Contamnt Transp - Porous Media | 1 |
| CV8204 | Soil Remediation | 1 |
| CV8205 | Spec Topics: Env Engineering | 1 |
| CV8206 | Water Resource System Analysis | 1 |
| CV8300 | Solid Mechanics | 1 |
| CV8301 | Appl of Finite Element | 1 |
| CV8302 | Dynamics of Structures | 1 |
| CV8303 | Renov/Repair - Existing Struct | 1 |
| CV8304 | High Perf Concrete Structures | 1 |
| CV8306 | Durability of Structures | 1 |
| CV8307 | Adv Struct R/P Concrete Design | 1 |
| CV8308 | Bridge Design and Construction | 1 |
| CV8309 | Spec Topics: Structural Engr | 1 |
| CV8400 | Road Safety | 1 |
| CV8401 | Traffic Operations & Mgmt | 1 |
| CV8402 | Public Transportation | 1 |
| CV8403 | Transportation Planning | 1 |
| CV8404 | Human Factors & Road Transp | 1 |
| CV8405 | Pavement Design and Mgmt | 1 |
| CV8406 | Adv Highway Geometric Design | 1 |

| | | |
|---|---|---|
| CV8407 | Special Topics: Transportation | 1 |
| CV8408 | Intelligent Transportation Sys | 1 |
| CV8500 | Advanced Satellite Positioning | 1 |
| CV8501 | Adv Top in Spatial Info Sys | 1 |
| CV8502 | Digital Stereo Image Proc | 1 |
| CV8503 | Geospatial Modelling & Visualiz | 1 |
| CV8504 | Adv Estim & Data Series Anal | 1 |
| CV8505 | Design/Impl of Spat Info Sys | 1 |
| CV8506 | Industrial Metrology | 1 |
| CV8507 | Satellite Remote Sens: Urban | 1 |
| CV8600 | Non-dstrct Tst & Instr - Struct | 1 |

**COURSE LISTING**

**Master's Thesis**
The student is required to conduct advanced research on a topic chosen in consultation with the student's thesis supervisor. The supervisory committee and the thesis supervisor must approve the thesis research plan/proposal, which is presented in writing by the student. The student must submit the completed research in a thesis format to an examination committee and make an oral presentation of the research thesis, and the research results, to this committee. The examination committee will assess and grade the thesis. Through the thesis, the student is expected to furnish evidence of competence in research and a sound understanding of the specialty area associated with the research. This is a "Milestone." Pass/Fail

**Master's Project**
The Project may consist of an advanced design assignment, laboratory research project, analysis of research data, or an in-depth review of an approved aspect of the scientific literature. The student submits a written proposal of the project plan, which must be approved by the project supervisor, and the supervisory committee. The MEng candidate must submit two copies of the completed project report to the supervisor. An oral presentation of the project report, and results, will be arranged in a seminar format. The supervisor and another member of the supervisory committee will assess and grade the report. This is a "Milestone." Pass/Fail

**PhD Candidacy Examination**
Pass/Fail

**PhD Dissertation**
Pre-requisite: Candidacy Examination. Pass/Fail

**CV8100 Directed Studies in Engineering**
Various possibilities exist for pursuing directed studies on topics approved by the course supervisor and thesis supervisor, including the other specialization course topics where they are not offered on a formal basis. 1 Credit

**CV8101 Civil Engineering Research Seminar**
This is a course that consists of a weekly seminar series with emphasis on current research in environmental, structural and transportation engineering. Presentations in different areas will be given by faculty and invited lecturers from industry and government agencies. Each student will prepare a major paper on a feasible research topic, complete with a comprehensive literature review, and make an oral presentation of the paper. 1 Credit

**CV8102 Construction Project Management**
The objective of this course is to provide participants with a detailed framework for understanding how engineering and construction projects are successfully planned, organized and controlled, and to equip them with some of the tools and techniques for developing and improving their managerial skills. Participants will learn how the various parties in the construction process organize projects, and in particular how to maximize the possibilities of realizing projects of the correct quality on time and within budget. The depth and practicality of the course will benefit participants who ideally will have at least a couple of years of industrial experience. 1 Credit

**CV8103 Research Methodology**
The is intended to familiarize newly enrolled graduate students with the research skills necessary for completing a major research work at the Masters or PhD level. It is taught by a series of formal lectures, small group discussions and required assignments. It is assumed that students have an adequate knowledge or expertise in their chosen field of research and are either currently involved in, or will soon be undertaking, a major experimental or survey research project. By way of introduction, students will be made to understand what graduate-level research is all about and what is expected of their thesis work. This course includes instructions on how to identify and locate electronic resources, full text of journal articles, the contents of reference and research publications, and other databases. Students will learn the skills for critical reading and for constructing valid arguments. They will also learn some common statistical tools and techniques required for the analysis of qualitative and quantitative data. This will include the design of questionnaires and field interviews,

vehicles for gathering the data and for disseminating the findings. The course ends with helpful suggestions on how to write, present and to defend a thesis. 1 Credit

**CV8104 Planning & Control of Construction Proj.**
This course emphasizes the techniques of planning and control within the unique project environment of the construction industry. It has a notable practical component and its contents go beyond the fundamental concepts of project planning and control. The course begins with resource planning and estimating, from a conceptual stage to the operation stage. Following a review of some of the more popular techniques of project planning and control, students have 4 "hands-on" sessions on the use of one major project management software. In addition to key topics in techniques of planning and control, this course also examines several associated and interrelated economic and financial issues in the planning and control of construction projects. These include life cycle costing, cost and time optimization, cash flow forecasting, and the economic evaluation and financing of construction projects. 1 Credit

**CV8105 Construction Administration and Management**
This course offers topics that focus on skills and techniques useful in administering and managing within a project environment of the construction industry. Participants should, preferably, have some previous responsibilities in one or more phases of the development of major constructed facilities, either in the planning, design, or construction of the facilities. Topics offered include international and Canadian construction, organisational design for projects and companies, management control structures and processes, meetings and negotiations, managing change in organisations, power struggles and politics in organisations, conflicts and their resolutions, claims and disputes in the industry, and the all important issue of construction safety. 1 Credit

**CV8106 Advances in Concrete Materials**
Chemistry and manufacturing of Portland cement; Supplementary cementing materials; Chemical admixtures for concrete; Properties of hardened concrete; Chemistry and mechanics of concrete deterioration and effects of SCM; Concrete of special properties; Advance experimental techniques in concrete. 1 Credit

**CV8200 Processes for Water Pollution Control**
This course expands on the principles and designs involved in the handling and treatment of different water pollution control systems: municipal, stormwater, and combined sewer overflows. Topics cover physical, chemical, and biological treatment processes, as well as the more advanced and innovative treatment including carbon columns for dissolved organics removal, biochemical phosphorus removal, biological nitrification-denitrification, ammonia stripping, alternative disinfection methods, and detoxication of sludge. A theoretical approach, supplemented by practical design applications and problem solving, will be adopted. 1 Credit

**CV8201 Surface Water Quality Modelling**
This course provides the fundamental concepts for modeling the physio-chemical and biological processes that pollutants undergo when discharged into different types of water bodies. Major topics include mass-balance and hydrodynamic equations in rivers, estuaries, harbours and lakes; finite-difference and finite element solution approaches; steady-state and time-variable pollutant discharges, principal water quality problems; dissolved oxygen eutrophication, toxic substances, indicator bacteria and viruses. Bioaccumulation of chemicals in aquatic animals and fishes through the food-chain and water vectors. 1 Credit

**CV8202 Surface Water Pollution Analyses**
A quantitative analysis of surface water pollution pathways is crucial to the development of water pollution prevention and control plans. This course will discuss the point and non-point sources in urbanized areas with emphasis on modeling approaches and analysis techniques. Topics include: surface hydrology, municipal water use cycle, urban drainage systems, point and non-point pollution control strategies for sanitary, storm, and combined sewer systems. 1 Credit

**CV8203 Contaminant Transport in Porous Media**
Prediction of contaminant transport in porous media is important for soil remediation and site selection for waste disposal. This course will discuss the processes governing contaminant transport and behaviour including advection, dispersion, diffusion, and adsorption. Topics include: natural groundwater quality, the geochemical origin of major ions in natural groundwater, causes of hardness, groundwater age determination using isotopes, common causes of groundwater contamination, and the transport and biochemical transformation of contaminants in the unsaturated saturated groundwater zones. 1 Credit

**CV8204 Soil Remediation**
This course overviews the design and operation of processes for soil remediation. Contaminants of interest include halogenated and non-halogenated volatiles, halogenated and non-halogenated semi-volatiles, flue hydrocarbons, pesticides and inorganics. Seven groups of technologies will be examined: (1) excavation and off-site disposal, (2) soil venting, (3) bioremediation, (4) thermal technologies, (5) chemical technologies, (6) mechanical flushing and washing, and (7) natural attenuation. Antirequisite ES8908. 1 Credit

**CV8205 Special Topics in Environmental Eng.**
The subject matter changes from year to year. The course description will be announced prior to the scheduling of the course. 1 Credit

**CV8206 Water Resources System Analysis**
This course deals with the planning, design and management of multi-component water resources systems. After a review of the use and nature of water resources systems, topics studied in details are: water resource economics,

methodology of design, system analysis, system design and decision making, applied mathematical programming, probabilistic models and water quality sub-systems. 1 Credit

**CV8300 Solid Mechanics**
Stress: notation; 2D and 3D transformation; differential equations of equilibrium; principal stresses; invariates. Strain: strain displacement equations; 2D transformation; relative displacement and notations. Isotropic stress strain formulations for plane stress, plain strain and 3D. Polar coordinates: governing equations and solutions. Tensor fundamentals; index notation; vector transformation of components; Kronecker; permutation symbols; tensor algebra; Gauss theorem. Equations of elasticity in tensor notation. Energy theorems. 1 Credit

**CV8301 Appl.of Finite Element Meth.in Struct.Eng.**
Application of stiffness method for trusses and frames. Direct formulation of CST and thermal-seepage. Finite element formulation by virtual work. Elements: triangular, Lagrangian and serendipity rectangles; numerical integration; curvilinear elements; three-dimensional elements; plates, shells and axisymmetric elements. Convergence: Rayleigh-Ritz method; patch test; reduced integration. Solution of special problems: 2D and 3D problems; secondary effects; non-linear problems; soil-structure interaction. 1 Credit

**CV8302 Dynamics of Structures**
Free-vibration. Damping in structures. Response to harmonic and periodic excitations. Response to arbitrary, step and pulse excitations. Numerical evaluation of dynamic response. Earthquake response of linear systems. Earthquake response to inelastic systems. Structural dynamics in International Building Codes. 1 Credit

**CV8303 Renovation/Repair of Existing Structures**
Maintenance, renovation, rehabilitation and preservation of infrastructure. Mechanisms of mechanical, chemical and biological infrastructure degradation. Corrosion of steel condition surveys and evaluation of buildings and bridges repair and preservation of materials, techniques and strategies. Codes and guidelines. Case Studies. 1 Credit

**CV8304 High Performance Concrete Structures**
This course deals with the use of high performance concrete (HPC) in structures. Topics include: HPC principles, relevant properties of HPC, materials and mechanical properties, producing and curing HPC, shrinkage problems, temperature effects, design issues, case studies. 1 Credit

**CV8306 Durability of Structures**
Basic concepts, durability, safety, repair and strengthening. Deterioration mechanisms, corrective and preventive measures. Reliability analysis. Design for durability. Bridges. Parking structures. Steel, timber and masonry structures. Management systems. Strengthening and retrofitting. Case studies. 1 Credit

**CV8307 Adv. Structural R/P Concrete Design**
Reinforced Concrete: Mechanics of reinforced concrete; truss model and compression field theory for beams failing in shear; design of slender columns; shear friction and horizontal shear transfer; design of deep beams and corbels. Prestressed Concrete: Design of beams for flexure, shear and torsion; losses in prestress; design of continuous beams and frames; design for camber, deflection and crack control. Antirequisite: CVL 904. 1 Credit

**CV8308 Bridge Design and Construction**
Types of bridges; material properties and design of timber, steel and concrete elements; bridge loads; load distribution in bridge superstructures; simplified methods of analysis, with reference to the Canadian Highway Bridge Design Code; design of slab bridges; design of slab-beam bridges; design of box-girder bridges; joints, bearings, bridge piers and abutments. 1 Credit

**CV8309 Special Topics in Structural Engineering**
The subject matter changes from year to year. The course description will be announced prior to the scheduling of the course. 1 Credit

**CV8400 Road Safety**
This course provides an understanding of the safety management process and the variety of tools used. Topics include: probability models of accident occurrence; estimation of safety in developing and evaluating countermeasures; methods for identifying hazardous elements; safety of road facilities: intersections, roadways, roadsides, railroad crossings and traffic control elements; driver, pedestrian and bicycle safety; applications of human factors principles; safety audits; vehicle safety; biomechanics of injuries; multidisciplinary accident investigation. 1 Credit

**CV8401 Traffic Operations and Management**
The course introduces topics related to the management of congestion on urban road networks. These include: capacity analysis; deterministic and stochastic models of traffic behaviour; traffic assignment models; incident detection and management; ramp metering; signal timing for networks and arterials; Applications of Intelligent Transportation Systems; demand management. Antirequisite: CVL902.
1 Credit

**CV8402 Public Transportation**
This course deals with the planning and operational analysis of public transit systems. Topics include: classification of public transport systems, system and service planning, capacity and quality of service of transit systems, economics and finance of public transport, ridership forecasting, and advanced public transportation systems. 1 Credit

**CV8403 Transportation Planning**
This course deals with the process and techniques of transportation planning, with emphasis on urban and regional applications. Topics include: historical development of transportation planning in North America; transportation planning framework; surveys and data collection; transportation-land use interaction; analysis and models of transportation demand; analysis and models of transportation performance; development and evaluation of transportation planning options. 1 Credit

**CV8404 Human Factors & Road Transportation**
This course will deal with human physical, perceptual and cognitive limitations as they impact traffic safety. The following introductory human factors topics will be covered: road user visual limitations (field of view, foveal and central vision, colour, contrast sensitivity, acuity) and information processing limitations (attention, channel capacity, memory, visual search strategies). Road user limitations will be considered in relation to the design of traffic control devices and highway geometry. The impact of driver impairments such as fatigue, inexperience, age, medical conditions and alcohol and drug use will be discussed. Common causes of collisions will be discussed, illustrated by real-life case studies. 1 Credit

**CV8405 Pavement Design and Management**
Pavement performance and distress. Theory and stress analysis of flexible and rigid pavements. Properties and characterization of paving materials. Design of flexible and rigid pavement for highways and runways. Overlay design. Reliability analysis. Flexible and rigid pavement construction. Pavement management systems. Review of design projects. Antirequisite: CVL 900. 1 Credit

**CV8406 Advanced Highway Geometric Design**
This course deals with the theory and practice of highway geometric design, including design controls, horizontal and vertical alignments, intersections, interchanges, and cross sections. Driver ability, vehicle performance, and safety are considered. Advanced topics such as three-dimensional sight distance, intersection control, safety audits, value engineering, design flexibility, design consistency, and reliability analysis are discussed. Unconventional topics such as intelligent transportation systems and roundabouts are also discussed. 1 Credit

**CV8407 Special Topics in Transportation**
The subject matter changes from year to year. The course description will be announced prior to the scheduling of the course. 1 Credit

**CV8408 Intelligent Transportation Systems**
This course presents an overview of intelligent transportation systems (ITS) that includes a wide range of information technology applications to surface transportation. The ITS categories include traffic management systems, traveler information systems, fleet control systems, commercial vehicle regulation systems, transit systems, rural systems, and vehicle control systems. The use of advanced surveillance, navigation, communication, and computer technology to monitor, analyze, and improve the performance and safety of surface transportation is demonstrated. Human factors and institutional issues are addressed. 1 Credit.

**CV8500 Advanced Satellite Positioning**
Overview of satellite positioning methods; description of GPS satellite orbits; characteristics of the GPS signals; GPS signal propagation; GPS measurements errors; GPS observables; linear combination of GPS observables; GPS models for short, medium and long distances; integer ambiguity determination for one, two and three frequencies; integration of GPS and GLONASS; integration of GPS and INS; current research topics. 1 Credit

**CV8501 Adv. Topics in Spatial Information Systems**
This course covers such advanced issues as database management; various data models; spatial data standards and interchange, GIS data integration and software integration (e.g., OGC framework & GIS toolkits), algorithms for processing spatial and non-spatial data, basic architecture for networking GIS, characteristics of Internet GIS/mapping, and implementation and integration issues for online spatial data dissemination and GIS services. 1 Credit

**CV8502 Digital Stereo Image Processing**
Design characteristics of digital imaging systems for metric data capture; Geometric modeling of sensors for high precision 3D data extraction; calibration and modeling of digital imaging systems; inclusion of various geometric constraints; solution approaches for convergent imaging geometries from multi-sensor networks; automation aspects of image correlation and feature extraction; image rectification procedures; applications in the areas of engineering deformation; industrial Photogrammetry; reverse engineering and medical imaging. 1 Credit

**CV8503 Geospatial Modeling & Visualization**
This course will examine current research topics in applications of remote sensing imagery for generating and visualizing environmental models. The focus is on integration of multisource and multiscale geospatial data at a local and regional scale for dynamic and multidimensional modeling and visualization tasks in a stand-alone or web-based environment. Selected case studies in transportation, forestry, agriculture, and urban landscape are addressed. 1 Credit

**CV8504 Adv. Topics in Estim. and Data Series Anal.**
Concept of a random process, classification of processes, auto- and cross-correlation functions, spectral density function, sampling theorem, discrete Fourier transform and fast Fourier transform, introduction to wavelet theory, filters, Wiener filtering, Kalman filtering, relationship to least-squares estimation, practical applications. 1 Credit

**CV88505 Design and Impl. of Spatial Info. Systems**
This course addresses the software design and implementation problems for spatial information systems. It covers the topics of software engineering, spatial data structures, spatial search, and algorithms for processing spatial data, with practical applications. 1 Credit

**CV8506 Industrial Metrology**
Data acquisition systems employed for close range measurements. Close-range Photogrammetry and laser imaging. Mathematical formulations for self-calibration with geometric considerations. Bundle adjustment, DLT-type, sequential and phased methods. Photogrammetric network design and post-adjustment analysis. Processing of laser point clouds and form fitting. Industrial case studies. 1 Credit

**CV8507 Satellite Remote Sensing of Urban Areas**
This course examines the characteristics of high-resolution space-borne remote sensing systems and their applications for the mapping and analysis of complex urban scenes. Major topics include overview of high-resolution satellite remote sensors, multi-sensor data fusion, knowledge-based image analysis, photogrammetric processing of satellite images for 3D object extraction, intelligent change detection systems, and integration of remote sensing and 3D urban GIS. Selected case studies in urban transportation planning, land-use/land-cover mapping, human settlement management and environmental impact analysis are addressed. A lab-based term project with a research report or paper is required. 1 Credit

**CV8600 Non-destruct. Test. and Inst. of Structures**
Non-destructive testing and evaluation methods; Visual inspection; Mechanical methods; Maturity method; Stress wave methods; Acoustic emission methods; Electric and magnetic methods; Penetrability methods; Electromagnetic methods; Infrared thermographic method; Nuclear methods. 1 Credit

## COMMUNICATION AND CULTURE

### CURRICULUM

### Master of Arts

| DEGREE REQUIREMENTS | | Credits |
|---|---|---|
| CC8900 | Core Issues: Cultural Studies | 1 |
| CC8901 | Core Issues: Commun Studies | 1 |
| CC8902 | Research Methods Workshop | 1 |
| CC8903 | MA Seminar: Rsrch & Practice | |
| Two credits from Group A: Foundation Courses | | 2 |
| Four credits from Group B, C or D: Specialization Electives | | 4 |
| | (at least one from two of the groups) | |

AND one of the following Options:

***RESEARCH PAPER Option:***

Master's Research Paper

And One additional credit from Group B, C or D

***THESIS Option:***

Master's Thesis

***PROJECT Option:***

Master's Project

### Doctor of Philosophy

| DEGREE REQUIREMENTS | | Credits |
|---|---|---|
| Comprehensive Examination | | |
| PhD Dissertation Research | | |
| CC8902 | Research Methods Workshop* | 1 |
| CC9903 | PhD Seminar: Rsrch & Practice | |
| CC9904 | Perspectives: Comm & Culture | 1 |
| AND Two credits from Group A: Foundation Courses* | | |
| AND Two credits from Groups B, C, or D: Specialization Electives | | |

*Student may apply for exemption (with substituion) if taken at the Master's level.

| ***Group A: FOUNDATION COURSES*** | | Credits |
|---|---|---|
| CC8920 | Theoretical Appch Media & Culture | 1 |
| *or* | | |
| *CC8921* | *Visual Culture* | 1 |
| CC8940 | Poltc Econ of Culture and Commun. | 1 |
| *or* | | |
| *CC8941* | *Issues - Commun & Cult Policy* | 1 |
| CC8960 | Adv Communication Technology | 1 |
| *or* | | |
| *CC9921* | *Technology Commun & Culture*** | 1 |
| | ***Doctoral students only* | |

***Group B: Specialization Electives in Media and Culture***

| | | |
|---|---|---|
| CC8822 | Performing Arts and the City | 1 |
| CC8823 | Transnat Id, New Mediations | 1 |
| CC8824 | Globlzn: Mkts, Citizen, Identity | 1 |
| CC8825 | Seminar Social Cultural Theory | 1 |
| CC8826 | Post-Human Cndn: Theory, Polit | 1 |
| CC8827 | City as Cinema | 1 |
| CC8828 | Philosophy, Culture & Values | 1 |
| CC8829 | Modernist Lit Circ: Cult'l Appr | 1 |

| | | |
|---|---|---|
| CC8830 | Writing the Self, Reading the Life | 1 |
| Cc8831 | Theorizing the Sacred | 1 |
| CC8920 | Theoretical Appch Media & Cult | 1 |
| CC8921 | Visual Culture | 1 |
| CC8922 | Issues in Cultural Studies | 1 |
| CC8923 | Culture as Perf: Anthr of Arts | 1 |
| CC8924 | Marxism Culture and Film | 1 |
| CC8925 | Reading Television | 1 |
| CC8926 | Theoretical Issues in Film | 1 |
| CC8927 | Reading Film | 1 |
| CC8928 | Culture and the Environment | 1 |
| CC8929 | Seminar: Symbolic Anthropology | 1 |
| CC8930 | Cult & Values - Pop Media | 1 |
| CC8931 | Popular Music Studies | 1 |
| CC8932 | Commun Culture & the City | 1 |
| CC8933 | Culture in the City Workshop | 1 |
| CC8934 | Contemp Topics: Social Theory | 1 |
| CC8935 | Critique of Everyday Culture | 1 |
| CC8936 | Cultural Condit of Authorship | 1 |
| CC8938 | Spec Top in Media Culture B | 1 |
| CC8939 | Special Topics in Media Culture A | 1 |
| CC8020 | Social Theory & Comm Process | 2 |
| CC8021 | Film and Social Change | 2 |
| CC8022 | Mediations of Identity | 2 |
| CC8023 | Contmp Topics: Social Theory | 2 |
| CC8024 | The Critique of Everyday Culture | 2 |
| CC8025 | Summer Seminar in Social, Cultural Theory | 2 |
| CC9920 | Topics in Psychoanal & Culture** | 1 |

**doctoral students only

***Group C: Specialization Electives in Politics and Policy***

| | | |
|---|---|---|
| CC8840 | Media Democracy | 1 |
| CC8841 | Owning Culture | 1 |
| CC8842 | Public Affairs Media | 1 |
| CC8843 | Culture, Counterpublics & the WTO | 1 |
| CC8844 | Introduction to Broadcast Management | 1 |
| CC8845 | Communication & International Development | 1 |
| CC8846 | Communication and Public Interest | 1 |
| CC8847 | Global Media | 1 |
| CC8848 | Armed Conflict, Peace & the Media | 1 |
| CC8940 | The Poltc Econ of Culture & Commun | 1 |
| CC8941 | Issues in Commun & Cult Policy | 1 |
| CC8942 | Cross-Cult & Internat Commun | 1 |
| CC8943 | Globalization of Comm & Cult | 1 |
| CC8944 | Technology and Globalization | 1 |
| CC8945 | Political Commun & Env Issues | 1 |
| CC8946 | Communication Policy | 1 |
| CC8947 | Cultural Policy | 1 |
| CC8948 | The Image Industry | 1 |
| CC8949 | The Communications Industry | 1 |
| CC8950 | Current Issues: Telecommun | 1 |
| CC8951 | Communications Law | 1 |

| | | |
|---|---|---|
| CC8952 | Political Economy of Media | 1 |
| CC8953 | Politics of Intellec Property | 1 |
| CC8954 | New Social Movements | 1 |
| CC8955 | Global Justice & Environment | 1 |
| CC8956 | Globlzn & Cultural Identity | 1 |
| CC8957 | Appl Rsrch Mth: Policy & Reg | 1 |
| CC8958 | Readings in Public Policy | 1 |
| CC8959 | Spec Topics: Politics & Policy | 1 |
| CC8050 | Appl Rsrch Meth: Policy & Reg | 2 |
| CC8051 | Readings in Public Policy | 2 |

***Group D: Specialization Electives in Technology in Practice***

| | | |
|---|---|---|
| CC8960 | Adv Communication Technology | 1 |
| CC8961 | Issues in Media Production | 1 |
| CC8962 | Lang & Narrative Film/Video/Mm | 1 |
| CC8963 | Social Cult Impl of New Media | 1 |
| CC8964 | Diffusion of Commun Technol | 1 |
| CC8965 | Communication in Organizations | 1 |
| CC8966 | Activist Video Making | 1 |
| CC8967 | Contemp Theory in Visual Arts | 1 |
| CC8968 | History & Theory of Film & Video | 1 |
| CC8969 | Media Ethics | 1 |
| CC8970 | Special Topics in Cdn Cinema | 1 |
| CC8971 | Experimental Media | 1 |
| CC8972 | Experimental Film Processes | 1 |
| CC8973 | Design: Interactive Multimedia | 1 |
| CC8974 | Media Production Workshop | 1 |
| CC8975 | Race & Gender in Digital Tech | 1 |
| CC8976 | Digital & Interact Entertainmt | 1 |
| CC8977 | Media Prod Techniques & Pract | 1 |
| CC8978 | Documentary Narration | 1 |
| CC8979 | Spec Topics:Technology & Commun | 1 |
| CC8980 | Adv Media Production Project | 1 |
| CC8981 | Internet Creativity & Innov | 1 |
| CC8982 | The Body and the Culture of Modernity | 1 |
| CC8983 | The Culture of the Avante-garde | 1 |
| CC8984 | A History of News | 1 |
| CC8985 | Photographic Vision/Practice | 1 |
| CC8986 | Future Cinema | 1 |
| CC8060 | Media Production Workshop | 2 |
| CC8061 | Wired World: Cult Tech Phil | 1 |
| CC9921 | Technology Commun & Culture* | 1 |

**Doctoral level only*

*The following courses may be used by Master's students in place of any Specialization course, with the permission of the Program Director or Associate Director.*

| | | |
|---|---|---|
| CC8990 | Directed Rdg: Commun & Cult A | 1 |
| CC8991 | Directed Rsrch: Commun & Cult | 1 |
| CC8992 | Directed Grp Stud: Comm & Cult | 1 |
| CC8993 | Field Placements | 1 |
| CC8994 | Directed Rdg: Commun & Cult B | 1 |

| | | |
|---|---|---|
| CC8090 | Directed Rdg: Commun & Culture | 2 |
| CC8091 | Directed Rsrch: Comm & Culture | 2 |
| CC8092 | Directed Grp St: Comm & Cult | 2 |
| CC8093 | Field Placements | 2 |

*The following courses may be used by Doctoral candidates in place of any Specialization course, with the permission of the Program Director or Associate Director.*

| | | |
|---|---|---|
| CC9990 | Directed Readings A | 1 |
| CC9991 | Directed Readings B | 1 |
| CC9992 | Directed Research | 1 |
| CC9993 | Directed Group Study | 1 |
| CC9090 | Directed Readings A | 2 |
| CC9091 | Directed Readings B | 2 |
| CC9092 | Directed Research | 2 |
| CC9093 | Directed Grp Stud Comm & Cult | 2 |

**COURSE LISTING**

All "CC" courses have York University course numbers indicated in brackets following the Ryerson University codes.

**Master's Research Paper**
This is a "Milestone." Pass/Fail

**Master's Thesis**
This is a "Milestone." Pass/Fail

**Master's Project**
This is a "Milestone." Pass/Fail

**Comprehensive Examination**
This is a "Milestone." Pass/Fail

**PhD Dissertation Research**
Pre-requisite: Comprehensive Examination. This is a "Milestone." Pass/Fail

**CC8020 (CMCT 6103 6.0) Social Theory and Communication Processes**
Theories of communication processes, the mass media, and symbolic behaviour. The mass media and the controversies about popular culture; criteria for evaluating the media; research methodology; and content analysis. Antirequisite SPT 6032 6.0 (York University), SOCI 6560 6.0 (York University). 2 Credits

**CC8021 (CMCT 5102 6.0) Film and Social Change**
This course investigates the ways in which films of all kinds can be used as a means to radical insights into culture, giving consideration to the contributions to film criticism and theory offered by various radical movements such as Marxism, Feminism, and Gay Liberation. Antirequisite FILM 4410 6.0 (Atkinson). 2 Credits

**CC8022 (CMCT 5103 6.0) Mediations of Identity**
This course is premised upon the principle that the mass media undertake the function of moral, political and ideological reproduction within society. In this respect, the course examines the ways in which media's representations of social identity (e.g. race, sexuality, gender, class, nation), act as highly selective and ideologically shaped portrayals of the social order. We shall closely consider current and 'classical' theories which allow particular insight into social construction of human identities, subjects and subjectivities. These theoretical frames of reference will also be applied in the analysis of various media forms and genres (including photography, television and film). Antirequisite AS/SOSC 4325 6.0 (York University). 2 Credits

**CC8023 (CMCT6113 6.0) Contemporary Topics in Social Theory**
The purpose of this course is to take up issues that are topical and require some knowledge of social, political, philosophical and psychoanalytic theory. Antirequisite SOCI 6220 6.0 (York University), PHIL 6640 6.0 (York University). 2 Credits

**CC8024 (CMCT6121 6.0) The Critique of Everyday Culture**
An attempt to integrate various theoretical frameworks centering on the twin problematics of everyday life and the study of popular culture. In particular, it examines anthropological, phenomenological, semiological, hermeneutical and neo-Marxist approaches to culture. Antirequisite SOCI 6130 6.0 (York University) & SPT 6609 6.0 (York University). 2 Credits

**CC8025 (CMCT 6130 6.0) Summer Seminar in Social, Cultural Theory**
This seminar examines key aspects of contemporary social and cultural theory, focusing on the writings of an important theorist in the field. Normally, that theorist will participate in the course for one week, offering a series of seminars on her/his work. 1 Credit

**CC8050 (CMCT 6312 6.0) App. Research Meth: Policy & Reg. Research**
Provides students with the opportunity to develop the research skills required for policy and regulatory research, and a critical appreciation of their appropriate use in the design of their own research. Antirequisite ENVS 6180 6.0 (York University). 2 Credits

**CC8051 (CMCT6313 6.0) Readings in Public Policy**
Exploration of key ideas about public policy processes with an emphasis on how this process is played out in the various policy areas of interest to students in the course. Antirequisite ENVS 6101R 3.0 (York University). 2 Credits

**CC8060 (CMCT6510 6.0) Media Production Workshop**
Combines active media analysis with the production of images/text around environmental issues. Students critically explore the production process through media observations, readings, and audio-visuals, visits to production sites, and interviews with imagemakers. There are opportunities to develop hands-on skills in photographic or video production. The central learning experience of the workshop involves a media production applying analytical insight, technical skills, and creativity. Antirequisite ENVS 6349 6.0 (York University). 2 Credits

**CC8061 (CMCT6520) Wired World: Culture, Tech. & contemp. Phil.**
This course explores the intersection of philosophical thought with communication and information technology. It considers both the importance of philosophical foundations for contemporary studies of technology as well as the philosophical implications of advances in contemporary communication technology. 2 Credits

**CC8090 (CMCT 6911 6.0) Directed Readings in Commun. and Culture**
The directed readings course is intended to permit the student to survey a coherent body of literature in an area of study related to the student's program objectives. 2 Credits

**CC8091 (CMCT 6902 6.0) Directed Research in Commun. and Culture**
The directed research course is intended to permit the student to conduct research or develop a theoretical perspective in an area of study related to the student's program objectives. The research may take the form of a pilot study for a thesis or project. 2 Credits

**CC8092 (CMCT 6903 6.0) Directed Group Study in Commun. and Culture**
The directed group study is intended to allow a group of students, with the agreement of a faculty member, to organize a seminar in an area not covered in the course offerings. 2 Credits

**CC8093 (CMCT 6909 6.0) Field Placements**
Master's students are able to receive credit for a two term course by undertaking a field placement in an appropriate institution. 2 Credits

**CC8700 Intro. to Theories of Commun. & Culture**
An intensive introduction to the major theories of communication and culture. The course will provide an overview of the major themes and thinkers in the area. Antirequisite AKCEFG4000 3.0 (York University).This course is a non-degree/non-credit course designed to provide background training and may be required of some students as conditions of admissions.

**CC8701 Understanding Commun. Technologies**
An intensive introduction for non-specialists to the history of communication technology and to the operation and uses of contemporary and emerging forms. Use of lecture, seminar and studio/lab demonstrations will provide the participant with opportunities to connect technology theory and practice. Antirequisite CDGS701 (Ryerson University, Continuing Education).
This course is a non-degree/non-credit course designed to provide background training in current communication and media production and delivery technologies and may be required of some students as conditions of admissions.

**CC8822 (CMCT 6112 3.0) Performing Arts and the City**
This course examines the impact of the performing arts on local communities. 1 Credit

**CC8823 (CMCT 6116 3.0) Transnat. Id., New Mediations & the Public**
This course explores the ways in which communications technologies shape national identities and understandings of public goods. We consider transformations and contestations of the public sphere, the public domain, intellectual property, freedom of speech, and multiculturalism in the face of an intensification of global population and cultural flows. 1 Credit

**CC8824 (CMCT 6108 3.0) Globalization: Mkts, Citizenship, Identity**
This course examines the discourse and theory of globalization narratives, pre-and post-Seattle from a critical perspective as they affect markets, cultural policy, public goods and diverse citizenship needs. 1 Credit

**CC8825 (CMCT 6130 3.0) Summer Seminar in Social, Cultural Theory**

This seminar examines key aspects of contemporary social and cultural theory, focusing on the writings of an important theorist in the field. Normally, that theorist will participate in the course for one week, offering a series of seminars on her/his work. 1 Credit

**CC8826 (CMCT 6321 3.0) The Post-Human Cond'n.: Theory & Politics**
Since the 1990's "cyber" has altered what it means to be human in terms of self and other, essence, agency, consciousness, intimacy, intelligence, reason, life, embodiment, identity, and gender. This course examines the meaning, possibilities, and implications of the posthuman. 1 Credit

**CC8829 (CMCT 6109B 3.0) Modern Lit Circ: Cult'l Appr**
Course studies culture of early twentieth-century modernist salons in New York, Paris, and London with focus on New York Dada, Left Bank Moderns, and Bloomsbury. Course explores a range of cultural expressions (print culture, visual culture and performance). More specifically, students investigate synergies of different media and nationalities and probe interrelationship among various artists; students also examine relationship of space including interior design and architecture in formation and flourishing of modernist salons and literary circles. 1 Credit.

**CC8830 (CMCT 6128 3.0) Writing the Self, Reading the Life**
This course will examine a variety of genres within the broadly defined category of life writing, including diary, memoir, autobiography, and biography. By sampling a range of texts from print, graphic, and electronic sources, students will explore the diverse ways in which people, both famous and otherwise, have communicated their personal and public stories about life and selfhood throughout history. 1 Credit

**CC8831 (CMCT 6125 3.0) Theorizing the Sacred**
This course is founded on the conviction that the film medium can furnish experiences through which we can better understand the nature of the sacred. The course, which is conducted as a seminar, combines readings from major film theorists with various different films as a way to explore the sacred. Among the issues it addresses are: What is the sacred? The relationship of the sacred to religion, to the profane, to freedom and enlightenment, to individual and social identities, to transcendence, to politics, to art and to film and cinema. 1 Credit

**CC8840 (CMCT 6314 3.0) Media Democracy**
This course examines the central role of the news media in a democratic society, with an emphasis on Canada. The constraints on media democracy, exploring various media from newspapers to the internet and attempts to address the lack of media democracy will be explored.
1 Credit

**CC8841 (CMCT 6318 3.0) Owning Culture**
The course explores the ways in which law shapes popular culture, with emphasis upon the intellectual property regimes of copyright, publicity rights, trademark, and domain names. We consider how these laws create rights to control meaning and effect forms of censorship, while provoking the emergence of alternative community norms. 1 Credit

**CC8842 (CMCT 6316 3.0) Public Affairs Media**
This course examines public affairs radio, television and convergence media from an historical and critical perspective. These media are examined with reference to models of broadcasting, public address, technology and globalization. 1 Credit

**CC8843 (CMCT 6317 3.0) Cultural Industries, Trade and the WTO**
This course examines the impact of trade and the WTO framework in shaping the culture and communications policy environment for governments and communities. It is designed as a research seminar to enable students to examine the way the WTO is shaping and influencing cultural and communications policy. 1 Credit

**CC8844 (CMCT 6340 3.0) Introduction to Broadcast Management**
Television is the most powerful form of public communication and, in Canada, is a highly regulated business. Those who manage television enterprises must balance business objectives and the public good in a changing creative and technological environment. This course examines issues in the management of public and private television enterprises in Canada. Students will investigate each issue in its historical context and will analyze the current environment and scenarios for the future of Canadian broadcasting. The course will include field visits and industry guests. 1 Credit

**CC8845 (CMCT 6321 3.0) Communication & International Development**
This course brings together various theoretical and policy approaches to communication and international development. As a seminar, selected critical readings will serve as a backdrop for discussions on the nexus of communication, technology, development and the nation-state. We will interrogate the historical and social construction of development and underdevelopment, and how state actors mobilize the rhetoric of technology to galvanize support for the national development. 1 Credit

**CC8846 (CMCT 6315 3.0) Communication and Public Interest**
This course explores the meaning of "public" in the context of media and public information/advocacy campaigns. A background in communication theory is recommended but not required. 1 Credit

**CC8847 (CMCT 63190 3.0) Global Media**
This course examines global media from an historical and critical perspective. Broadcasts, publications, films and digital productions are viewed as transnational communication channels which have a decisive impact on contemporary life. 1 Credit

**CC8900 (CMCT 6000 3.0) Core Issues in Cultural Studies**
[formerly Theories of Communication & Culture I] This course provides an overview of the historical development of theories and approaches to cultural studies, surveying contemporary theories and discussing a wide range of approaches. The course deals with areas of inquiry in cultural studies that are the subject of debate and controversy and draws on material from a number of disciplines. The course will cover such topics as the following: the meaning of culture, subjectivity and identity, constructionism, commodification, the culture industry, hegemony, public sphere, modernity and postmodernity, colonial and post-colonial theories, citizenship and civil societies. Masters Core Course. 1 Credit

**CC8901 (COUC 6001 3.0) Core Issues in Communication Studies**
[formerly Theories of Communication & Culture II] This course provides an overview of the historical development of theories and approaches to communication studies, surveying contemporary theories and discussing a wide range of approaches. The course deals with areas of inquiry in communication studies that are the subject of debate and controversy and draws on materials from a number of disciplines. The course will cover topics such as the following: political economy, commodification and markets, representation and discourse, medium theory (McLuhan), audience theory and reception theory, interpretive theories and feminist approaches. Masters Core Course. 1 Credit

**CC8902 (CMCT 6002 3.0) Research Methods Workshop**
Students in the core courses are required to attend a workshop on research methods in communication and cultural studies. These sessions are designed to complement the theoretical materials presented in the core seminars and will provide an overview of the range of research methods in communication and cultural studies. The course introduces students to a wide range of methods and approaches, including research design (qualitative and quantitative), survey research, content analysis, textual analysis, discourse analysis, historiography, legal and documentary research, ethnographic techniques, cultural studies approaches and others. Masters Core Course. 1 Credit

**CC8903 (CMCT 6003 0.0) Seminar in Commun. Research and Practice**
This seminar presents an overview of current work in the field and features presentations by faculty and students in the program on their current and proposed projects. It explores current approaches and perspectives in policy analysis and applied research in communication and culture. Masters Core Course. Pass/Fail. No course credit

**CC8920 (CMCT 6100 3.0) Theoretical Approaches to Media & Culture**
This course reviews central issues in the study of media and culture through an examination of the ways in which mediations of social identity (e.g. class, gender, race, sexuality, nationality), act as highly selective and ideologically shaped portrayals of the social order. The course is built around a number of current and "classical" theories which allow particular insight into the articulations of representation (discursive, imagistic, visual) with human identity, subjectivity and selfhood. These theoretical frames of reference are also applied in the analysis of various media forms and genres., including text, photography, television, film and the built environment. (Foundation Course). Antirequisite POLS 6055 3.0 (York University). 1 Credit

**CC8921 (CMCT 6110 3.0) Visual Culture**
The course will begin by exploring the ways in which we have been taught to analyse and understand images, and how to produce and reproduce them. The course aims, however, to move beyond analysis of specific texts in order to historicize and understand the larger cultural meanings that have been assigned to the visual. We will attempt to come to terms with what W. J. T. Mitchell has called the "pictoral turn" in all its complexity. The course includes works by philosophers and cultural theorists as well as poets, painters, novelists, videographers, filmmakers, and cyberneticists. 1 Credit

**CC8922 (CMCT 6101 3.0) Issues in Cultural Studies**
This course is an advanced examination of the contribution of cultural studies perspectives to the study of communication and culture, with emphasis on contemporary problems and theories. 1 Credit
Note: This course will focus on the needs of PhD students. MA students with appropriate background will be admitted with permission.

**CC8923 (CMCT 6102 3.0) Culture as Performance-Anth. of the Arts**
This course explores expressive culture by examining the performance and products which express cultural meaning. It investigates how performances are produced, interpreted and transformed through time, utilizing theoretical arguments related to the process of cultural production, including structuralism, formal analysis, semiotics and hermeneutics. Key questions include: how are artistic domains integrated within a society? What regularities and patterns can be seen cross-culturally within one form of artistic expression? How do artistic forms condense and communicate key symbolic messages? How is artistic expression transformed through mass culture and tourism? 1 Credit

**CC8924 (CMCT 6095 3.0) Marxism, Culture and Film**
This course examines the Marxist tradition in cultural and aesthetic theory and practice. It considers selections from the philosophical and aesthetic writing of Marx and Engels and later Marxists like Lukacs, Gramsci, Lenin and Trotsky and goes on to consider the Frankfurt School, James, Debord, Althusser, Williams, Jamieson, Said and Eagleton, among others. Theoretical and creative work by major artists like Brecht, Eisenstein, Godard and Alea be discussed. Selected important debates and controversies about Soviet culture, the role avant-gardes, realism and socialist realism, cultural

imperialism and colonialism, feminism, modernism and postmodernism will be discussed. Specific discussions will focus on analysis and practice related to the Marxist and socialist tradition in film, selected from the Soviet 20s, Renoir and the French Popular Front, the Hollywood Reds, Italian neo-realism, Godard and May '68 and the Third Cinema of the "third world". Antirequisite POLS 6055 (York University). 1 Credit

**CC8925 (CMCT 6104 3.0) Reading Television**
Fundamental to contemporary cultural studies is recognition that the meaning, form and value of cultural products such as situation comedies, soap operas, advertisements, cannot be separated from the social context in which they are produced and received. The course will explore such questions as: What are the genre conventions? How do different individual communities use and value television products? To what extent do television products promote resistance and change and to what extent do they preserve the status quo? Students will apply several frameworks to selected products in order to analyse how the products work in relation to individuals and communities. 1 Credit

**CC8926 (CMCT 5101 3.0) Theoretical Issues in Film**
This course examines screen representation from a historical, sociological, and critical perspective, introducing relevant contemporary theoretical approaches framed as analysis of a particular theme, period, filmmaker, or genre. Attention is given to a range of problems including filmic representation and indexicality; dramaturgy; the history of filmic representation and its political economy; filmic representation and hegemony. Antirequisite FILM 5210 3.0 (York University). 1 Credit

**CC8927 (CMCT 6096 3.0) Reading Film**
The course examines screen representation of gender as expressivity and enactment, from a historical, sociological, and critical perspective focusing largely on dramaturgy. Relevant approaches are introduced and a focused study of films and theoretical issues of choice is enabled. 1 Credit

**CC8928 (CMCT 6120 3.0) Culture and the Environment**
Critical exploration into current literature in the emerging field of Cultural Studies. Examination of the discourses through which we attach “culture” to nature, place, and space. Particular attention is given to what resources contemporary cultural studies might offer in analyzing interactions between culture, nature, and place; between social identity, community, and built and natural environments. 1 Credit

**CC8929 (CMCT 5104 3.0) Seminar in Symbolic Anthropology**
Particular attention is placed on a fundamental understanding of symbolic thought and action with the aim of addressing the questions: how do symbols symbolize? How do they function to mediate meanings and transform sentiment and emotions into significant inducements or dispositions to action? Literature in anthropology, language and linguistics, semiotics and literary criticism among others are surveyed. Antirequisite ANTH 5140 3.0 (York University). 1 Credit

**CC8930 (CMCT 6105 3.0) Culture and Values in Popular Media**
This course examines the rights, freedoms and social obligations of the media, with special attention to content producers and disseminators, both private and public. The issues of freedom of expression and its limits, access to information, privacy, and accountability are highlighted. The role of audiences as citizens, consumers and potential producers of content is also examined. 1 Credit

**CC8931 (CMCT 6106 3.0) Popular Music Studies**
The phenomenon of popular music is investigated from a number of perspectives through a survey of scholarly and popular vernacular literature. Issues in popular music, including paradigms for analysis and interpretation are examined. Antirequisite MUSI 6320 3.0 (York University). 1 Credit

**CC8932 (CMCT 6114 3.0) Communication, Culture and the City**
This course will examine a variety of conceptions of culture in use in the social sciences, humanities and fine arts in particular with relevance to how they can be used to inquire into social forms and practices of city life. The course will further seek to perpetuate an ongoing intellectual relationship to the reciprocal exchanges between interpretation of culture and of the city and bring this discussion to bear on representations of space, urbanity, communication, congestion and memory. Readings will include Durkheim, Weber, Simmel, Park, Bakhtin, Benjamin, Harvey, Seja, and Sassen. . Antirequisites SOCI 6132 3.0 (York University), SPT 6626 3.0 (York University). 1 Credit

**CC8933 (CMCT 6115 3.0) Culture in the City Workshop**
This course will be conducted as a research workshop in which students will be encouraged to initiate, design, and develop an exploratory study on a specific social process in the city, and create a framework for treating spaces and localities as interpretive problems through qualitative methods. The workshop will provide experience and skill in case study analysis and ethnographic and documentary methods for interpreting texts, sites and social actions. The instructor will aid students in identifying problems related to select areas of urban life and in generating a small study as a course requirement. Students will be expected to contribute to the collegiality of the environment by discussing their mutual work as part of a process of developing theoretically informed case studies. Antirequisite SOCI 6132 3.0 (York University), SPT 6626 3.0 (York University). 1 Credit

**CC8934 (CMCT6113 3.0) Contemporary Topics in Social Theory**
The purpose of this course is to take up issues that are topical and require some knowledge of social, political, philosophical and psychoanalytic theory. Antirequisites SOCI 6220 3.0 (York University), SPT 6043 3.0 (York University), PHIL 6640 3.0 (York University) 1 Credit

**CC8935 (CMCT 6121 3.0) The Critique of Everyday Culture**
An attempt to integrate various theoretical frameworks centering on the twin problematics of everyday life and the study of popular culture. In particular, it examines anthropological, phenomenological, semiological, hermeneutical and neo-Marxist approaches to culture. Antirequisites SOCI 6130 3.0 (York University), SPT 6609 3.0 (York University) 1 Credit

**CC8936 (CMCT 6107 3.0) The Cultural Conditions of Authorship**
With its focus on the author and the cultural conditions of authorship, this course aims to fill a gap in current course offerings in the Media and Culture stream of Program. The author and the book are all but absent from a program that studies the dynamics of media and cultural production. This course returns to the subject of the book as one of the earliest and most enduring examples of cultural production. By focusing on the economy of the culture industry – specifically the social, political, historical, and material conditions of authorship – this course undertakes a study of the commodification of Canadian authors that began in the early nineteenth century and continues to this day.
1 Credit

**CC8938 (CMCT 6109B 3.0) Special Topics in Media and Culture B**
Under this rubric, program faculty members propose limited duration courses arising from major research projects or current issues.
1 Credit

**CC8939 (CMCT 6109A 3.0) Special Topics in Media and Culture A**
Under this rubric, program faculty members propose limited duration courses arising from major research projects or current issues.
1 Credit

**CC8940 (CMCT 6300 3.0) The Political Econ. of Culture & Commun.**
This course reflects the theoretical perspective that communication systems and cultural practices shape and are shaped by the social distribution of power in all societies. It examines the role of the state, the market civil society in the production and distribution of cultural products and the implications of their relationships for society. (Foundation Course)
1 Credit

**CC8941 (COUC 6301 3.0) Issues in Communication & Cultural Policy**
This course focuses on specific issues that are shaping communication and cultural policy, including the emergence of the "information highway," globalization and convergence. (Foundation Course) 1 Credit

**CC8942 (COUC 6302 3.0) Cross-Cultural and International Commun.**
This course examines communication in the context of divergent cultural value systems, differing levels of technological adaptation, and unequal power configurations. It explores applications in international development, business communication, and cross-cultural electronic communication. 1 Credit

**CC8943 (COUC 6303 3.0) Globalization of Communication & Culture**
This course focuses on the role and significance of the rapid growth of multinational communication industries in shaping the modern world, with particular emphasis on the relationship between technology and the structures of power and control. Global communication systems, the global economy, and global crises will be examined from a critical perspective. 1 Credit
Note: This course will focus on the needs of PhD students. MA students with appropriate background will be admitted with permission.

**CC8944 (CMCT 5301 3.0) Technology and Globalization**
This course examines the role of technology within the global context. What will it mean to be part of a global audience, work in a global factory, shop in a global supermarket, be governed by a world government? Can technology help to solve problems of environmental depletion and pollution? What role does technology play in escalating militarism around the world? Can technology reduce the gap between rich and poor, within nations and between nations? Antirequisite: POL607. 1 Credit

**CC 8945 (CMCT 6304 3.0) Political Commun. & Env. Issues**
This course examines the communication strategies of governments, political parties, and advocacy groups in the context of contemporary media and communication technologies, with particular reference to Canada. It examines theories of political discourse, ideology, and public opinion. Antirequisite ENVS 6143 3.0 (York University) and POLS 6165 3.0 (York University). 1 Credit

**CC8946 (CMCT 6305 3.0) Communication Policy**
This course will examine the structure and functioning of the media industries and explore the government policies that have been developed to try to ensure that the media function effectively and in the public interest. While emphasis will be placed on the communication media in Canada, attention will also be given to the way in which the media function in other countries and on an international basis. In examining Canadian government policy, attention will be given to public policies in other countries.

The mandate and operation of agencies such as the CRTC, the CBC, the National Film Board, and Telefilm Canada will be examined, as well as the central policy development mandate of the federal Department of Canadian Heritage (Previously the Department of Communications). The course will include an examination of a number of major federal policy documents. Attention will be given to special issues arising from the bilingual nature and regional character of

Canadian society and to the respective roles of federal and provincial governments. While the primary emphasis is on established media, the course will include consideration of issues related to new media, including discussion of the Information Highway Advisory Council's Phase I and II reports. Antirequisite ARTM 6330 3.0 (York University). 1 Credit

**CC8947 (CMCT 6306 3.0) Cultural Policy**
This course examines the relationship between cultural and social policy in Canada through the study of historical and contemporary examples. In so doing, focusing on arts policies, the course will examine the historical development of policy and the formulation and execution of municipal, provincial and federal policies in Canada. The course will have a research orientation and will focus in particular on current issues in arts and cultural policy and strategies for the future. Where appropriate, comparative analyses will examine other policy models with special reference to Europe, Britain, and the United States. Antirequisite ARTM 6300 3.0 (York University). 1 Credit

**CC8948 (CMCT 5302 3.0) The Image Industry**
Images are organized into presentations and exhibitions in books and periodicals, in cinemas, in concerts, plays, and performances, at conferences and conventions, in galleries, in lectures and readings on television and closed circuit systems, in recordings, and theatres. This course examines the nature and operations of the image industry, its relationship with image users and consumers and its interaction with individual image makers. Antirequisite NPF 552. 1 Credit

**CC8949 (CMCT 5303 3.0) The Communications Industry**
This course is designed to provide a perspective on the Canadian information technology and telecommunications industry, in international context. It provides an in-depth understanding of the structure and dynamics of voice, data, video, internet, wireless, hardware and content markets. It explores the current environment, trends, and major players, including their strategies and prospects. Antirequisite AIM 307. 1 Credit

**CC8950 (CMCT 5304 3.0) Current Issues in Telecommunications**
This course explores emerging issues of interest to telecommunications and information technology analysis, managers, and policy-makers. It assumes a basic understanding of the technology and industry and features presentations by leading experts in regulations, technology, and emerging issues. Antirequisite AIM 407. 1 Credit

**CC8951 (CMCT 6307 3.0) Communications Law**
Communication law and regulation are viewed from two perspectives: first, the rationales for regulating broadcasting and telecommunications are explored; and secondly, areas of law and regulation in the fields of broadcasting and telecommunications are examined, including cultural regulation, standards, access, quality service, new services, and rates. This course will examine law, policy, and regulations concerning broadcasting (radio, TV and news services) and telecommunications. Of particular interest are questions about controversial and biased programming, access to media, Canadian content, and the implications of competition and new services in the Canadian broadcasting system. In telecommunications, emphasis will be given to issues arising from competition and new technologies. Antirequisite Law 3005 3.0 (Osgoode). 1 Credit

**CC8952 (CMCT 6310 3.0) Polit.Econ.of Media: Tech/Polit/Global**
The course examines the profound transformation of the media industries by new technologies and market applications, such as satellite television, the Internet, and the digital revolution. These technological and commercial forces have destabilized national media landscapes, especially where government policies and regulations have attempted to protect and promote domestic cultural and communications industries. The course examines the emergence of transnational commerce actors in the media industries and their impact on political arrangements. Canada is discussed in comparative perspective. 1 Credit

**CC8953 (CMCT 6308 3.0) The Politics of Intellectual Property**
The expansion of intellectual property rights (IPRs) has become a major area of international controversy and global resistance as these properties come into conflict with broader public interests and violate human rights. The course explores the new regimes of trade that are expanding the privatization of more and more areas of human life, the political and social consequences of these expanded rights and struggles involving farmers, feminists, developing countries and indigenous peoples to protest and contain these rights. 1 Credit

**CC8954 ( CMCT 5307 3.0) New Social Movements**
Examination of new social movements that have arisen in response to the crisis of industrial culture, economic restructuring, shifting political formations, and ecological disasters. The focus is on current theories of social movements in action. Opportunities for students to gain first-hand experience with social movement organizations through participatory research projects are provided. Antirequisite ENVS 5073 3.0 (York University), ENVS 4161 3.0 (York University). 1 Credit

**CC8955 (CMCT 5306 3.0) Global Justice and the Environment**
Introduction to socio-environmental ethics in general and, in particular, to social justice, as applied to issues of global development, the global environment, and international relations; theoretical schools of thought and particular public controversies are covered. Antirequisite ENVS 5068 3.0 (York University), ENVS 4311 3.0 (York University). 1 Credit

**CC8956 (CMCT 6311 3.0) Globalization and Cultural Identities**
This course explores globalization and its influence on the construction of cultural identities. We address the contested term and its impact on nations, institutions, and peoples as they experience in local situations special and temporal

transformations produced in discourses, images, and actions resulting from this process. Antirequisite SPTH 6212 3.0 (York University) and ANTH 5135 3.0 (York University)
1 Credit

**CC8957 (CMCT 6312 3.0) App. Research Meth: Policy & Reg. Research**
Provides students with the opportunity to develop the research skills required for policy and regulatory research, and a critical appreciation of their appropriate use in the design of their own research. Antirequisite ENVS 6180 3.0 (York University). 1 Credit

**CC8958 (CMCT 6313 3.0) Readings in Public Policy**
Exploration of key ideas about public policy processes with an emphasis on how this process is played out in the various policy areas of interest to students in the course. Antirequisite ENVS 6101R 3.0 (York University). 1 Credit

**CC8959 (CMCT 6309 3.0) Special Topics in Politics and Policy**
Under this rubric, program faculty members propose limited duration courses arising from major research projects or current issues.
1 Credit

**CC8960 (CMCT 6500 3.0) Advanced Communication Technology**
This course is an exploration of the major current issues for communication and culture raised by contemporary and emerging communication technologies and their applications. The course encompasses theoretical and applied perspectives. (Foundation Course) 1 Credit

**CC8961 (CMCT 6501 3.0) Issues in Media Production**
Contemporary theory is employed to examine the changes in socio-technical systems and the production environment as well as the craft. Group projects may include radio news and drama, broadcast and print journalism, documentation for studio television, as well as CD-ROM, visualization, and web-based projects. 1 Credit

**CC8962 (CMCT 6503 3.0) Language & Narrative in Film/Video/Mm**
Each medium has its own conventions for creating meaning. New interactive media demand new approaches to creating meaning. This course examines the evolution of language and narrative from a theoretical and practical perspective. 1 Credit

**CC8963 (CMCT 6504 3.0) Social and Cult. Implications of New Media**
This course focuses on the changes brought about by changes in communication technology for individuals, groups and organizations, and the challenges and opportunities presented by them. 1 Credit

**CC8964 (CMCT 6505 3.0) The Diffusion of Commun. Technologies**
Technology is often adopted in ways not anticipated by its creators and is shaped by the interaction of technological innovation, economic interests, and social and political power. This course explores the models developed for understanding the diffusion of communication technologies in society and examines specific cases, such as the printing press, the motion picture, the telephone, television, the computer, and the Internet. 1 Credit

**CC8965 (CMCT 6506 3.0) Communication in Organizations**
This course presents a framework for understanding communication in organizations, including contingency, structuration, and interpretive approaches. The course exposes students to a variety of perspectives on telecommunication. It considers technological, social, cultural and economic perspectives at the organizational level and their implications. 1 Credit

**CC8966 (CMCT 6516 3.0) Activist Video Making**
From the earliest of times, the potential of using film and video to animate, agitate and educate has attracted committed film and video-makers. Participants in this course will be involved in the collaborative production of short community-based video works focused on selected social and political issues. The course will also include an historical overview of documentaries made by film and video makers engaged in radical production, post-production and distribution practices. Antirequisite FILM 5320 3.0 (York University) 1 Credit

**CC8967 (CMCT 5501 3.0) Contemporary Theory in the Visual Arts**
The course contextualizes the contemporary structuralist, psychoanalytical feminist, Marxist, and postmodernist theory with respect to the history and development of specific art practice in the visual arts and its relationship to society. The relationship between contemporary critical theory and artistic production will be addressed through an examination of prescribed reading and examples of works drawn from the visual arts, film, video, new media and performance. This examination incorporates an analysis of French, British and North American sources together with debates, artistic productions, and explorations by contemporary artists. Antirequisite VISA 5600 3.0 (York University).
1 Credit

**CC8968 (CMCT 5502 3.0) History and Theory of Film and Video**
This course enables students to concentrate on specific aspects of the history and theory of film and video. The course deals with national and alternative cinema, film genres and alternative video. The relationship between the aesthetic features of given works and their cultural production are emphasized. Antirequisite NPF 557. 1 Credit

**CC8969 (CMCT 5503 3.0) Media Ethics**
An examination of the rights, freedoms, and obligations of the media and of practicing journalists. The course deals with such issues as the grounds and limits of freedom of expression, moral responsibilities respecting truth, balance, and objectivity; ethical and business pressures in media; obligations to the public, the audience, sources, colleagues, employers, and oneself. The course includes case studies and discussion of ongoing media activity. Antirequisite PHL 530. 1 Credit

**CC8970 (CMCT 5504 3.0) Special Topics in Canadian Cinema**
A seminar course focusing on particular topics in Canadian film and video. Antirequisite FILM 5310 3.0 (York University). 1 Credit

**CC8971 (CMCT 5505 3.0) Experimental Media**
In the past century, groups of artists have repeatedly called for new methods for the creation of artworks, to revitalize arts that had grown dreary, stale, and predictable. The course comprises workshops and seminars and explores the value of such proposals. Antirequisite NPF555. 1 Credit

**CC8972 (CMCT 5506 3.0) Experimental Film Processes**
An exploration of alternatives to conventional ways of producing black and white and colour cinematographic images, including non-standard ways of generating cinematographic images and unorthodox means of transforming them. Antirequisite FNP 544. 1 Credit

NOTE: Students with appropriate background may take selected production courses in various units for graduate credit, with permission. A list of Ryerson and York courses available for this purpose will be made available prior to registration in September.

**CC8973 (CMCT 6502 3.0) Design for Interactive Multimedia**
This course examines multimedia production in the context of a studio environment. Particular emphasis is placed on design models and their applications. 1 Credit

**CC8974 (CMCT 6510 3.0) Media Production Workshop**
Combines active media analysis with the production of images/text around environmental issues. Students critically explore the production process through media observations, readings, and audio-visuals, visits to production sites, and interviews with imagemakers. There are opportunities to develop hands-on skills in photographic or video production. The central learning experience of the workshop involves a media production applying analytical insight, technical skills, and creativity. Antirequisite ENVS 6349 3.0 (York University). 1 Credit

**CC8975 (CMCT 6511 3.0) Race and Gender in Digital Technology**
In recent years, corporate leaders, government officials, and media pundits have portrayed the western restructured socio-economic near-future as a “digital” one, forefronting the centrality of digital technology and the digitisation of information to the social, economic, and political changes currently sweeping Canada, as well as the rest of the OECD. In this course, we will examine the ways in which race and gender manifest in the discourses, policy decisions and representations of digital technology in Canada. 1 Credit

**CC8976 (CMCT 6512 3.0) Digital and Interactive Entertainment**
This course examines the convergence of digital content, broadband and wireless distribution over a variety of display platforms. If compatibility standards and data-protection schemes are worked out, we will be able to enjoy, create and distribute content in a variety of new ways. 1 Credit

**CC8977 (CMCT 6517 3.0) Media Production Techniques and Practices**
This course introduces students to a wide range of media-making techniques and production processes, including those currently employed and emerging in various media industries. The course will include lab demonstrations, practical workshops and examination of the context and social implications of these techniques and processes. 1 Credit.

**CC8978 (CMCT 6514 3.0) Documentary Narration**
While non-fiction films are most frequently discussed in terms of the images they bring to us, most of these films from early sound newsreels to present day historical essays are in fact highly dependent upon the quality of their voice-over narration. This course will focus on the nature of the writing that has shaped those works, including its relationship to the images. The course will also examine the way in which voice-over narration is used in television news and television actuality programming as well as personal essays. Antirequisite: FILM 5320P 3.0 (York University). 1 Credit

**CC8979 (CMCT 6509 3.0) Special Topics in Technology and Commun.**
Under this rubric, program faculty members propose limited duration courses arising from major research projects or current issues.
1 Credit

**CC8980 (CMCT 6518 3.0) Advanced Media Production: Project**
This course offers students who have advanced production skills and who have successfully completed the necessary technical proficiency examinations to access equipment and an opportunity to develop and produce their own media project. Students will work independently or in teams to produce a previously approved production using existing or emerging technologies from a variety of media. 1 Credit

**CC8981 (CMCT 6513 3.0) Struggle for Internet Creativity & Innov.**
This course is about the future of ideas. The Internet environment was originally designed to enable the new and is now being transformed to protect the old. The course examines principles and technologies needed to let innovation flourish on the Internet. 1 Credit

**CC8982 (CMCT 6118 3.0) The Body and the Culture of Modernity**
In the later half of the twentieth century, the body emerged as a topic that attracted the efforts of many artists who were committed to some form of cultural critique. Many recent artists have revolted against the modern body – the mechanized, regimented, controlled and profoundly unfree body. They have strived to move beyond the culture of modernity by creating a Dionysian body culture that is life-affirming, a culture that expresses bodily energies and passions, a culture that will bind people together in shared cultural experiences of ecstasy and intoxication. They have strived to dissolve the individual ego in collective ecstasy and sensual surrender. In this course we will survey some themes that arise in recent body art and assess their political/cultural implications. 1 Credit

**CC8983 (CMCT 6117 3.0) The Culture of the Avante-garde**
In this course we survey a number of avant-garde art movements of the twentieth century. We first consider the cultural paradigm that these various artistic movements reacted against, the paradigm known as modernity. We then examine various vanguard artistic movements of the twentieth-century as expressions of discontent with the culture of modernity. We do this partly through selected readings in cultural theory; however, the principal source of information will be the manifestos the various movements issued. 1 Credit

**CC8984 (COCU 6519 3.0)**
This course studies the evolution of news as a historical phenomenon. It focuses on the various forms which news has taken at different periods and in different places; on how these forms have been influenced by changing technology, business organization, and markets; on how different audiences have responded to news; and on how the producers of news have understood their role in relation to their society, their audiences, their employers and their peers. 1 Credit

**CC8985 (COCU ) Photographic Vision/Practice**
The importance of photographic imagery in history, culture, media and communication is widely acknowledged but is for the most part unexamined. This course proposes an investigation into the materials and methods of photographic image-making, combined with a survey of key critical writings and the contemporary theories about photographic representation that grow out of these. This dual investigation will be supplemented by independent research and writing undertaken by each student. Critical texts will balance writings of practicing photographers (Paul Strand, Gisele Freund, Henri Cartier-Bresson, Robert dams) with those of critics and theorists (Walter Benjamin, Jean Beaudrillard, Alan Sekula, Susan Sontag); in addition, several contemporary anthologies (by Richard Bolton, Vicki Goldberg, Liz Wells) will also provide source material. 1 Credit

**CC8986 (FILM 5254 3.0) Future Cinema**
This course examines the shift from the traditional cinematic spectacles to works probing the frontiers of interactive, performative, and networked media. Drawing upon a broad range of scholarship, including film theory, communication studies, cultural studies and new media theory, the course will consider how digital technologies are transforming the semiotic fabric of contemporary visual cultures. 1 Credit

**CC8990 (CMCT 6911 3.0) Directed Readings in Commun. and Culture A**
The directed readings course is intended to permit the student to survey a coherent body of literature in an area of study related to the student's program objectives. 1 Credit

**CC8991 (CMCT 6902 3.0) Directed Research in Commun. and Culture**
The directed research course is intended to permit the student to conduct research or develop a theoretical perspective in an area of study related to the student's program objectives. The research may take the form of a pilot study for a thesis or dissertation project. 1 Credit

**CC8992 (CMCT 6903 3.0) Directed Group Study in Commun. and Culture**
The directed group study is intended to allow a group of students, with the agreement of a faculty member, to organize a seminar in an area not covered in the course offerings. 1 Credit

**CC8993 (CMCT 6909 3.0) Field Placements**
Master's students are able to receive credit for a one term course by undertaking a field placement in an appropriate institution. 1 Credit

**CC8994 (CMCT 6911 3.0) Directed Readings in Commun. and Culture B**
The directed readings course is intended to permit the student to survey a coherent body of literature in an area of study related to the student's program objectives. 1 Credit

**CC9090 (CMCT 7011 6.0) Directed Readings A**
A directed readings course is intended to permit the student to survey a coherent body of literature in an area of study related to the student's program objectives. Doctoral Course. 2 Credits

**CC9091 (CMCT 7012 6.0) Directed Readings B**
A directed readings course is intended to permit the student to survey a coherent body of literature in an area of study related to the student's program objectives. Doctoral Course. 2 Credits

**CC9092 (CMCT 7002 6.0) Directed Research**
A directed research course is intended to permit the student to conduct research or develop a theoretical perspective in an area of study related to the student's program objectives. The research may take the form of a pilot study for a thesis or dissertation project. Doctoral Course. 2 Credits

**CC9093 (CMCT 7003 6.0) Directed Group Study in commun. & Culture**
Under this heading, a group of students, with the agreement of a faculty member, may organize a seminar in an area not covered in the course offerings. Doctoral Course. 2 Credits

**CC9903 (CMCT 6003 0.0) PhD Seminar in Research and Practice**
This seminar presents an overview of current work in the field and features presentations by faculty and students in the program on their current and proposed projects. It explores current approaches and perspectives in policy analysis and applied research in communication and culture. PhD Core Course. Pass/Fail. No course credit

**CC9904 (CMCT 7000 3.0) Perspectives in Commun. & Cultural Studies**
[formerly Advanced Theories in Communication & Culture I] This course provides an advanced exploration of the major theories and research approaches in the field, with particular attention to a critical assessment of contemporary theories and methods. The first segment of the course will introduce students to those classical theorists and philosophers whose work was taken up and developed by more recent studies in the late twentieth century. It therefore deliberately anticipates issues that were subsequently developed so that students may be equipped to decide in the second part of the course which themes are relevant or irrelevant to the study of communication and culture. Doctoral Course. 1 Credit

**CC9920 (COCU 7120 3.0) Selected Topics in Psychoanalysis and Culture**
This course will survey some of the key concepts of Freudian and post-Freudian theory and assess their value in the study of culture and society. The course will then present an overview of some of the ways that psychoanalytic theory has been used in the study of culture.
1 Credit

**CC9921 (CMCT 7500 3.0) Technology, Communication and Culture**
Employing the insights of the Toronto school and related theories, this course explores culture and technology as productive processes, with emphasis on the historical development of communication technologies and their influence on culture and society. Doctoral Foundation Course. 1 Credit

**CC9990 (CMCT 7011 3.0) Directed Readings A**
A directed readings course is intended to permit the student to survey a coherent body of literature in an area of study related to the student's program objectives. Doctoral Course. 1 Credit

**CC9991 (CMCT 7012 3.0) Directed Readings B**
A directed readings course is intended to permit the student to survey a coherent body of literature in an area of study related to the student's program objectives. Doctoral Course. 1 Credit

**CC9992 (CMCT 7002 3.0) Directed Research**
A directed research course is intended to permit the student to conduct research or develop a theoretical perspective in an area of study related to the student's program objectives. The research may take the form of a pilot study for a thesis or dissertation project. Doctoral Course. 1 Credit

**CC9993 (CMCT 7003 3.0) Directed Group Study**
Under this heading, a group of students, with the agreement of a faculty member, may organize a seminar in an area not covered in the course offerings. Doctoral Course. 1 Credit

## COMPUTER NETWORKS

### CURRICULUM

### Master of Applied Science

**DEGREE REQUIREMENTS**

Master's Thesis

| | | |
|---|---|---|
| CN8811 | Multimedia Proc & Digital Comm | 1 |
| CN8812 | LAN and WAN Switching | 1 |
| CN8813 | IP Protocols | 1 |
| CN8814 | Network Math & Simulations | 1 |
| CN8815 | Network Architectures | 1 |
| Two Elective credits | | 2 |

### Master of Engineering

**DEGREE REQUIREMENTS**

| | | |
|---|---|---|
| CN8001 | Master's Project/Case Study | 2 |
| CN8810 | Intro to Computer Networks | 1 |
| CN8811 | Multimedia Proc and Digital Comm | 1 |
| CN8812 | LAN and WAN Switching | 1 |
| CN8813 | IP Protocols | 1 |
| CN8814 | Network Math & Simulations | 1 |
| CN8815 | Network Architectures | 1 |
| Four Elective credits | | 4 |

***Electives***

| | | |
|---|---|---|
| CN8816 | Network Security | 1 |
| CN8817 | Wireless Networks | 1 |
| CN8819 | Multimedia Networks | 1 |
| CN8821 | Software Engineering | 1 |
| CN8822 | Network Operating Systems | 1 |
| CN8823 | Embedded & Real-Time Op Sys | 1 |
| CN8825 | Network Design | 1 |
| CN8831 | Adv Topics in Network Security | 1 |
| CN8841 | Content-Aware Networking | 1 |
| CN8861 | Network Management | 1 |

### COURSE LISTING

**Thesis**
The student is required to conduct advanced research on a topic chosen in consultation with the student's thesis supervisor. The student must submit the completed research in a thesis format to an examination committee and make an oral presentation of the research thesis, and the research results, to this committee. Through the thesis, the student is expected to furnish evidence of competence in research and a sound understanding of the specialty area associated with the research. This is a "Milestone." Pass/Fail

**CN8001 Project/Case Study**
The student will be required to analyze the performance of a network and either design a new network or an upgrade to an existing network. Some approved projects could be undertaken with collaborating external corporation(s) under the supervision of faculty advisor(s). This is a "Milestone." Pass/Fail

**CN8810 Introduction to Computer Networks**
This course offers a general introduction to computer networks. It explores goals, services and problems with computer networks. Computer communication is examined using the seven-layer OSI model. The purpose of each layer is discussed both from conceptual and practical aspects. Topics include: OSI model, layered architecture, data link protocols, LAN protocols, WAN protocols and details of Internet protocol. There will be several lab projects to reinforce the topics discussed in the lectures. 1 Credit

**CN8811 Multimedia Processing and Digital Communication**
The course first covers the basic concepts in source and channel coding techniques. It subsequently introduces various aspects of multimedia processing. Topics include: sampling, quantization, PCM, DPCM, delta modulation, line coding, digital modulation, information theory on entropy, Huffman coding, Lempel Ziv coding, model-based coding, information theory on channel capacity, linear block codes, cyclic codes, convolutional codes, trellis code modulation, multimedia data compression standards, and multimedia information retrieval. Theoretical concepts will be re-enforced through some real-time experiments in the laboratory using Matlab and C. 1 Credit

**CN8812 LAN and WAN switching**
This course covers both LAN and WAN switching. In addition, it discusses various WAN technologies. It first covers Ethernet switching and related topics such as spanning tree, VLAN, and trunking. Next, it examines switch architectures and performances. The protocols in X25 and Frame-Relay networks are then studied. ATM technology and protocols are discussed with the emphasis on Quality–of-Services (QoS), traffic shaping, and traffic policing. Finally, various wide-area access technologies are introduced and studied. 1 Credit

**CN8813 IP Protocols**
The course provides an in-depth coverage of the Internet protocols. It has two main focuses. First, it studies various interior gateway protocols: RIP, IGRP, Enhanced IGRP, and OSPF. It then concentrates on the protocols related to the Internet operations and management, such as ICMP, DHCP, DNS, and SNMP. Other topics include multicasting and IPv6. Prerequisites CN 8810 and CN8811. 1 Credit

**CN8814 Network Mathematics and Simulations**
This course provides foundations in probability and random processes, and develops the understanding of Markov processes and the simulation of Markov Chains. The course also covers queuing systems and Monte Carlo simulation. Basic simulation and modeling techniques are then discussed, followed by output data analysis. The course concludes with various Computer Networks Simulation projects using OPNET. Prerequisites: CN 8810 and CN8812. 1 Credit

**CN8815 Network Architectures**
This course covers the design aspects of large scale internets. It introduces the concept of route distribution and examines the use of Border Gateway Protocol (BGP) for interdomain routing. Multi-Protocol Label Switching (MPLS), an advanced datagram forwarding architecture, is also introduced, and its applications in Virtual Private Networks (VPNs) and traffic engineering are studied. Prerequisite CN8813. 1 Credit

**CN8816 Network Security**
This course covers the cryptographic algorithms and secure protocols, and their applications in security mechanisms for computer networks. The course introduces conventional encryption algorithms and Public Key Algorithm with integrity mechanism. Authentication mechanisms for OSI protocols and TCP/IP are also discussed, and their applications in Firewall and IDS (Intrusion Detection System) are studied using actual industrial (for example CISCO's) products. Prerequisities CN8810 and CN8812. 1 Credit

**CN8817 Wireless Networks**
This course provides an overview of wireless networking, including wireless physical characteristics and mobility, wireless channel characteristics, signal propagation and multiplexing techniques. Specialized medium access protocols for TDMA and CDMA are then discussed, followed by an overview of the architecture of 3G systems (UMTS and CDMA2000). The course also discusses the IEEE 802.11 standard for wireless LAN, mobile routing techniques including Ad Hoc networking, mobile IP and roaming protocols, and wireless transport/TCP enhancements. The course also includes a design project of a small scale wireless network. 1 Credit

**CN8819 Multimedia Networks**
This course covers the concepts and design of multimedia networks. It first introduces the real-time transport protocols and various signaling protocols in multimedia-over-IP environments. A significant part of the course discusses the design and implementation of integrated voice/data networks. Different methods will be investigated to maintain the desirable voice quality performance. The course includes the following topics: Signaling system #7 (SS7), RTP and RTCP, multimedia signaling protocols such as H323, SIP, and MGCP, congestion control methods, and RSVP. Prerequisites CN8812 and CN8815. 1 Credit

**CN8821 Software Engineering**
This course includes the study of the software development process, software requirements and specifications, and software design techniques. The material is presented in the context of distributed networked systems design and implementation. 1 Credit

**CN8822 Network Operating Systems**
This course focuses on the issues surrounding network design using Unix and Microsoft Windows Operating Systems (OS). It explores the structure and networking capabilities of the OS's, introduces students to OS interprocess communication and client-server application design. The lab component focuses on network design, providing essential network services, and monitoring performance using Unix and Microsoft Windows servers. 1 Credit

**CN8823 Embedded & Real-time Operating Systems**
This course covers the basics of real-time operating systems and embedded system organization. It introduces the background knowledge required for understanding real-time and embedded systems, architecture of embedded networking devices and system on chip technologies. The students will be able to grasp the internals of an operating

system including processes/tasks threads and scheduling techniques. The course will emphasize real-time task scheduling and provide hands on experience to develop applications using the industry standard real-time operating system, VxWorks. Tornado integrated development environment from Wind River Systems will be employed for developing VxWorks applications. Fault-tolerance concepts required for safety critical and high availability real-time systems will also be presented in the course. Case studies of various networking devices utilizing the real-time system concepts will also be conducted. 1 Credit

**CN8825 Network Design**
This course presents the methods used for the design of various types of communication networks. The topics include: management and business perspectives on network design, estimation of traffic demand, network cost analysis, topological design, capacity assignment, routing, virtual network design, wireless network design, availability analysis and survivable network design. 1 Credit

**CN8831 Advanced Topics in Network Security**
Students of this course will obtain a firm understanding of the theory and applications of network security. Topics include: AAA mechanisms, secure policy manager, network secure management, Internet security and privacy, and web security. In addition, it covers wireless security fundamentals and addresses common risks and threats on wireless environment. 1 Credit

**CN8841 Content-Aware Networking**
This course provides a focused perspective on the core technologies of the World Wide Web, and also state-of-the-art technologies of how to improve the web performance and how to build a content-aware and intelligent network. We focus on architectures, protocols, standards and devices (such as client, proxies, servers and load balancers) that constitute the web and deliver the content across the Internet. The course also covers web caching, content delivery networking, peer-to-peer networking, and multimedia streaming. 1 Credit

**CN8861 Network Management**
The course first provides an introduction and overview of Network Management models. It then focuses mainly on the TCP/IP-based Internet management including SNMP, agent architectures, MIB, and FCAPS management. The course also introduces and discusses advanced topics such as policy-based management, distributed management, and service management architectures. 1 Credit

## EARLY CHILDHOOD STUDIES

### CURRICULUM

### Master of Arts

**First Offered Fall 2006**

| **DEGREE REQUIREMENTS** | | *Credits* |
|---|---|---|
| Master's Research Paper* | | |
| CS8901 | Research Methods in ECS | 1 |
| CS8902 | Curriculum Design | 1 |
| CS8903 | Educational Equity: Families | 1 |
| CS8904 | Theoretical Frameworks: ECS | 1 |
| Three elective credits | | 3 |

* *Students may apply to substitute three courses for the Master's Research Paper*

***ELECTIVES***

| | | |
|---|---|---|
| CS8921 | Elements of Statistics | 1 |
| CS8922 | Inclusion: Educational Change | 1 |
| CS8923 | Social Justice in Education | 1 |
| CS8924 | Inclusion: Issues in Assessment | 1 |
| CS8925 | Multiage Groupings in ECS | 1 |
| CS8926 | Risk and Resil: Child/Family | 1 |
| CS8927 | Social/Political Contexts for ECS | 1 |
| CS8928 | Transformative Literacy | 1 |
| CS8929 | The Minority Child | 1 |
| CS8930 | Social Research with Children | 1 |
| CS8931 | Children and Canadian Policies | 1 |
| CS8932 | Learning Theories Technologies | 1 |
| CS8933 | Directed Studies in ECS | 1 |
| CS8934 | Special Topics in ECS | 1 |
| IS8921 | Equity for Newcomers: Schools | 1 |
| IS8934 | Multicultural Cities–Planning Plcy | 1 |

### COURSE LISTING

**Master's Research Paper**
Students will conduct specialized research on a topic of their choice and produce a scholarly paper, based on primary and/or secondary sources, addressing an early childhood topic from any disciplinary perspective. Students will be required to submit a proposal for faculty approval identifying their topic, its significance for early childhood studies, sources, and methodology. The research paper will be evaluated by a three-person committee and will require an oral defence examination. The Master's Research Paper is a "Milestone." Pass/Fail

**CS8901 Research Methods in ECS**
In this course, students will learn the qualitative and quantitative methods that are key to research in this field. They will become skilled in evaluating current research, and, by the end of the course, they will have developed a full proposal for their required research paper. 1 Credit.

**CS8902 Curriculum Design in a Changing Society**
This course will address the many possible adaptations of curriculum that facilitate the successful inclusion of students who speak languages other than English and children with an identified special need. It will discuss traditional non-inclusive practices and the obstacles to be overcome in order to move curricula to a more supportive and successful inclusion of children with diverse needs. 1 Credit

**CS8903 Educational Equity: Families**
This course will investigate the institutional processes in education that routinely disadvantage certain populations. Approaches to equity will be explored from three perspectives: research and theory on social dominance; recent attempts by educational organizations to develop processes that are friendly to immigrant families; and research on what migrants (children and parents) in the educational system say about their experiences. Several populations, selected in consultation with the class, will be the subject of these investigations. 1 Credit

**CS8904 Theoretical Frameworks: ECS**
In this course, students delve deeply into the foundations of developmental theory that show the great variations existing in patterns of child development. They will also examine anthropological and sociocultural theories and their implications for research and practice in early childhood studies. 1 Credit

**CS8921 Elements of Statistics**
This course will cover the basic theory behind hypothesis-testing and explore various techniques for summarizing data, measuring relationships, and making inferences. Common statistical techniques such as correlation, t-tests, analyses of variance, simple linear regression, and chi-square will be taught. Students are expected to learn how to use the SPSS statistics package or equivalent. 1 Credit

**CS8922 Inclusion: Educational Change**
Educational change processes for inclusive school delivery models will be explored in this course within the sociopolitical context of family, school, community and society. The skills and role of the resource consultant as a collaborator in change, and the impact of inclusion on families, educators, and learners from diverse populations will be considered. 1 Credit

**CS8923 Social Justice in Education**
In this course students will explore the role of language and discourse in making people feel included in or excluded from our schools and society. Through the lens of postmodernism, students will examine theories and ideologies such as emancipatory leadership, social justice, critical realism, and cultural capital, and will develop a critically informed knowledge base for the pursuit of social justice as an explicit and necessary educational practice. 1 Credit

**CS8924 Inclusion: Issues in Assessment**
This course will focus on authentic assessments of learners with special needs across diverse populations. Issues of eco-behavioural assessment, evidence-based pedagogy, adaptive instruction and assistive technology for children with special needs will be highlighted. 1 Credit

**CS8925 Multiage Groupings in ECS**
This course introduces students to the discourses of multiage groupings, framing them within a cultural-contextual approach and presenting them as alternative constructions that challenge the legitimacy of the mainstream same-age grouping approach. Emphasis will be placed on community development, programming models for multiage groupings, elements of quality, fostering positive relationships, and children's learning. 1 Credit

**CS8926 Risk and Resil: Child/Family**
This course will examine the constructs of health and resilience and the factors that contribute to healthy outcomes for children in the face of risk and adversity. Students will critically examine the social, familial, and individual factors that pose risks for childhood development and identify points of intervention and change, with an emphasis on how diverse social and cultural experiences offer varied paths to adulthood. Research and theories on resilience will also be critically examined. 1 Credit

**CS8927 Social/Political Contexts for ECS**
This course explores social and political factors that shape learning opportunities and determine access to early childhood education programs. An historical and international perspective will be used to examine the respective roles of the family, government, non-profit sector and for-profit sector in providing early childhood services. Students will be provided an opportunity to develop their roles as advocates and change agents within a particular education/care context. 1 Credit

**CS8928 Transformative Literacy**
This course will analyze concepts and implementations of a transformative approach to literacy and its implications for the education of immigrants and minorities. The approach establishes the goals of bilingualism, biculturalism, and biliteracy as critical to positive academic outcomes. The main strategy of implementation is to involve teachers with students' families in authoring books about their histories in order to strengthen young students' racial, cultural, ethnic, and linguistic identities and foster their commitment to education. 1 Credit

**CS8929 The Minority Child**
This course takes a sociolinguistic approach to understanding the central role of language in explaining a diverse social world and the power of classroom contexts and teacher practices in this regard. Topics covered include different cultural discourse norms, mismatches in discourse, bi-lingual and ESL education, standard and non-standard language varieties, the signing deaf and gendered discourse norms. 1 Credit

**CS8930 Social Research with Children**
Building on the core course in research methods, this course will focus on current debates and discussions regarding research that involves children. Methodological and ethical issues such as informed consent, children as collaborators in the research process, and power issues in social research with children will be considered. 1 Credit

**CS8931 Children and Canadian Policies**
This course will critically examine a wide range of Canadian social policies that touch the lives of young children. Policies that impact children's health, care, education, family life, and future well-being will be evaluated. The course will include the assessment of public policies that specifically affect Aboriginal children and public policies that specifically affect the

children of newcomers. The beliefs and values that form the foundation for present policies will be clarified. Options for future policy development will be discussed. 1 Credit

**CS8932 Learning Therories Technologies**
This course will critically evaluate the role of technology in the lives of children. Ideally, computers and online technologies are tools for putting people in touch with people and the objects they create. However, much of the technology is designed for children without sufficient investigation as to how children conceptualize technology in the context of constructivist and constructionist theories of learning. Traditional learning theories have not kept pace with new technologies, and as a result, much of the content developed for online learning does not take into account either the advantages of the new technologies, or the development of children's thinking as a result of the dramatic increase in computer-mediated experiences. This course will explore learning technologies as they relate to children from a variety of perspectives. We will consider how technology is used in formal and informal learning environments, as well as the variety of interactions children typically have with technology through the consideration of children's theories of learning, children's software, and technical production with children (learning by doing, and performative thinking). 1 Credit

**CS8933 Directed Studies in ECS**
This course is for Masters Students who wish to gain knowledge in a specific area for which no graduate level class is offered. It would involve a directed study for which the student would be given credit. Students wishing to take the class would be assigned an advisor most familiar with the specific area of interest. Students would be required to present the work of one term (not less than 90 hours in the form of directed research, tutorials and individual study), in an organized publication format. 1 Credit

**CS8934 Special Topics in ECS**
This course provides students with the opportunity to pursue advanced studies on issues and themes of immediate and current significance in the fields of Early Childhood Studies. It allows students to access leading-edge research and to explore new and emerging models of practice. The particular theme, topic and structure of the course will vary in response to changes and trends in the field, availability of specialists and student interest. 1 Credit

## ELECTRICAL AND COMPUTER ENGINEERING

**CURRICULUM**

### Master of Applied Science

**DEGREE REQUIREMENTS**

Master's Thesis

EE8010 Master's Research Seminar in ELCE

Five Elective credits

### Master of Engineering

**DEGREE REQUIREMENTS**

Master's Project*

Eight Elective credits

*students may apply to substitute 2 courses for the project.

### Doctor of Philosophy

First Offered Fall 2004

**DEGREE REQUIREMENTS**

Candidacy Examination
Dissertation

EE9010 PhD Research Seminar in ELCE

Four Elective credits

(Only one elective credit may be a Directed Studies course)

| ***ELECTIVES*** | | *Credits* |
|---|---|---|
| EE8102 | Signal Detection Theory | 1 |
| EE8103 | Random Processes | 1 |
| EE8104 | Adaptive Signal Processing | 1 |
| EE8105 | Digital Signal Processing I | 1 |
| EE8107 | Digital Communications | 1 |
| EE8108 | Multimedia Processing & Comm | 1 |
| EE8109 | Wireless Communications I | 1 |
| EE8111 | Digital Signal Processing II | 1 |
| EE8112 | Digital Waveform Compression | 1 |
| EE8113 | Statistical Time Series Anal | 1 |
| EE8114 | Optical Commun & Networks | 1 |
| EE8115 | Network Engineering Anlys | 1 |
| EE8119 | Wireless Communications II | 1 |
| EE8120 | Applied Optimization Technique | 1 |
| EE8121 | Wireless Networks | 1 |
| EE8122 | Opto-electronic Devices | 1 |
| EE8201 | Computer Vision | 1 |
| EE8202 | Digital Image Processing I | 1 |
| EE8204 | Neural Networks | 1 |
| EE8205 | Embedded Computer Systems | 1 |
| EE8207 | High Perform Comp Sys Design | 1 |
| EE8208 | Arch Synth & Des of Dig Sys | 1 |
| EE8209 | Intelligent Systems | 1 |
| EE8211 | Advanced Topics in Comp Networks | 1 |
| EE8212 | Digital Image Processing II | 1 |
| EE8213 | Computer Network Security | 1 |

| | | |
|---|---|---|
| EE8214 | Computer Systems Modelling | 1 |
| EE8215 | Human Computer Interaction | 1 |
| EE8216 | Computer Networks | 1 |
| EE8301 | Linear System Theory | 1 |
| EE8306 | Fund Robot Dynamics & Control | 1 |
| EE8401 | Computer Methods Pwr Sys Analysis | 1 |
| EE8403 | Adv Topics in Power Systems | 1 |
| EE8405 | Power Sys Stability & Control | 1 |
| EE8406 | Electric Motor Drives | 1 |
| EE8407 | Power Converter Systems | 1 |
| EE8408 | Switch Mode Power Supplies | 1 |
| EE8409 | Electromagnetic Theory | 1 |
| EE8410 | Power Electronics | 1 |
| EE8412 | Advanced AC Drive Systems | 1 |
| EE8413 | Adv Digtl Contrl Of Power Elec | 1 |
| EE8501 | VLSI System Design | 1 |
| EE8502 | CMOS Analog Int Circuits | 1 |
| EE8503 | VLSI Circuits & Sys for Comm | 1 |
| EE8504 | VLSI Dsgn Automtn & CAD Tools | 1 |
| EE8505 | Digital Systems Testing | 1 |
| EE8506 | Digital CMOS VLSI Integrated Circuits | 1 |
| EE8601 | Directed St: Electrical Engr | 1 |
| EE8603 | Selected Topics: Computer Engr | 1 |
| EE8604 | Selected Topics: Electrical Engr | 1 |
| EE8605 | Selected Topics: Computer Sci | 1 |

**COURSE LISTING**

**Master's Thesis**
The student is required to conduct advanced research on a topic chosen in consultation with the student's thesis supervisor. The supervisory committee, and the thesis supervisor, must also approve the thesis research plan/proposal, which is presented in writing by the student. The student must submit the completed research in a thesis format to an examination committee and make an oral presentation of the research thesis, and the research results, to this committee. The examination committee will assess and grade the candidate's research thesis. Through the thesis, the student is expected to furnish evidence of competence in research and a sound understanding of the specialty area associated with the research. This is a "Milestone." Pass/Fail

**Master's Project**
The Project may consist of an advanced design assignment, laboratory research project, analysis of research data, or an in-depth review of an approved aspect of the scientific literature. The student presents the proposed project plan in writing, which must be approved by the project supervisor, and the supervisory committee. The MEng candidate must submit two copies of the completed project report to the supervisor. An oral presentation of the project report, and results, will be arranged in a seminar format. The supervisor and another member of the supervisory committee will assess and grade the candidate's project report. This is a "Milestone." Pass/Fail

**Candidacy Examination**
This is a "Milestone." Pass/Fail

**Dissertation**
The student is required to conduct advanced research on a topic chosen in consultation with the student's supervisor. The supervisor and supervisory committee must approve the research proposal, which is presented in writing and orally by the student. The student must submit the completed research in a dissertation format and make an oral presentation to an examination committee. The examination committee will evaluate the presentation and the dissertation. Through the dissertation, the student is expected to furnish evidence of competence in research and a sound understanding of the specialty area associated with the research. The research is expected to result in original and significant contribution to knowledge in the discipline. Pre-requisite: Candidacy Examination. This is a "Milestone." Pass/Fail

**EE8010 Master's Research Seminar in Electrical and Computer Engineering**
This course consists of weekly seminars with emphasis on current research in the specialization fields and emerging areas of electrical and computer engineering. This course will run through Fall and Winter semesters, 1 hour/week. Presentations will be given by graduate students, faculty members, visiting scholars and guest speakers. In order to

achieve a pass grade in the course, the student must attend a minimum of 75% of the seminars and do an oral presentation on a research topic. Pass/Fail.

**EE8102 Signal Detection Theory**
Classical and statistical detection theory, multiple hypotheses, composite hypotheses, sequential analysis. Classical estimation theory. Representation of random processes. Detection of signals (white and coloured noise, signals with unknown parameters). Estimation of signal parameters. Linear filtering theory, estimation of continuous waveforms. Wiener and Kalman filtering. 1 Credit

**EE8103 Random Processes**
Probability theory: mathematical model, conditional probabilities, random variables, pdf, transformation of random variables, conditional densities, statistical averages. Random processes concept; ensemble, stationarity, ergodicity, correlation and covariance, power spectral density, calculation and measurement of AVF and PSD, Gaussian random processes, noise. Transmission of random processes through linear systems: time-invariant systems, multiple terminals, Gaussian processes, non-stationary processes.
1 Credit

**EE8104 Adaptive Signal Processing**
The course begins with a brief review of linear signals and systems. Adaptive filter algorithms such as least mean squares (LMS), recursive least squares (RLS), and recursive least squares lattice (RLSL) will be covered. Linear prediction theory, autoregressive modeling, and spectral estimation will also be discussed. The course will briefly cover advanced adaptive signal analysis techniques based on time-frequency and wavelet transforms. 1 Credit

**EE8105 Digital Signal Processing I**
The class provides an introductory treatment of the theory and principles of digital signal processing, with suitable supporting work in linear system concepts and digital filter design. More specifically, the class deals with the following topics: general concepts of digital signal processing, continuous-time system analysis, Fourier analysis and sampled-data signals, discrete-time system analysis, discrete-time systems, infinite impulse response digital filter design, discrete and fast Fourier transforms, and general properties of the discrete Fourier transform. Antirequisite: ELE 792. 1 Credit

**EE8107 Digital Communications**
The class is intended to introduce the student to the concepts and theory of digital communications. The concepts of information, channel capacity, error probability, intersymbol interference, pulse shaping and spectrum shaping and optimum filtering are discussed. Digital multiplexing and bit stuffing, encoding, scrambling, equalization and synchronization problems are studied. Regenerative repeaters, M-ary signaling systems, basic modulation techniques - ASK, PSK and FSK; and performance characteristics of digital transmission systems are considered. 1 Credit

**EE8108 Multimedia Processing and Communications**
This course will touch some of the fundamental issues in media processing and applications. It will start with a quick look at the standards which set the baseline work for multimedia, such as MPEG-4 and MPEG-7. It will then present to the class the latest and the most important issues in multimedia, including indexing and retrieval, media coding, media transmission, human-computer interface, image and speech processing for multimedia, wireless multimedia, and more. Examples, demonstrations, and applications will also be provided. 1 Credit

**EE8109 Wireless Communications I**
This class provides an overview of wireless communications systems and fundamental analysis and design techniques. The class introduces cellular system, channel characterization for propagation losses, fading, and interference. Coding, modulation, and advanced transceiver design issues are examined. Modern mobile wireless communication system applications are reviewed. 1 Credit

**EE8111 Digital Signal Processing II**
This course covers signal processing topics such as discrete cosine transform, principal component analysis, continuous and discrete wavelet transforms, multirate filterbanks, independent component analysis, and quadratic time-frequency distributions. Applications of the above techniques in denoising, data compression, feature extraction, and source localization will also be discussed. Prerequisite: EE8105 or equivalent 1 Credit

**EE8112 Digital Waveform Compression**
Numerical representation of waveform information; common waveform communication systems; statistical models used for waveforms; Differential PCM, motion estimation/compensation for video compressions. Transform coding: run length coding, Huffman and arithmetic coding, segmentation/ contour/edge based coding; pre-processing and post-processing strategies. Vector quantization. Sub-band coding and wavelet transform. Zero trees. Channel concerns: robustness, error recovery, masking video/image bit rate source models. Coding of two-level graphics. Review of standards: JPEG, MPEG, H.261. 1 Credit

**EE8113 Statistical Time Series Analysis**
Time-series analysis and spectrum estimation constitute an important area of digital signal processing that finds applications in sonar and radar, geophysics and oil exploration, biomedicine, speech and image processing. This course will cover the basic principles and wide variety of signal processing techniques developed for time series and spectral analysis. Topics include: definitions of power spectrum; conventional spectrum estimation methods, maximum likelihood method of Capon; maximum entropy method; parametric modeling of time series; AR and ARMA spectrum estimation;

harmonic decomposition techniques; duality between spectral analysis and array processing; signal and noise subspace methods in array processing. Higher-order spectral analysis methods and applications. 1 Credit

**EE8114 Optical Communications and Networks**
The objective of the course is to provide an in-depth understanding of light wave communication systems. Active and passive state of the art photonic devices that form the backbone of high-speed optical systems will be studied. Theoretical and practical aspects of the devices as well as the optical channel will be evaluated. Relevant issues such as analog and digital optical modulation techniques, noise sources and mechanisms, optical signal processing techniques and multiple access techniques such as DWDM (dense wavelength division multiplexing) and CDMA (code division multiple access) will also be covered. Both the guided (fiber based) and free space (optical wireless) systems will be discussed. 1 Credit

**EE8115 Network Engineering and Analysis**
This course covers queuing theory, self similarity and flow control. The topics to be covered are: review of basic continuous-time and discrete-time probability distributions: exponential distribution and Poisson process, concept of Markov modeling, Markov chain and basic queueing theory, analysis of M/M/1, M/M/m, M/M/m/m, M/G/1 models, network traffic modeling: an introduction to self-similarity, fitting of different self-similar traffic models, network traffic flow control and engineering: additive-increment and multiplicative-decrement (AIMD) etc., analysis of different designs based on AIMD. 1 Credit

**EE8119 Wireless Communications II**
This is an advanced course on wireless communication. The topics to be covered include: communication over fading channels, equalization, synchronization; Spread Spectrum Systems; Co-channel Interference Control: power control, interference statistics and performance analysis, opportunistic communication over fading channels; Diversity Techniques: time, space and frequency diversity and macro diversity; Multi-antenna and Multi-carrier Systems: MIMO channels and capacity, OFDM and MC-CDMA; State-of-the-art development in digital mobile communication systems. Prerequisite: EE8107/EE8109 or equivalent 1 Credit

**EE8120 Applied Optimization Techniques**
This course covers the following topics: Linear and nonlinear programming, unconstrained optimization techniques such as gradient techniques (steepest descent, conjugate gradient, Newton-Raphson) and constrained optimization techniques such as Lagrange multiplier, quadratic and dynamic programming, least square techniques, integer and mixed-integer programming. NP-complete problems: branch-and-bound as well as heuristic algorithms, graph colouring, partitioning, and maximum matching. Bounds, variable priorities, special ordered sets and search algorithms (random search, binary search, genetic algorithms, and tabu search). Optimization algorithms in Electrical and Computer Engineering areas will be discussed in depth. 1 Credit

**EE8121 Wireless Networks**
This course is a moderately advanced level course on wireless networks. This course will assume necessary background knowledge in Internet Protocol (IP) networks with particular emphasis on routing, transport protocol design (congestion control and flow control), and quality of service and then build upon it. In particular, this course focuses on four major areas of wireless networks: (1) Design of different WNs including their integration, (2) Medium access control for WN, (3) Routing in WN, and (4) TCP design for WN. A discussion on applications and security is also included to introduce the students with those topics. 1 Credit.

**EE8122 Opto-electronic Devices**
This course offers a comprehensive overview of optical properties of semiconductors devices. The course begins with the transmission properties of electromagnetic wave in different media. This introduction is followed by the devices that generate light: light-emitting diodes (LEDs) and laser diodes (LDs). Topics also include optical spectra and transitions, spontaneous and stimulated emission, population inversion, carrier and optical confinements in heterostructures, etc. Some of the most popular devices such as LCD, CCD, DVD and LED will be discussed. The last part is the semiconductor photodetectors such as photoconductors, photodiodes and avalanche photodiodes. 1 Credit.

**EE8201 Computer Vision**
This course introduces the fundamental concepts for computer and robot vision. Mainly, intermediate and high-level vision processes will be covered, including shape feature extraction, representation and aggregation. Basic concepts of surface orientation, optical flow, and texture will be introduced for 3D shape analysis. Shape from shading, contour, texture, motion and stereo techniques will also be covered. Special topics in application of computer vision including automated visual inspection; robotic vision, autonomous navigation, etc. will be presented.
1 Credit

**EE8202 Digital Image Processing I**
This course starts with the introduction to digital image fundamentals, imaging geometry, and image storage formats. Simple spatial domain techniques as well as spatial frequency domain methods and digital filter design for image enhancement and restoration are discussed. Low-level image segmentation and feature extraction concepts will also be introduced. Special topics in application of image processing including remote sensing, medical imaging, etc. will be presented. 1 Credit

**EE8204 Neural Networks**
The class deals with preliminaries of artificial neural systems including fundamental concepts and models. Single layer perception classifiers and multi-layer feed forward networks, single-layer feedback networks, and associative memories are covered. 1 Credit

**EE8205 Embedded Computer Systems**
This course focuses on the design and implementation of software for embedded systems. High performance embedded system and safety critical embedded system architecture will be introduced, Fault-tolerant and reliable embedded system design techniques are also highlighted. The main topics to be covered include embedded computer organization, hardware/software codesign of embedded systems, CAD tools for hardware/software codesign, system on chip, advance concepts of real-time operating systems and real-time scheduling. The course introduces the technologies used in the design of embedded systems such as processor cores, embedded system specification languages, and software tools for hardware/software co-verification and system partitioning. The application of embedded systems for emerging networking and medical devices will also be covered. 1 Credit

**EE8207 High Performance Computer System Design**
This course will focus on the design of high performance computer systems. Topics covered include: Advanced pipelining and parallelism issues, including branch prediction, instruction and data level parallelism; Advanced processors including superscalar, VLIW, speculative, vector and multi-processors; Physical limitations and scalability issues; Real-world examples including MMX technology, PowerPC and Alpha architectures, and DLX architectures. The lab projects include using CAD tools to design a branch predictor and trace cache for Pentium 4 processor. Antirequisite: ELE818 1 Credit

**EE8208 Architectural Synthesis & Design of Digital Systems**
This course will explore the methodologies for high-level architectural synthesis and low-level logic design of digital systems and architecture-to-task optimization techniques. Topics will include: architecture overview of modern computing systems, overview of recent hardware basis for custom digital systems (FPGA and CPLD) and hardware description languages (VHDL), methodology for high-level architectural synthesis including resource scheduling and binding, and low-level logic synthesis of digital systems. Case studies on synthesis process of digital systems from functional and technical specification to electrical schematic diagram will be discussed. Students are expected to read selected papers from current research literature, learn one of hardware description languages (VHDL or Verilog) and perform a project using a commercial CAD system. 1 Credit

**EE8209 Intelligent Systems**
This course introduces the fundamental practice and underlying principles involved in the study of intelligent systems. The emphasis of the course is on a practical approach to problem solving and learning processes in the context of neural networks. In addition to theoretical, mathematical, and implementation of such systems students will get exposure to some of the popular intelligent systems tools. Applications in signal processing, pattern recognition and vision will be considered. Antirequisite: ELE888 1 Credit

**EE8211 Advanced Topics in Computer Networks**
Topics covered include design and operation of computer networks, Gigabit Networking, Fiber Optics and SONET standards, Cell Networking, Asynchronous Transfer Mode, Wide Area and Local Area Cell networks, Gigabit packet networks, Applications, Internetworking Protocols, Traffic Modelling ad Performance Issues, Switch Architectures and current research areas. Practical aspects of network software design are also discussed. 1 Credit

**EE8212 Digital Image Processing II**
This course deals with advanced concepts in digital image processing. In particular, emphasis will be on color image processing. The concepts that will be covered include: color vision, trichromacy theory, color spaces, colour image creation/representation/storage, component colour image processing, vector colour image processing, segmentation, and colour image compression. The course will include a practical aspect by discussing applications and implementations of image processing techniques currently in use in industry. The course will have student implemented assignments and projects that will require hands-on programming, literature reviews and oral presentation. Prerequisite: EE8202 or equivalent 1 Credit

**EE8213 Computer Network Security**
This course provides a thorough understanding of technologies and methodologies in network security. It deals with the fundamental techniques used in implementing secure network communications, and forms of attacks on computer networks and approaches to their prevention and detection. Topics that are covered include Introduction to Cryptography, Virtual Private Networks (VPN), Firewalls and intrusion detection techniques. In addition, the course covers worms, viruses, and DDOS attacks and their remedies. Kerberos authentication Protocol, SSL, and anonymous communication protocols. 1 Credit

**EE8214 Computer Systems Modeling**
The objectives of this course are to study the characteristics of various analytical models of computer systems and to learn how to apply those models to analyze system performance and dependability. The modeling techniques to be covered include Poisson, renewal, Markov processes, fault trees, Petri nets and queuing networks. Examples include models of computer systems, computer networks, and wireless systems. 1 Credit

**EE8215 Human Computer Interaction**
The course is designed as an introduction to Human Computer Interaction from the perspective of human capabilities and limitations. It will provide the student with an understanding of human sensory systems and information processing models to support future work in any systems design where there is a human interface. Applications range from basic computer interfaces and web page design to semi-autonomous robotics and remote systems control to the design of complex systems such as flight simulators or other virtual environments. By the end of the course, the student will have gained knowledge in some of the essentials of cognitive human factors and information theory concepts, and an

understanding of factors that affect human performance such as memory, learning, attention and reaction times. The student will be capable of specifying displays and controls to optimize overall useability and system performance outcomes. 1 Credit

**EE8216: Computer Networks**
This is an advanced course in computer networking. The course is designed to include materials relevant to the industry, for example IP QoS and TE necessary for VOIP and MPLS services. The course deals with the principles, architectures, algorithms, and protocols related to Internet, with emphasis on routing, transport protocol design, flow control and congestion control, IP Quality of Service and Traffic Engineering. It also introduces IP security. Anti-requisite: COE865 or ELE865. 1 Credit

**EE8301 Linear System Theory**
The main thrust of the class is to introduce an algebraic unification of finite-dimensional linear systems with emphasis on continuous and discrete dynamic systems, using an operator theoretic approach. Topics covered include transition matrices, functions of matrices, adjoint systems, weighing patterns, realizability; canonical forms; stability, minimal realization; minimum norm, and approximation problems. 1 Credit

**EE8306 Fundamentals of Robot Dynamics and Control**
This course provides a comprehensive treatment on the fundamentals of robotics, particularly in the kinematics, dynamics and control of robotic manipulators. Topics include: forward dinematics, homogeneous transformation; the Denavit-Hartenberg representation of linkages. Inverse kinematics: closed-form and numerical solutions. Differential motion; Jacobian matrix; singularities. Dynamics: the Euler-Lagrange formulation. Trajectory generation. Motion and interaction control of robotic manipulators. Actuators and sensors. Antirequisite: ELE869 1 Credit

**EE8401 Computer Methods in Power System Analysis**
Advanced topics in load flow analysis; Decoupled load flow, inclusion of high-voltage direct current links in load flow. Parameter estimation for power systems. Static state estimation. Load modeling. 1 Credit

**EE8403 Advanced Topics in Power Systems**
Basic concepts. Review of optimization techniques. Linear and non-linear programming. Pontryagin's maximum principle. Fletcher-Powell method, etc. Systems security monitoring. State estimation. Optimal power flow. Real and reactive power optimization. On-line optimization. Load dispatching. Generator scheduling, maintenance scheduling in hydro, thermal and hydrothermal systems. Some case studies.
1 Credit

**EE8405 Power System Stability and Control**
This is an advanced course in power system stability studies focused on the design of digital signal processing systems for improvement of steady state and transient power system stabilities. This course provides studies on analytical techniques and computer methods for power system stability enhancement, and digital signal processing control design and implementation of advanced power system stabilizers. 1 Credit

**EE8406 Electric Motor Drives**
Characteristics of dc and ac motors, speed-torque profiles of motors and loads, motor models, principle of motor speed control, field and armature current control for dc motor drives, V/F control and field oriented control for ac motors, motor drive dynamics, digital implementation, drive performance evaluation, industrial application examples. 1 Credit

**EE8407 Power Converter Systems**
Principle of ac to dc converters, dc/dc and dc/ac converters, voltage and current source converters, multi-level high-power converters, pulse width modulation techniques, harmonic reduction techniques, modeling and simulation techniques, and industrial applications. 1 Credit

**EE8408 Switch Mode Power Supplies**
Flyback converters, forward converters, bridge converters, Cuk converters, pre-regulators, inrush control, start-up methods, overvoltage and undervoltage protections, foldback current limiting, output filters, transformer design, induction and choke design, current mode control, stability. 1 Credit

**EE8409 Electromagnetic Theory**
The course will cover the following: Electromagnetostatic fields, Maxwell's equations, Poynting and uniqueness theorems, losses due to polarization damping forces, Helmholtz wave equation, auxiliary potential functions, reciprocity theorem. Transverse electromagnetic waves, wave polarization, reflection and transmission at interfaces, wave matrices, oblique incidence. Waves between parallel planes, rectangular and circular waveguides, microwave cavities, Antennas, antenna characteristics. 1 Credit

**EE8410 Power Electronics**
A course on microprocessor-controlled solid state converters. Major topics include: solid state switching devices, dc-dc switch mode converters, diode & thyristor rectifiers, current & voltage source inverters, industry applications and microprocessor programming techniques. Typical control schemes for these converters will also be discussed. Important concepts are illustrated with laboratory design projects. An MC68HC11 microprocessor based MPP board will be used in the projects. Antirequisite: ELE754 1 Credit

**EE8412 Advanced AC Drive Systems**
The topics include general configurations of voltage source inverter (VSI) and current source (CSI) fed drives, reference frame theory, space-vector and dq-axis models of ac machines, dynamic behavior of ac machines, principle of field orientation, indirect and direct field oriented controls for VSI and CSI drives, direct torque control, sensorless control of ac drives, observers for flux, torque and speed, and simulation and design of closed-loop control systems. 1 Credit

**EE8413 Adv Digital Control of Power Electronics**
A course on the design of digital system for power electronic applications. Major topics include are: digital implementation of switch mode power supplies, digital control of active filters, voltage compensators, reactive power compensator, PWM rectifiers, and AC motor drive systems. The course focus on the digital design of the control system including modeling, digital signal processing, digital filter design and digitalize of an analog control system. The implementation includes the DSP/FPGA control system, A/D conversion, gate signal generation and hardware design of the digital control system. 1 Credit

**EE8501 VLSI System Design**
This course deals with the design of CMOS integrated circuits using deep sub-micron CMOS technology at the system level. The course consists of two essential components: theory and project. The theoretical component consists of : advanced topics on modeling of MOS transistors, modeling of interconnects (lumped, distributed RC, distributed RLC, and transmission line models), impedance matching techniques, layout techniques for high-speed digital and mixed analog-digital circuits, clock generation and distribution on chip, power distribution on chip, analog and digital grounding of mixed analog-digital circuits on chip, I/O and pad design, packaging and ESD protection, switching noise, and high-speed data links. The project component consists of design, layout, and simulation of CMOS circuits using state-of-the-art CMOS technology and CAD tools. Antirequisite: ELE863 1 Credit

**EE8502 CMOS Analog Intergrated Circuits**
The class deals with providing a detailed description of the MOS (Metal-oxide-semiconductor) transistor in conjunction with analog MOS circuitry. Major topics that will be covered are: introduction to semiconductor physics, pn junctions, MOS capacitors, DC and AC characteristics of MOSFET, analysis of analog MOS elements (current mirrors, amplifiers, and biasing circuitry), noise and RF using MOS transistors will also be addressed. Antirequisite ELE704. 1 Credit

**EE8503 VLSI Circuits and Systems for Communications**
This advanced graduate course deals with the design of VLSI circuits and systems for communications. Major topics include fundamentals of data communications (modeling of MOS devices, noise figure, PCM, PAM, inter-symbol interference, modeling of channels, transmission lines and impedance matching, pre-emphasis and post-equalization), wideband amplifier design techniques (low-noise design, gain-boosting, bandwidth enhancement, switching noise, mismatch compensation, voltage-mode and current-mode), high-speed electrical signaling schemes, Gbps serialization and de-serialization, voltage and current-controlled oscillators, phase noise of oscillators, phase-locked loops, clock and data recovery. Prerequisites: EE8501 or EE8502 or equivalent 1 Credit

**EE8504 VLSI Design Automation and CAD Tools**
The objective of this course is to introduce the fundamental principles of VLSI (Very Large Scale Integrated) circuit design and layout. This course is targeted towards an introduction to the mathematical topics of “algorithmic graph theory”, and will be followed by introductions to “computational complexity” and “general methods for Combinatorial optimization” for layout partitioning, floorplanning, placement, routing and compaction based on exact mathematical programming (linear, integer and nonlinear programming) as well as an introduction to advanced heristic techniques (i.e. Tabu search, genetic algorithms and simulated annealing, neural networks, etc.). 1 Credit

**EE8505 Digital Systems Testing**
The course covers theory and techniques for digital systems testing and testable design. The concepts of fault modeling, fault simulation, test generation, bridging faults testing, functional testing, and logic-level diagnosis are examined. RAM testing, PLA testing, FPGA and microprocessor testing, and design for testability issues are discussed. Compression techniques, built-in self-test and self-checking circuits are considered. 1 Credit

**EE8506 Digital CMOS VLSI Integrated Circuits**
This course will provide students with various topics in the design and analysis of digital CMOS VLSI integrated circuits. Some of these topics will be discussed deeply and other moderately. The major topics to be covered are: (1) System-level and intellectual property block design methodologies, (2) MOSFET (Metal Oxide Semiconductor Field Effect Transistor) modeling and analysis, (3) Logic families such as complementary CMOS, ratioed CMOS, and dynamic CMOS, (4) Circuit characterization and performance estimation, (5) Interconnects analysis and modeling, (6) Sequential circuits design, and (7) Subsystems design and analysis. 1 Credit

**EE8601 Directed Studies in Electrical Engineering**
This class is available to graduate students in electrical engineering, who wish to gain knowledge in a specific area for which no graduate-level classes are offered. Students are assigned an advisor and are required to present a formal report, or take a formal examination, at the end of the class. 1 Credit

**EE8603 Selected Topics in Computer Engineering**
This course consists of lectures, seminars, and readings covering the latest advances and research in Computer Engineering such as communications, signal processing, and computer hardware and software. The course description will be announced prior to scheduling of the course. 1 Credit

**EE8604 Selected Topics in Electrical Engineering**
This course consists of lectures, seminars, and readings covering the latest advances and research in electrical Engineering such as electronics, electromagnetics, controls and power devices. The course description will be announced prior to scheduling of the course.
1 Credit

**EE8605 Selected topics in Computer Science**
This course consists of lectures, seminars, and readings covering the latest advances and research in Computer Science. The course description will be announced prior to scheduling of the course. 1 Credit

**EE9010 PhD Research Seminar in Electrical and Computer Engineering**
This course consists of weekly seminars with emphasis on current research in the specialization fields and emerging areas of electrical and computer engineering. This course will run through Fall and Winter semesters, 1 hour/week. Presentations will be given by graduate students, faculty members, visiting scholars and guest speakers. In order to achieve a pass grade in the course, the student must attend a minimum of 75% of the seminars and do an oral presentation on a research topic. Pass/Fail.

## ENVIRONMENTAL APPLIED SCIENCE AND MANAGEMENT

### CURRICULUM

### Master of Applied Science

| DEGREE REQUIREMENTS | | *Credits* |
|---|---|---|
| *ES8901 | Chemical and Biological Pathways | 1 |
| ES8921 | Environmental Law and Policy | 1 |
| ES8930 | Seminar in Env. Appl. Science & Mgt. | 1 |
| AND one of the following Options: | | |
| ***PROFESSIONAL PROJECT Option*** | | |
| Master's Project | | |
| Seven Elective credits, with a minimum of two from Group A and two from Group B | | 7 |
| ***THESIS Option*** | | |
| Master's Thesis | | |
| Four Elective credits, with a minimum of one from Group A and one from Group B | | 4 |

***ELECTIVES***

| ***Group A: Environmental Applied Science*** | | *Credits* |
|---|---|---|
| *ES8902 | Wtr Pollution Control Process | 1 |
| *ES8903 | Pollution Prevention | 1 |
| *ES8904 | Waste Management | 1 |
| ES8905 | Air Pollution Science and Engr | 1 |
| ES8906 | Water Pollution Transport | 1 |
| ES8907 | Wastewater Engineering | 1 |
| ES8908 | Soil Remediation | 1 |
| ES8909 | Environmental Biotechnology | 1 |
| *ES8910 | Energy and The Environment | 1 |
| ES8911 | Ecotoxicology | 1 |
| ***Group B: Environmental Management*** | | |
| ES8801 | Facil Siting & Env Risk Asses | 1 |
| ES8922 | GIS for Environmental Management | 1 |
| ES8923 | Environmental Assessment | 1 |
| ES8924 | Environmental Mgmt Systems | 1 |
| ES8925 | Dec Making & Strat Plan Mgmt | 1 |
| ES8926 | Environmental Economics | 1 |
| ES8927 | Risk Assessment in Envl Mgmt | 1 |
| ***Group C: Environmental Applied Science and Management*** | | |
| ES8950 | Indp Study in Env Sci & Mgmt | 1 |

***Platform Courses:** The program offers a set of five platform courses in environmental applied science. They are structured to provide both foundational knowldege and advanced study at the graduate level. These courses enable students from a wide range of academic backgrounds (including geography, Public Health Urban and Regional Planning, and Environmental Studies) to take engineering and applied science subjects. Students who successfully complete a Platform Course will have the option of enrolling in advanced applied environmental science courses in subsequent semesters.*

### COURSE LISTING

**Master's Project**
The research project option is intended for students following a professional career path in environmental applied science and management, and is typically conducted in an applied setting. In the project, students propose and carry out advanced work in an industry or a public sector organization under the direction of a faculty supervisor and a project

supervisory committee. The research project is submitted in a written report to the faculty supervisor and is evaluated by a project examining committee. This is a "Milestone." Pass/Fail

**Master's Thesis**
In the thesis option, students conduct an advanced examination of a topic in the environmental applied science and management areas. Students propose and carry out the research under the direction of a faculty supervisor and a thesis supervisory committee. On completion, the research is submitted in a thesis format, to the supervisor and defended by the student before a thesis examining committee. This is a "Milestone." Pass/Fail

**ES8801 Facility Siting & Env. Risk Assessment**
This course explores the theory and practice of public facility siting and the role that risk analysis and risk assessment play in the siting process. The course will examine the nature of facility siting conflicts, the effects of objective and perceived risks, the methods used in risk analysis and assessment, and the means presently employed in environmental management practice to analyze and manage risks that are the unavoidable consequences of many6 large-scale public undertakings. Antirequisite: UPE815. 1 Credit

**ES8901 Chemical and Biological Pathways**
This course is devoted to the examination of fundamental and applied aspects in chemical and bio-geochemical processes in the environment. It will primarily deal with the mechanisms which affect the dispersion of naturally occurring and xenobiotic compounds in soils and water. The use of such information and its incorporation into environmental models will be covered. The effect of environmental impacts on chemical and biological processes will be emphasized. The course will include a combination of lectures, student-led seminars and case studies, and a computer-modeling workshop/laboratory. (Platform Course) 1 Credit

**ES8902 Water Pollution Control Processes**
This course will examine the sources of water pollution including wastewater, non-point source pollutants and storm water run off. The analytical characterization of contaminants will be covered for the major sources and control processes will be reviewed with a focus on wastewater processes. This will be followed by a review of the most relevant technologies used to treat industrial and municipal effluents. (Platform Course) 1 Credit

**ES8903 Pollution Prevention**
The course examines a number of industry-environment interactions. It discusses pollution prevention and industrial ecology, and it presents a survey of environmental concerns including material and energy budgets, life-cycle assessment, and industrial process wastes and their minimization. Design for environmental quality is discussed including energy use and design for energy efficiency. The course explores the future of industrial activity with regard to the environment and it reviews studies in selected industrial applications. (Platform Course) 1 Credit

**ES8904 Waste Management**
This course describes the development of solid waste management in response to legislative requirements for waste transport and disposal. To know when solid waste is a resource or a disposal problem requires its analysis and classification. Processing and handling of solid waste demands the proper application of available technology and basic engineering principles. These will be explained and followed by more advanced principles related to separation (including recycling), processing, and transformation of solid waste. Hazardous waste and hazardous materials, as well as federal and provincial regulatory processes governing hazardous wastes, will also be examined. Waste stabilization and solidification, land disposal of waste, environmental site and subsurface characterization will be discussed. Physical conversion of waste including incineration technologies, chemical and biological conversion technologies as well as successful combinations of the three will be described. The course will conclude with a brief review of the main issues in integrated solid waste management. (Platform Course) 1 Credit

**ES8905 Air Pollution Science and Engineering**
This course examines the nature and movement of pollutants released into the atmosphere and the theoretical aspects upon which devices and technologies for air pollution engineering are based. The characteristics of airborne contaminants are examined and their dispersion is discussed in relation to atmospheric circulation patterns, wind profiles, turbulent diffusion, topographical effects, local circulation effects, temperature in the atmosphere, atmospheric stability, general plume behaviour and the Gaussian model. The characteristics and operation of the relevant devices and technologies are investigated. The design of devices and their integration into overall pollution control systems are covered. The devices considered include: settling chambers, cyclones, particulate scrubbers, electrostatic precipitators, fabric filters, VOC incinerators, adsorption, absorption, and condensation devices. 1 Credit

**ES8906 Water Pollution Transport**
A quantitative analysis of surface and subsurface water pollution pathways is crucial to the development of water pollution prevention and control plans. This course discusses the point and non-point pollution sources in urbanized areas with emphasis on modeling approaches and analysis techniques. It examines the processes governing contaminant transport and behaviour including advection, dispersion, diffusion and adsorption. Topics include: surface hydrology, municipal water use cycle, urban drainage systems, point and non-point pollution sources and pollution control strategies for sanitary, storm, and combined sewer systems. It also examines natural groundwater quality, the geochemical origin of major ions in natural groundwater, causes of hardness, groundwater age determination using isotopes, common causes of groundwater contamination, and the transport and biochemical transformation of contaminants in the unsaturated and saturated groundwater zones. 1 Credit

**ES8907 Wastewater Engineering**
The course is an advanced description of the unit operations in wastewater engineering. It includes physical, chemical and biological processes. In the first case, filtration, sedimentation and clarification of solids will be discussed. Liquid-liquid and gas-liquid separations will follow. Chemical operations will include neutralization, precipitation, chemical redox and ion exchange. The last part of the course will cover fixed and suspended growth biological processes. 1 Credit

**ES8908 Soil Remediation**
This course overviews the design and operation of processes for soil remediation. Contaminants of interest include halogenated and non-halogenated volatiles, halogenated and non-halogenated semi-volatiles, fuel hydrocarbons, pesticides and inorganics. Seven groups of technologies will be examined: (1) excavation and off-site disposal, (2) soil venting, (3) bioremediation, (4) thermal technologies, (5) chemical technologies, (6) mechanical flushing and washing, and (7) natural attenuation. Antirequisite CV8204. 1 Credit

**ES8909 Environmental Biotechnology**
This course, as a series of lectures and student-led discussions, covers the application of biologically-based technologies in environmental control and remediation. Particular emphasis is placed on understanding the key metabolic processes involved in biodegradation and biodeterioration. Areas of application covered include control of biodeterioration, biologically-based remediation of air, soil, solid waste, wastewater, energy, and bio-control agents. The relevant technologies are also discussed along with the potential positive and negative impacts which may be associated with the use of biotechnologies in the environment. 1 Credit

**ES8910 Energy And The Environment**
A review of thermodynamic fundamentals is provided including combustion, electricity generation, co-generation, heating, cooling and incineration. Energy utilizing technologies in the residential, commercial, institutional, industrial and transportation sectors and their impacts on the environment are examined. Methods and technologies for controlling and reducing the environmental impacts of energy technologies are discussed. The course covers the design of energy technologies for environmental management. (Platform Course) 1 Credit

**ES8911 Ecotoxicology**
The course examines the fate and transport of the major inorganic and organic contaminants in the biosphere. Their properties, release, environmental destiny, and impact on ecological systems will be studied. Included will be the molecular basis of pollutant toxicity, progressing to consequent effects at higher levels of organization including cellular, whole organism, population, community, and ecosystem. From lower levels of ecological structure to global effects, including geopolitical ramifications, it provides perspectives on this multidisciplinary science. 1 Credit

**ES8921 Environmental Law and Policy**
Major themes in environmental law and policy are the effects of scientific uncertainty, political interest groups, economic principles and environmental ethics on the development of environmental policies and laws. Current concepts such as sustainable development, the precautionary principle and the ecosystem approach are critically examined in relation to their legal manifestations. Traditional and novel legal techniques for motivating change in behaviour are compared in terms of their effectiveness: performance and procedural approaches, bench-marking, economic rewards and sanctions, and internal auditing. A comparative approach is taken with environmental laws and policies in other jurisdictions such as the United States and the European Union. A close connection is made between environmental management systems and the need for establishing a due diligence defence for all members of an organization in the event of prosecution. 1 Credit

**ES8922 GIS for Environmental Management**
Geographic Information Systems (GIS) are used to examine the spatial dimensions of environmental data and provide capabilities for data analysis in managing environmental problems. GIS systems are being increasingly recognized for their environmental modeling capabilities. This course indicates the uses of GIS in support of site evaluations, effects monitoring, policy development and decision making. Environmental management research opportunities are explored through lectures, case studies, seminars and hands-on activities using major GIS software packages. 1 Credit

**ES8923 Environmental Assessment**
This course provides an integrated, interdisciplinary approach to the application and evaluation of current biophysical, social and economic impact assessment. It examines environmental assessment as an environmental decision making instrument in provincial, federal and international contexts and it reviews methods to predict, evaluate and mitigate impacts in both human and natural environments. The course reviews the technical and scientific concepts that must be addressed in a comprehensive assessment of project impacts on complex, interacting physical and human systems. This is complemented by a critical appraisal of institutional structure and decision making in environmental management. Evaluation methods and practical applications are emphasized. 1 Credit

**ES8924 Environmental Management Systems**
This course examines the legal, economic and ethical reasons for the development, implementation and monitoring of a comprehensive, location-specific Environmental Management System (EMS). An EMS enables an organization to systematically identify environmental concerns and address them. The elements of a generic EMS are explored: planning and risk assessment phases; establishment of a policy; the outline of organization arrangements; design of the array of programs that address specific sets of environmental concerns such as production methods, energy use and waste disposal; and the development of a program of periodic environmental audits. The requirements of ISO 14000 are explored. Issues relating to the integration of EMS with quality management systems and occupational health and safety systems are discussed. 1 Credit

**ES8925 Decision Making/Strategic Plan. in Mgt.**
This course presents methods in tackling decision making problems and strategic planning issues in engineering and management. Topics in quantitative decision theory such as influence diagrams, decision trees, subjective probability assessment, and the role of information in decision making including Bayesian analysis are discussed. Multi-criteria decision making techniques such as multi-attribute utility theory and Analytic Hierarchy Process are covered. Key steps and end results of the strategic planning process are analysed. Formulating planning assumptions, analysing opportunities, setting objectives, developing strategies and implementing strategic plans are discussed. Case studies are an integral part of the course. 1 Credit

**ES8926 Environmental Economics**
Environmental economics considers economic tools and analyses and their application in understanding environmental issues. Key economic concepts such as opportunity cost, marginal benefits and costs, and consumer and producer surplus are applied in examining the relationship between economic activities and the environment. The equimarginal principle, the Coase theorem, and the central concepts in cost-effectiveness and cost-benefit analyses are discussed. Case studies are used to illustrate the role of economics in evaluating environmental policies and regulations. The course also examines how business managers are meeting the environmental challenge. The question of how environmental problems and policies affect different groups within society is a central focus of the course. 1 Credit

**ES8927 Risk Assessment in Environmental Mgt.**
This course examines the application of risk analysis and assessment in environmental management. It reviews the methods of estimating probabilities and consequences of risks in the environment including new technologies, chemicals, biological agents and risk generating facilities. Risk analysis includes risk identification, risk pathways, exposure models and dose-response relationships. The course also sets out the principles of risk management and the process by which risks are perceived and communicated in making environmental decisions. A critical evaluation of risk assessment in environmental decision making is supported by a review of selected cases. 1 Credit

**ES8930 Seminar in Env. App. Sci. & Mgt.**
The seminar course introduces students to a range of existing environmental problems and the ways that management concepts, drawn from both environmental science and management, can be applied to them. Seminars will include the participation of academic and professional experts in a number of disciplines who will present research and case reviews in environmental practice. Students are assigned to multi-disciplined teams and are required to apply science and management concepts to environmental applied science and management problems. Students demonstrate in their group work, problem definition and analysis, the design of feasible solutions and multi-disciplinary processes for achieving objectives. Each team is required to produce a report that outlines the analytic and decision resolution of the problem. 1 Credit

**ES8950 Independent Study in Env. Sci. & Mgt.**
Individual directed study of subject areas in environmental applied science and management not addressed in the current curriculum will be carried out under the supervision of a faculty member. A program of supervised, advanced study related to the student's area of concentration will be negotiated on an individual basis with the supervising faculty member. The independent study course is normally intended for students in the final semesters of study. 1 Credit

## IMMIGRATION AND SETTLEMENT STUDIES

### CURRICULUM

### Master of Arts

| DEGREE REQUIREMENTS | | *Credits* |
|---|---|---|
| Master's Research Paper | | |
| IS8100 | Seminar and Field Placement | 1 |
| IS8901 | The Cdn Immigration Experience | 1 |
| IS8902 | Settlemnt Experience in Canada | 1 |
| IS8903 | Imm Law Policy Politics Pract | 1 |
| IS8904 | Research Methods | 1 |
| Three credits from Elective List | | |

***ELECTIVES***

| | | |
|---|---|---|
| IS8921 | Equity for Newcomers:Schools | 1 |
| IS8922 | Changing Multicult Mosaic: GTA | 1 |
| IS8923 | Immigrants' Voices in Cdn Lit | 1 |
| IS8924 | The Economics of Immigration | 1 |
| IS8925 | Glbl Migration & Pop Movements | 1 |
| IS8926 | Women Immigration & Settlement | 1 |
| IS8927 | Imm Fams & Intergenerat Rltns | 1 |
| IS8928 | Law Enforcement in Cdn Imm Sys | 1 |
| IS8929 | Issues of Aging in Settlement | 1 |
| IS8930 | Race and Ethnic Relations | 1 |
| IS8931 | Refugee Issues | 1 |
| IS8932 | Immigration and Health | 1 |
| IS8933 | Ethical Issues: Migratn & Sett | 1 |
| IS8934 | Multicultural Cities–Planning Plcy | 1 |

### COURSE LISTING

**Master's Research Paper**
In this course students will conduct specialized research on a topic of their choice. Students will be required to submit a Paper proposal for faculty approval which identifies the topic, its significance for immigration and settlement, sources and methodology. Students may choose to undertake a scholarly study based on primary and/or secondary sources; or to undertake an applied demonstration project as the basis of their research. Papers in the former category may address an immigration and/or settlement topic from any disciplinary perspective in an advanced, scholarly fashion. By way of illustration, students may conduct research on such topics as: immigrant-ethnic economies; the history of a particular immigrant community; immigrant residential settlement patterns; immigrants and schooling; immigration, global cities and transnationalism; intersections of newcomer status and race, gender, religion, language, sexual orientation and class. Papers in the demonstration project category may engage any issue related to immigration and/or settlement in a policy, service-delivery or advocacy capacity. By way of illustration, students may write their 'demonstration project' papers on service agency attempts to develop new programs for under-serviced newcomer communities; on newcomer community attempts to advocate changes in government policy; on the implications of a new immigrant-selection system for Canada. The research paper will be evaluated by a three-person committee, including the supervisor, and will involve an oral defence. This is a "Milestone." Pass/Fail

**IS8100 Seminar and Field Placement**
This course affords students the opportunity to prepare, undertake and present their learning in a seminar linked to a practicum served with an organization engaged in immigrant and settlement policy, programs or services. Through this practicum, students will apply and test their classroom learning in applied settings such as immigrant-serving agencies, newcomer community organizations, schools and government departments. Students will have the opportunity to analyze how organizations' mandates shape their "culture", policies, practices, and interpersonal behaviour; and the challenges facing immigrant-serving groups in the context of today's ever-changing environment. During the Fall and Winter terms, students will attend seminar presentations from practitioners in policy development, service delivery, and community advocacy. Supplemented by complementary readings, these seminars will provide students with the theoretical and applied grounding for their practicum. Typically, for full-time students this will involve three weeks of full-time equivalent placement with an appropriate organization during the Spring/Summer term. Scheduling of placements for part-time students will incorporate the necessary flexibility to assure equivalent placement time, consistent with the work responsibilities of part-time students. The course will conclude with a post-placement symposium in which students

present their placement learning to students, faculty and external practitioners. A placement paper is required which relates practicum learning to literature in the field. This is a "Milestone." Pass/Fail

**IS8901 The Canadian Immigration Experience**
North America is a continent of immigrants and Canada is a nation of immigrants. This has held true from the arrival of the first native peoples to the landing of our most recent potential citizens. This course examines the immigrant phenomenon, beginning with a description of the social, political, and economic factors which drive emigration/immigration. These factors are then applied to successive waves of Canadian immigration from the sixteenth to the twenty-first centuries. Some attention is given to where immigrants chose to settle, and to immigrants who, for reasons that will be explained, did not stay in Canada, but the focus is on migration rather than settlement. The course draws heavily on immigrant diaries/reminiscences to illustrate the process of immigration, as well as statistical and secondary source material. Comparisons will be drawn to immigration and settlement experiences of newcomers to other countries, in order to illustrate the commonalities and uniqueness of Canada as an immigrant receiving country. 1 Credit

**IS8902 The Settlement Experience in Canada**
This course examines the experiences over time of the immigrants who have settled in Canada, their integration into Canadian society, and the social processes of marginalization, Antirequisite, or banishment in those experiences. It will study the institutions they have built as well as the practices and barriers that affect immigrants and refugees in their interactions with Canadian institutions. Comparative reference will also be made to settlement experiences of newcomers to other countries. Students will develop an understanding of the lived experiences of migrants and the practical interventions that may interact with, reproduce, or challenge processes of social Antirequisite. Equitable and anti-oppressive approaches to service provision and community development with refugees and immigrants, including social movement and immigrant-based services, will be explored in depth. 1 Credit

**IS8903 Imm Law, Policies, Politics, & Practices**
This course begins with the legal foundations, both international and national, for the migration of immigrants and asylum-seekers to Canada. It then examines various theoretical approaches to understanding policy development and their impacts; the evolution of Canadian immigration policy; and contemporary challenges facing immigration policies. It also provides a comparative analysis of Canadian immigration policy and practices with those of other traditional countries of immigration, such as the United States and Australia; as well as countries more recently receiving large numbers of newcomers, such as Germany, Italy, Switzerland and Holland. The course will thus enrich understanding of the distinctive characteristics of Canadian immigration policy. 1 Credit

**IS8904 Research Meth. in Imm. & Sett. Studies**
This course yields to the research aspirations of the students. What are the questions that students wish to address? How can they be framed for the purpose of logical inquiry? In what ways do various theoretical approaches and previous studies influence the nature of the questions being asked, the types of information being sought, and the analytical procedures to be used? What is 'information'? – and what influences how it may be interpreted? What are the types of information that are available to researchers in the field? How must researchers handle surveys involving human subjects? To whom, and how, should research be addressed and disseminated? At the conclusion of the course, the student will have prepared a draft research proposal for use in IS8000: Research Paper, and have examined the usefulness of demographic, quantitative, qualitative, economic, and evaluative methods for the varied purposes of research in immigration and settlement. 1 Credit

**IS8921 Equity for Newcomers: Schools**
This course will investigate the institutional processes (policies and practices) in education that routinely disadvantage certain populations, especially migrants and those whose first language is not English. The approaches to equity will be explored from three perspectives: research and theory on social dominance; recent attempts by educational organizations to develop educational processes that are friendly to immigrant families; and research on what the migrants (children and parents) in the educational system say about their educational experiences. Several populations, selected in consultation with the class, will be the subject of these investigations -- such as first generation families from East Asia, Africa, and Latin America; and second generation children of various groups. 1 Credit

**IS8922 Changing Multicultural Mosaic of the GTA**
Toronto is, without question, one of the world's most multicultural cities. According to the latest census information it is home to people from about 170 different countries of origin, and its citizens speak more than 100 languages. The purpose of this course is to explore this diversity from a spatial or geographic perspective by asking who lives where in the GTA and why? The answers to such questions have important policy implications in relation to the equitable and efficient provision of a variety of services to immigrants who choose to settle in the Toronto area. Students will be introduced to the use of data, in combination with Geographic Information Systems, to identify, display, and analyze recent socio-cultural trends in the Toronto region. 1 Credit

**IS8923 Immigrants' Voices in Canadian Literature**
The radical transformation of Canadian Literature into a robust body of writing occurred during the twentieth century, a period of intense immigration to this country. This course will examine a range of work by newly arrived and not-so newly arrived writers and will consider how identity is affected by the physical and cultural upheaval that characterizes the immigrant's experience. Whether and how the "self" is (re)constituted through immigration narratives will be considered. The course will focus on writing of the past 30 years, when an increased number of individuals from around the globe arrived and settled in Canada, some of whom have produced literary texts out of disrupted lives.
1 Credit

**IS8924 The Economics of Immigration**
The course begins with an overview of labour economic theory and economic models of migration. These theories are then applied to the context of immigration with particular emphasis on labour market outcomes of both the immigrants and the 'native born'. Does immigration affect the labour market outcomes of the 'native born'? Do immigrants' earnings catch up to those of 'native born'? Do immigrants drain public spending on social assistance? Economic push and pull factors determining immigration flows are also examined. Special issues are also discussed, such as the economic effects of migration on the source country. 1 Credit

**IS8925 Global Migration & Population Movements**
This course reviews historical, geographical, and sociological sources to compare various patterns of population movements and migrations. Historical and sociological records demonstrate that geographic mobility rather than permanence has been the characterizing dynamic in shaping human settlements. Ecological factors, demographic and economic pressures, plagues, wars, and various violent social disruptions have resulted in various forms of voluntary and involuntary population movements. While the state often aimed to restrict population movements, it sometimes fostered migration through slavery, deportation, and colonialism. 1 Credit

**IS8926 Women, Immigration, and Settlement**
This course offers an analytical and theoretical orientation to understanding how immigrant women's lives are shaped by the intersection between gender, social class, race, ethnicity, and immigrant status. We will explore the history of Canadian immigrant women through the periods of colonization, agrarian transformation, nation state formation, industrialization, and globalization. Through these time periods, we will uncover patterns in the shaping of immigrant women's economic, political, and social rights, together with the attendant changing historical images of immigrant women. Particular attention will be paid to the changing nature of immigration policy, and immigrant women's settlement experiences – focusing on the multiple effects of immigrant status, gender, and race on employment and community life. 1 Credit

**IS8927 Imm. Families & Intergenerational Relations**
This course will explore family and intergenerational relations in the immigration and settlement process through an analysis of: the diversity of kinship and family forms; the evolution of obligations and roles; and, the changing nature of kinship and intergenerational relations upon immigration. How do families cope with disruption to their customary kin relations? How do immigrants manage and maintain their family connections over time and distance? What factors contribute to the process of family reunification? How do immigrants create new family units if their customary kin relations are permanently disrupted? What kinds of issues arise with regard to the different generations of parents, children, and grandparents? What are the most significant changes in family relationships that result from family reunification? Can customary kinship patterns survive the process of immigration and settlement? 1 Credit

**IS8928 Law Enforcement in Canada's Imm. System**
This course examines the more contentious issues involving immigration to Canada, such as terrorism, criminality, and illegal migration. Who is a terrorist? Why are some people refused admission? Who decides who comes in? In addition, legal and procedural mechanisms used to bar some people entry to Canada are examined. The course then turns to an investigation of how and why Canada perceives threats to its public and national security interests, and what effect such definitions have on certain immigrant groups. Specific case studies will provide both insight into how Canada's immigration system actually works and opportunities to discuss many of the difficulties confronting both the law enforcement establishment and those seeking to come into Canada. 1 Credit

**IS8929 Issues of Ageing in Settlement**
This course examines some of the historical, sociological, and residential issues that are part of the experience of older ethno-racial immigrants to Canada. Many of these individuals arrived after age 50 to join family as part of a family reunification process. Sociological issues revolve around the structure of support that is available from both family friends and the wider community. Gender issues arise because many senior immigrant women have foreshortened educational experiences that reflect their class status and the culture of their country of origin. Finally, we address how issues of race, language, education, and community combine to inform all aspects of the experience of ageing within Canada's multicultural mosaic. 1 Credit

**IS8930 Race and Ethnic Relations**
This course is constructed on the premise that systemic racism and ethnocentrism have been and continue to be prominent features of Canadian society, as are anti-racist organizing and community action, which have challenged the dominant institutions. The course will examine the historical roots, contemporary manifestations and continual reproduction of racism and ethnocentrism, starting at the point of first contact between European colonizers and Aboriginal peoples, and continuing to draw examples from the subsequent patterns of immigration including the most recent attention to racialized minority immigrants. In its multi-dimensional approach to race and ethnic relations, the course will first discuss how dominant or majority group values, norms, and conflicting ideologies affect the development and maintenance of inequitable social, political, economic and cultural systems and structures in Canada. Second, race and ethnic relations will be analyzed by looking at how they are manifested in government, immigration policy, education, media, human services employment, justice, and law enforcement. Third, the course will examine the ways in which racism and ethnocentrism affect individual and group identities. Central to this debate is a need to examine critically both state policies of multiculturalism and policies that seek to integrate racialized minorities into Canadian society. 1 Credit

**IS8931 Refugee Issues**
To be developed. 1 Credit

**IS8932 Immigration and Health**
To be developed. 1 Credit

**IS8933 Ethical Issues: Imm and Sett**
To be developed. 1 Credit

**IS8934 Multicult Cities-Planning Plcy**
Recent immigration patterns have prompted Canadian governments to diversify the way urban facilities, services and infrastructures are provided. Ethnic groups often require a divergent set of community services, housing facilities and neighbourhood arrangements. This course will prepare students about how multiculturalism extends the meaning of pluralism in planning. This course will examine theories of urban planning, diversity, and social exclusion, case studies and illustrations to find out how planning practice can respond to the challenges of difference in Canadian cities. 1 Credit

## INTERNATIONAL ECONOMICS AND FINANCE

**CURRICULUM**

### Master of Arts

| DEGREE REQUIREMENTS | | Credits |
|---|---|---|
| Master's Research Paper | | |
| EF8901 | Micro Economics | 1 |
| EF8902 | Macro Economics | 1 |
| EF8903 | Econometrics | 1 |
| EF8904 | Financial Theory | 1 |
| Four courses from one of the following Fields of Study | | |
| **Field I - International Finance** | | |
| Required: | | |
| EF8911 | Internat Monetary Economics | 1 |
| Electives: | | |
| EF8912 | Country Risk Analysis | 1 |
| EF8913 | Internat Financial Markets | 1 |
| EF8914 | Financial Econometrics | 1 |
| EF8915 | Internat Corporate Finance | 1 |
| **Field II - International Trade & Policy** | | |
| Required: | | |
| EF8931 | Internat Trade Theory & Policy | 1 |
| Electives: | | |
| EF8912 | Country Risk Analysis | 1 |
| EF8932 | Intnl Trade-Imperfect Comp | 1 |
| EF8933 | Empirical Topics: Intnl Trade | 1 |
| EF8934 | Global Inst & Internat Economy | 1 |
| EF8935 | Law/Reg-Intnl Trade & Invest | 1 |

**COURSE LISTING**

**Master's Research Paper**
The student is required to complete a research paper on a topic related to his/her field of specialization (international trade or international finance). The research topic is selected in consultation with the student's supervisor, where the student presents an outline of the research plan in writing, and the research is carried out under the direction of a faculty supervisor and monitored by a supervisory committee. On completion, the research results are submitted in a thesis format to the supervisor and then to an examining committee, before which an oral presentation is made for the assessment and grading of the research paper. Through the research paper, the student is expected to provide evidence of competence in carrying out research and a sound understanding of the material associated with the research. This is a "Milestone." Pass/Fail

**EF8100 Mathematics and Statistics Review**
All students who have been admitted to the International Economics and Finance program must demonstrate competence in quantitative methods by passing a preliminary course in mathematical economics. The course will review some of the mathematics and statistics used in graduate economics courses. Course material will be provided both in class and on the web during the last two weeks of August. Attendance is highly recommended but not compulsary. This is a pass/fail, non-credit course for which there will be an exam during the first month of studies in the program. Students who fail the course can rewrite the exam before the end of the first term. Students who fail on their second attempt will be asked to withdraw from the program. Pass/Fail

**EF8901 Micro Economics**
This course provides in depth coverage of the foundations of microeconomic theory required for effective analysis of international economic issues. Fundamentals such as static and dynamic optimization, consumer choice (deterministic and under uncertainty), and producer theory (profit maximization, costs, and duality) will be supplemented with applications to market structure, game theory in trade and policy, the economics of information, and general equilibrium. Examples and illustrations will be drawn from an international context throughout the course. 1 Credit

**EF8902 Macro Economics**
This course is an introduction to graduate macro economics and the techniques associated with analyzing macroeconomic models. Topics include theories of aggregate supply, rational expectations, inflation and monetary policy, growth theories, consumption and savings, open economy macro economics and empirical methods suitable for studying international linkages of exchange rates, interest rates and prices. The technical tools include standard calculus, linear algebra, optimization in continuous time using the Hamiltonian, optimization in discrete time using dynamic programming, and methods in time series analysis. 1 Credit

**EF8903 Econometrics**
This course is an introduction to the theory and practice of econometric modeling. The theoretical aspects of the course include specification, estimation and inference in the context of the classical linear regression and time series models, and under conditions when the classical assumptions about the error term are violated such as under heteroskedasticity and autocorrelation. The focus of econometric modeling and estimation will be on empirical models for the exchange rate, international interest parity and purchasing power parity, using data sets from the Canadian and the international economy. Students are required to have working knowledge of one or more statistical packages such as EVIEWS, TSP, Stata or SAS. 1 Credit

**EF8904 Financial Theory**
This course will teach fundamentals of finance in an international framework. After introducing students to foreign exchange markets, we will examine return and risk concepts for internationally diversified portfolios. We will concentrate on shareholder wealth maximization for both domestic and multinational firms. During the course students will learn about financial instrument valuation (stocks, bonds and derivative securities). In the second half of the course capital budgeting, capital structure and dividend policy of domestic firms and multinational firms will be investigated. 1 Credit

**EF8911 International Monetary Economics**
(International Finance Field)
This course examines theoretical and empirical issues regarding international monetary arrangements. Topics include the determinants of the international balance of payments, theories of foreign exchange rate determination, fixed versus flexible exchange rate regimes and the efficacy of monetary and fiscal policies under such regimes. The course also examines the theories of optimum currency areas, dollarization and currency boards. 1 Credit

**EF8912 Country Risk Analysis** This course introduces the students to the theory and practice of managing cross-border lending and international investment risk. The course gives a comprehensive coverage of the analysis and reporting of sovereign creditworthiness, political risk, current account analysis, statistical credit-scoring methodologies, loan valuation, portfolio management and regulatory supervision. Several case studies will be used, including the Mexican Peso crisis and the collapse of the markets in South East Asia.
Anti-requisite: ECN 821. 1 Credit

**EF8913 International Financial Markets**
The objective of this course is to develop a solid understanding of international financial markets and examine managerial decision making in an international setting. International financial markets will be studies in the context of the foreign exchange, offshore, derivative securities, and international asset portfolio markets. Theoretical and empirical aspects of these markets will be analyzed in detail. Decision making regarding the measurement and management of risk in international markets will be analyzed from the point of view of individuals and firms. 1 Credit

**EF8914 Financial Econometrics**
The purpose of this course is an introduction to the theory and econometric techniques that are necessary to undertake empirical analysis of financial time series. Topics include univariate linear and nonlinear stochastic models such as ARMA processes, ARIMA processes, ARCH-GARCH processes, martingales and random walks. Multivariate stationary and non-stationary processes will also be examined in the context of Vector Autoregressive (VAR) models and Vector Error Correction Models (VECM) for integrated processes. Empirical application of these techniques will be done using data from the Canadian and/or international financial markets. Students of this course are expected to have a solid background in econometrics and have working knowledge of an econometrics package such as EVIEWS, TSP, Stata or SAS. 1 Credit

**EF8915 International Corporate Finance**
The purpose of this course is for students to understand the dynamics of international corporate finance by concentrating on the financing and investment policies of multinational corporations. We will examine how to evaluate international projects which require large investments and calculate the cost of capital. We will investigate the costs and benefits of issuing securities on international markets. Other topics include international portfolio diversification, taxation issues and functions of offshore centres.
This course offers an in-depth treatment of the Classical, neoclassical, and contemporary theories of international trade. Topics include commercial policy, income distribution, international factor movements, and growth. The course also examines various trade policies and their impact on welfare. 1 Credit

**EF8931 International Trade Theory and Policy**
(International Trade Field)
This course offers an in-depth treatment of the Classical, neoclassical, and contemporary theories of international trade. Topics include commercial policy, income distribution, international factor movements, and growth. The course also examines various trade policies and their impact on welfare. 1 Credit

**EF8932 International Trade under Imperfect Competition**
This course will provide students with a firm grasp of theoretical and empirical methods of analyzing international trade outside of the traditional competitive framework, utilizing the tools of New Trade Theory. Topics addressed include multinational corporations, strategic interaction between governments and firms, intra-industry trade, intellectual property rights and the emergence of international technology gaps. 1 Credit

**EF8933 Empirical Topics in International Trade**
This course examines the pattern of trade and the welfare consequences of various trade policies from an empirical view point and teaches the students how to apply trade analysis in a policy environment. The use of the gravity equation will be examined as well as other methods of analyzing trade flows and impediments to trade such as tariffs and transportation costs. The course will emphasize the difficulties in obtaining data and deciding on the appropriate estimation method. 1 Credit

**EF8934 Global Institutions and the International Economy**
This course is divided into two parts. The first part investigates various explanations of why institutions exist and examines the challenges of creating international institutions that enforce agreed upon rules governing economic relations among nations. The second part of the course looks at the structure of existing international institutions, such as the IMF, the World Bank and the WTO. Case studies will be presented to analyze the impact of policies of these institutions on the national economies. 1 Credit

**EF8935 The Law and Regulation of International Trade and Investment**
This course introduces the student to the law and regulation of international trade and investment. The course will begin with an introduction and overview of the history and characteristics of the WTO trading system. The similarity and differences to NAFTA will be reviewed. Students will then examine the regulation of trade in goods and services, as well as current international regulatory issues relating to the environment, labour, immigration, culture and ethics. Government procurement and intellectual property rules will be examined. International investment rules and dispute settlement will be studied as well as international competition policy and its relationship to AD and CVD rules. The course will conclude with an examination of the dispute settlement regimes of NAFTA and the WTO. 1 Credit

## MANAGEMENT OF TECHNOLOGY AND INNOVATION

**CURRICULUM**

### Master of Management Science

| **DEGREE REQUIREMENTS** | | *Modules** |
|---|---|---|
| Master's Thesis | | |
| MT8101 | Applied Research Methods I | 1 |
| MT8102 | Applied Research Methods II | 1 |
| MT8201 | Technology and Org Theory | 1 |
| MT8202 | Technology and Org Strategy | 1 |
| MT8203 | Tech Diffusion and Innovation | 1 |
| MT8204 | Ethical Leadership/Chng Mgmt | 1 |
| MT8205 | Adv Project Management I | 1 |
| MT8207 | Financial Analysis | 1 |
| MT8208 | Entrepreneurial Mindsets | 1 |
| MT8209 | Human Factors in Tech Design | 1 |
| MT8210 | Adv Technology Integration | 1 |
| MT8211 | Global Markets and Tech Trends | 1 |
| | total | 12 |

### Master of Business Administration

| **DEGREE REQUIREMENTS** | | *Modules** |
|---|---|---|
| MT8201 | Technology and Org Theory | 1 |
| MT8202 | Technology and Org Strategy | 1 |
| MT8203 | Tech Diffusion and Innovation | 1 |
| MT8204 | Ethical Leadership/Chng Mgmt | 1 |
| MT8205 | Adv Project Management I | 1 |
| MT8207 | Financial Analysis | 1 |
| MT8208 | Entrepreneurial Mindsets | 1 |
| MT8209 | Human Factors in Tech Design | 1 |
| MT8210 | Adv Technology Integration | 1 |
| MT8211 | Global Markets and Tech Trends | 1 |
| Six Modules from one Field of Study | | 6 |
| Four Modules from Fields of Study or General Electives | | 4 |
| | total | 20 |

| ***FIELDS OF STUDY*** | | *Modules* |
|---|---|---|
| ***Information Systems Management*** | | 1 |
| MT8301 | Collab/Decision Technologies | 1 |
| MT8302 | Data and Knowledge Mgmt I | 1 |
| MT8303 | Data and Knowledge Mgmt II | 1 |
| MT8304 | Governance of IT | 1 |
| MT8305 | Network Management I | 1 |
| MT8306 | Network Management II | 1 |
| MT8307 | Strategic Risk Management | 1 |
| MT8308 | Systems Analysis and Design I | 1 |
| MT8309 | Systems Analysis and Design II | 1 |
| ***Media Management*** | | 1 |
| MT8401 | Adv Media/Communication Tech | 1 |
| MT8402 | Legal/Policy Issues for Media | 1 |

| | | |
|---|---|---|
| MT8403 | Competitive Strategy for Media | 1 |
| MT8404 | Innovation in Media Industries | 1 |
| MT8405 | Understanding Media Consumers | 1 |
| MT8406 | Managing Creativity in Orgs | 1 |
| MT8407 | Special Topics: Media Mgmt | 1 |
| ***Supply Chain Management*** | | 1 |
| MT8501 | Adv Supply Chain Tech I | 1 |
| MT8502 | Adv Supply Chain Tech II | 1 |
| MT8503 | Implementing ERP Systems I | 1 |
| MT8504 | Implementing ERP Systems II | 1 |
| MT8505 | Logistics Management | 1 |
| MT8506 | Production/Inventory Mgmt Sys | 1 |
| MT8507 | Intro Operations Research I | 1 |
| MT8508 | Intro Operations Research II | 1 |
| ***GENERAL ELECTIVES*** | | 1 |
| MT8060 | Practicum/Internship | 4 |
| MT8101 | Applied Research Methods I | 1 |
| MT8102 | Applied Research Methods II | 1 |
| MT8206 | Adv Project Management II | 1 |
| MT8801 | Managing Knowledge and IP | 1 |
| MT8802 | Strategic Tech Portfolio Mgmt | 1 |
| MT8803 | Leadership in a PMO Context | 1 |
| MT8804 | Contracts and Negotiations I | 1 |
| MT8805 | Contracts and Negotiations II | 1 |
| MT8901 | Directed Readings | 2 |

* Each Module is equivalent to half (.5) of a Ryerson one-term credit

**COURSE LISTING**

**Master's Thesis**
This is a "Milestone". Pass/Fail

**MT8101 Applied Research Methods I**
A survey of quantitative and qualitative research techniques with particular emphasis on their application to the management of technology, to technology forecasting and technology implementation. Concepts and models for technological forecasting and competitive intelligence are also introduced. Students must develop a research proposal. 1 Module

**MT8102 Applied Research Methods II**
A continuation of MT8101. 1 Module

**MT8201 Technology and Org Theory**
The purpose of this module is to help the student understand basic issues in designing and managing organizations that will motivate people to perform effectively in the development and implementation of technology. The module will address organization theory, classic principles and emerging dynamic guidelines for designing organizational structures, approaches to organizational change and the role of technology.
1 Module

**MT8202 Technology and Org Strategy**
Examines how strategic leaders transform and position their organizations to exploit technological change for competitive advantage. Provides an understanding of the issues surrounding the formulation and implementation of technology-based strategies, and the framework for managing in a technology-based economy. 1 Module

**MT8203 Tech Diffusion and Innovation**
This introductory module provides the foundation for preparing students to manage in a turbulent, high technology environment. Approaches, strategies, and theories of change and transformation are examined with an emphasis on their relationship to organizational effectiveness and development. The module is designed to develop students' analytic,

diagnostic, and management skills pertaining to both planned and unplanned change and transformation during all stages of the organizational life cycle. This module examines the technical and managerial challenges presented by emerging technologies. Particular consideration is given to the forces affecting the nature and rate of technological innovation and the managerial options available. 1 Module

**MT8204 Ethical Leadership/Chg Mgmt**
Topics include valuing differences, understanding the dynamics of influence, using power with integrity, the art of active listening, and maintaining balance between personal and professional life. The module involves considerable opportunities for feedback from faculty and peers; it uses the classroom as a learning laboratory where in-class action is the basis for reflection and knowledge. Provides students with the skills necessary for leading upwards (managing superiors) as well as laterally (e.g., in project teams) and downwards (subordinates). Students will learn how to manage and facilitate group processes in a way that evokes leadership behaviours on the part of all team members. 1 Module

**MT8205 Adv Project Management I**
Focuses on both the science of project management and the art of managing projects, and provides a comprehensive, integrative understanding of the project management process with particular emphasis on it application to technology and IT projects. 1 Module

**MT8206 Adv Project Management II**
This is an advanced theory elective that will focus on emerging theory in the field with particular reference to the emerging work in areas like capability maturity models, emerging theory around project risk management and mitigation and the newest aspects of complexity and chaos theory applied to the management of large, enterprise-wide projects. 1 Module

**MT8207 Financial Analysis**
For technical managers who are charged with directing, planning, and controlling operations and/or major projects and making a variety of management decisions particularly in R&D and advanced technology. Students learn how to extract vital information from the accounting system and how to make financial decisions within the organization. The focus is on identifying and evaluating costs and benefits as well as evaluating investment decisions using a wide range of models and tools. The module includes concepts related to technology valuation, building business cases, examining R&D productivity, etc. Particular attention will be focused on risk management, and the module will use current cases as a basis for discussion. 1 Module

**MT8208 Entrepreneurial Mindsets**
This module introduces students to entrepreneurial thinking. Case studies will be used to demonstrate how entrepreneurs foster innovation in the development of successful businesses or in fostering innovation within existing businesses. Principles of entrepreneurship will be outlined, and students will learn how such principles can be applied within organizations (intrapreneurship), to identify new opportunities, initiatives and innovations for organizational benefit. 1 Module

**MT8209 Human Factors in Tech Design**
User-centred theory and approaches to understanding and designing technologies will be introduced. Emphasis will be placed on the effective application of these approaches in a development and management of technology context to suit all users including those with disabilities. Students must apply the theoretical constructs to a practical design or development project. 1 Module

**MT8210 Adv Technology Integration**
This module allows students to further develop their technological competence, with a focus on understanding the key technologies widely adopted across enterprises and beyond. The module adopts a problem-based approach to enable students to comprehend, and respond to, the challenges that arise in integrating multiple technologies within the enterprise and across inter-organizational networks. 1 Module

**MT8211 Global Markets and Tech Trends**
Explores several emerging issues (technologies, trends, geopolitical policies etc.) with an emphasis on their potential impact on global enterprise practices. Also focuses on developing planning models to incorporate environmental scanning and technology forecasting as components of effective strategic planning models. 1 Module

**MT8301 Collab/Decision Technologies**
This module provides an overview of the development and usage of decision support systems (DSS) and collaboration technologies. Students will learn how database technologies support managerial decision making, and will understand the role of the data warehouse in supporting DSS. 1 Module

**MT8302 Data and Knowledge Mgmt I**
These modules will cover the basic principles and practices of knowledge management, the technology to support knowledge sharing and the issues in designing and implementing a value-based knowledge management system in an organization. Topics include: understanding today's knowledge economy and knowledge workers; enabling knowledge creation; knowledge maintenance: accuracy, currency, accessibility; developing a knowledge management strategy; information policies, measuring value, change management and human factors in implementing a knowledge management system. A review of the technology and applications to support knowledge sharing will be done.
1 Module

**MT8303 Data and Knowledge Mgmt II**
A continuation of MT8302. 1 Module

**MT8304 Governance of IT**
This module examines the role of IT governance (CIO, CKO. CTO) in achieving organizational objectives. It explores the responsibilities of senior IT managers, and examines how senior level managerial decision making enables alignment of business and IT strategic goals. The importance of IT governance in monitoring performance and accountability is also considered. 1 Module

**MT8305 Network Management I**
Module 1 develops the managerial level of technical knowledge and terminology for data, voice, image, and video communications and computer networks necessary to effectively communicate with technical, operational and management people in telecommunications. Module 2 focuses on the application of data communications concepts to situations encountered in industry, with emphasis given to understanding how the organizational context shapes network requirements. 1 Module

**MT8306 Network Management II**
A continuation of MT8305. 1 Module

**MT8307 Strategic Risk Management**
The module focuses on identifying and understanding general technology risks within organizations. Risk management processes are outlined. Through case discussions, students determine specific approaches to managing strategic and organizational risks. They also consider security related risk identification and risk management. 1 Module

**MT8308 Systems Analysis and Design I**
These modules instruct students in the principles of systems analysis and design. Topics include the systems development life cycle; analysis and design techniques; information systems planning and project identification and selection, requirements collection and structuring, process modeling, data modeling, design of interface and data management, system implementation and operation, system maintenance, and change management implications of systems. Students will apply current methods and tools (e.g. rapid application development, prototyping, and visual development) to develop real solutions to support or improve organizational processes. 1 Module

**MT8309 Systems Analysis and Design II**
A continuation of MT8308. 1 Module

**MT8401 Adv Media/Communication Tech**
This module surveys contemporary and emerging communication technologies such as Next Generation Network Technologies, Multimedia and Internet Systems and Services, Broadband Satellite Technologies, Wideband Wireless Communication Technology and Services, and Advanced Intelligent Network Technology and Services, and explores their applications implications for communication and cultural practices. The module encompasses theoretical and applied perspectives. 1 Module

**MT8402 Legal/Policy Issues for Media**
Around the world, rapid changes in the media and communications industries are affecting the legal, regulatory, and policy frameworks within which these industries operate. Business leaders need to understand how competition, ownership, content, contracts, privacy, intellectual property rights, liability, trade, and taxation issues affect their firms. This module provides an overview of these issues in Canada and internationally. 1 Module

**MT8403 Competitive Strategy for Media**
This is a competitive strategy module with a focus on media firms and dynamics of strategy in the media industries. The module combines resource-based and competence-based approaches to strategy and examines determinants of performance in media firms. It introduces multiple case studies to illustrate industry dynamics, innovation and resources, strategic architecture, intangible factors, performance metrics in media firms. 1 Module

**MT8404 Prod Innov in Media Industries**
Media industries continuously develop new products and services in rapidly changing markets. This module explores product/service innovation practices and processes in media industries, with a focus on management capabilities, organization of decision making, investment mechanisms, product and service strategies, and product portfolios. 1 Module

**MT8405 Understanding Media Consumers**
This module examines trends in consumption of media products and services and introduces the student to ways of understanding consumer behaviour with respect to media products and services. The module examines methods and models that treat consumers as customers, users, and audience members. 1 Module

**MT8406 Managing Creativity in Orgs**
Creative individuals and the creative process are at the heart of media production. This module examines the management of creativity in terms of processes, structures, incentives, and practices that enable the manager to successfully lead creative people. Topics include brainstorming, team building, performance measurement and feedback techniques, relationship building, communication, and motivation. 1 Module

**MT8407 Special Topics: Media Mgmt**
Special topics modules will be offered on a regular basis in response to students' needs and interests. Topics may include international or intercultural media management, media industry analysis, new venture management in the media industry, and financing media ventures.
1 Module

**MT8501 Adv Supply Chain Tech I**
Topics include enabling on-line purchasing/supply network functions, production, distribution and logistics systems, enterprise system evaluation and supplier selection, financial considerations, outsourcing and partnership options, competitive bidding and negotiation, contracts, client service and satisfaction issues, etc. Emerging models of buyer-supplier networks and electronic markets will be introduced and discussed in terms of the range of key technologies used to support processes within e-enabled corporations. (This course may use the SAP system logistics components to demonstrate aspects of integrated IT supply chain management systems in both B2B and B2C settings.)
1 Module

**MT8502 Adv Supply Chain Tech II**
A continuation of MT8501. 1 Module

**MT8503 Implementing ERP Systems I**
The first module provides students with an understanding of the business challenges faced when organizations implement ERP systems. In the second module students focus on understanding the technical issues involved in ERP selection and implementation. 1 Module

**MT8504 Implementing ERP Systems II**
A continuation of MT8503. 1 Module

**MT8505 Logistics Management**
The goals of this module are to develop an understanding of the logistics process, and to acquire skill in monitoring the ability to provide end customer satisfaction and financial effectiveness. The core competencies developed in this course start with study of decision strategies in warehousing and inventory management as well as order processing and decision support systems, and conclude with a look at global logistics and the strategic logistics plan. 1 Module

**MT8506 Production/Inventory Mgmt Sys**
This module will deal with features of production/service systems, methods of modelling their operation and their control system. Topics include aggregate planning, forecasting techniques, work-force and operations scheduling, material requirement planning, and models and techniques for managing inventory systems. Emphasis will be placed on the modelling aspect as well as the use of analytical approaches in the solution of system problems. 1 Module

**MT8507 Intro Operations Research I**
The modules provide an overview of the basic principles of Operations Research with special emphasis on the paradigms associated with linear programming and queuing theory. These include generic modelling; mathematical modelling; the 'max', 'min', and 'mixed case' simplex algorithms; sensitivity analysis; duality; 'assignment', 'transportation' and 'transhipment' models; and basic principles and models associated with queuing or 'waiting-line' problems. These subjects will be studied from both theoretical and practical perspectives. The class requires background in probability theory and linear algebra as well as some skills in computer programming. 1 Module

**MT8508 Intro Operations Research II**
A continuation of MT8507. 1 Module

**MT8801 Managing Knowledge and IP**
Intellectual capital has been defined as any asset that cannot be measured but is used by a company to its advantage. Knowledge, collective expertise, goodwill, brand value and patents usually are absent from conventional financial statements but are critical to organizational success. This module will focus on ways of assessing, organizing, sharing, protecting and leveraging intellectual property (IP) and strategies for knowledge using established knowledge management techniques. 1 Module

**MT8802 Strategic Tech Portfolio Mgmt**
This module reviews models for establishing technology priorities and managing multiple projects with an emphasis on the portfolio management process. 1 Module

**MT8803 Leadership in a PMO Context**
Providing project or program leadership is different than providing project support and coaching to other project managers as part of a centralized Project Management Office (PMO). Explore the differences between direct and indirect leadership and the issues involved in creating and managing internal project management centres of excellence. Explore the definitions of established approaches to setting up and managing a PMO and understand best practices that work effectively to encourage the sharing and application of new knowledge in organizations. 1 Module

**MT8804 Contracts and Negotiations I**
Students will learn about the standard contractual arrangements in the IT industry, including hardware and software contracts, outsourcing contracts, service contracts and service level agreements. A variety of decision models used to

help organizations determine appropriate IT sourcing arrangements will be introduced. Students will participate in simulation exercises to learn about negotiation techniques in the IT sector. 1 Module

**MT8805 Contracts and Negotiations II**
A continuation of MT8804. 1 Module

**MT8901 Directed Readings**
The directed readings course is intended to permit the student to survey a coherent body of literature in an area of study related to the student's field of study. 2 Modules

**MT8060 Practicum/Internship**
Students will work directly with a faculty member in the program and an industry partner on a specific research question. There are two deliverables for the practicum, a research paper and a practicum report. The research paper will outline the outcomes of the research project, the practicum report will offer reflection on the research process. 4 Modules

## MECHANICAL ENGINEERING

### CURRICULUM

### Master of Applied Science

**DEGREE REQUIREMENTS**

Master's Thesis

Five Elective credits

### Master of Engineering

**DEGREE REQUIREMENTS**

Master's Project*

Eight Elective credits

*students may apply to substitute 2 courses for the project.

### Doctor of Philosophy

**DEGREE REQUIREMENTS**

Candidacy Examination

Dissertation

Four Elective credits

| ***Electives*** | | *Credits* |
|---|---|---|
| ME8100 | Adv Experimental Stress Anal | 1 |
| ME8101 | Advanced Engineering Design | 1 |
| ME8102 | Advanced Fluid Mechanics | 1 |
| ME8103 | Advanced Human Factors | 1 |
| ME8104 | Advanced Heat Transmission I | 1 |
| ME8105 | Advanced Heat Transmission II | 1 |
| ME8106 | Advanced Mechanics of Solids | 1 |
| ME8107 | AI for Mechanical Engineers | 1 |
| ME8108 | Aircraft Turbine Engines | 1 |
| ME8109 | Casting & Solidifn of Material | 1 |
| ME8110 | Chaotic Motion | 1 |
| ME8111 | Corrosion Engineering | 1 |
| ME8112 | Comp Fluid Dyn & Heat Transfer | 1 |
| ME8113 | Design for Assembly & Manufac | 1 |
| ME8114 | Energy Management | 1 |
| ME8115 | Finite Element Methods in Engr | 1 |
| ME8116 | Flight Dyn & Aircraft Control | 1 |
| ME8117 | Fracture Mechanics | 1 |
| ME8118 | Info Sys Analysis & Design | 1 |
| ME8119 | Intro to Composite Materials | 1 |
| ME8120 | Intro to Operations Research | 1 |
| ME8121 | High Speed Aerodynamics | 1 |
| ME8122 | Mech Behav of Engr Materials | 1 |
| ME8123 | Mechanical Vibrations | 1 |
| ME8124 | Multiple Particip/Obj Dec Making | 1 |
| ME8125 | Neuro-Fuzzy Systems | 1 |
| ME8126 | Nonlinear Vibrations | 1 |
| ME8127 | Optimization Models | 1 |
| ME8128 | Prob Models in Operation Rsrch | 1 |
| ME8129 | Rocket Propulsion | 1 |

| | | |
|---|---|---|
| ME8130 | Robot Mechanics | 1 |
| ME8131 | Simulation of Industrial Sys | 1 |
| ME8132 | Sequencing and Scheduling | 1 |
| ME8133 | Space Mechanics | 1 |
| ME8134 | Turbulence in Real Fluids | 1 |
| ME8135 | Directed Studies: Mechanical Engr | 1 |
| ME8136 | Adv Fatigue Fracture Analysis | 1 |
| ME8137 | Advanced Systems Control | 1 |
| ME8138 | Computational Dynamics | 1 |
| ME8139 | Prob Stats & Stochiastic Proc | 1 |
| ME8140 | Simulation Theory/Methodology | 1 |
| ME8141 | Transport Phenomena in Porous Media | 1 |

**COURSE LISTING**

**Master's Thesis**
The student is required to conduct advanced research on a topic related to one (or more) of the following specialty areas: aerodynamics, thermofluids, manufacturing, materials, solid mechanics, and industrial engineering. The topic is chosen in consultation with the student's thesis supervisor, the student presents the research plan in writing, and the research is carried out under the direction of the supervisor. The student must submit the completed research in a thesis format to an examination committee and make an oral presentation of the thesis to this committee, which will assess the thesis. Through the thesis, the student is expected to furnish evidence of competence in research and a sound understanding of the specialty area associated with the research. This is a "Milestone." Pass/Fail

**Master's Project**
The student is required to conduct an applied advanced research project involving one (or more) of the following specialty areas: aerodynamics, thermofluids, manufacturing, materials, solid mechanics, and industrial engineering. The student presents the project plan in writing, and the project is carried out under the guidance of the supervisor. The student must submit the completed project in the form of a technical report to an examination committee and make an oral presentation of the report to this committee, which will assess the report. This is a "Milestone." Pass/Fail

**Candidacy Examination**
This is a "Milestone." Pass/Fail

**Dissertation**
The student is required to conduct advanced research on a topic related to one (or more) of the following specialty areas: aerodynamics, thermofluids, manufacturing, materials, solid mechanics, and industrial engineering. The topic is chosen in consultation with the student's supervisor, the student presents the research plan in writing, and the research is carried out under the direction of the supervisor and monitored by a supervisory committee. The student must submit the completed research in dissertation format to Program and School of Graduate Studies examination committees and make oral presentations to these committees, which will make an assessment. Through the dissertation, the student is expected to furnish evidence of competence in research and a sound understanding of the chosen specialty area(s). The research must lead to an original contribution of knowledge in the specialty area(s). Pre-requisite: Candidacy Examination. This is a "Milestone." Pass/Fail

**ME8100 Advanced Experimental Stress Analysis**
Theory and applications of methods in experimental mechanics for measuring static and dynamic deformation of 2-D and 3-D models and bending of plates and shells. Techniques of electric resistance strain gage, photoelasticity, moire, holographic interferometry, laser speckle interferometry, moire interferometry, caustics, optical correlation by computer vision. Applications to problems in fracture mechanics, composite mechanics, interface mechanics and micromechanics. 1 Credit

**ME8101 Advanced Engineering Design**
An undergraduate education necessarily concentrates on analysis. This class focuses on synthesis. Creativity is the engine of design and analysis is the feedback governing design. Through the media of case studies, laboratory exercises, instruction, and practice, this class studies the process of design; the business of translating societal needs into real, manufacturable objects. Lecture topics will include: the hierarchical, iterative nature of design; aids to creativity; the appropriate use of analysis; the transformation from functional space to physical space; prototype design; consumer durable versus capital equipment design; and special lectures on microprocessors in machinery, optimization, and CAD/CAM. 1 Credit

**ME8102 Advanced Fluid Mechanics**
A general review of principles, concepts and methods in fluid dynamics will be conducted. Advanced treatment with mathematical techniques for solving specific classes of fluid-flow problems will be introduced, including: surveys of

governing equations and basis theories; two and three-dimensional potential flows; surface waves; boundary-layer theory; and, shock-wave phenomenon. 1 Credit

**ME8103 Advanced Human Factors**
Human anatomical, physiological and psychological capabilities and limitations are considered for systematic analysis, identification and evaluation of human-machine-environment systems in order to design consumer products, equipment, tools and the workstation. Application of ergonomics principles and data compiled at the human-machine interface in industrial and other occupational settings are emphasized. 1 Credit

**ME8104 Advanced Heat Transmission I**
An advanced study of the transmission of heat by conduction and convection. Derivation and application of the equations governing steady and unsteady conduction heat transfer, transient conduction, and numerical solutions are examined with selected topics. Governing equations for forced and natural convection; dimensional analysis and similarity transforms are applied. 1 Credit

**ME8105 Advanced Heat Transmission II**
An advanced study of the transmission of heat by radiation. Topics covered include: physical properties of radiation, thermal radiation laws, characteristics of real and ideal systems, geometric shape factors, grey and non-grey system analysis, energy transfer in absorbing media and luminous gases, solar radiation. 1 Credit

**ME8106 Advanced Mechanics of Solids**
The class provides an introduction to the general equations of the theory of elasticity of an anisotropic solid. Elastic equilibrium and boundary value problem formulations are considered. The theories of thermoelasticity, viscoelasticity and plasticity are introduced. The class also provides an introduction to modelling of inhomogeneous composite solids, the effective moduli theory, and the elasticity of composite laminates. The fundamentals of fracture mechanics and applications to mechanical design are considered. 1 Credit

**ME8107 AI for Mechanical Engineers**
Introduction, Logical Foundations of AI (Conceptualization, Predicate Calculus, Semantics, Inference Procedures, Provability, Logical Implications, Resolution, True-False Questions, Fill-in-Blank Questions, Soundness and Completeness, Resolution Strategies, and Induction), Search Techniques, Heuristic Search, Rule-Based Expert Systems (Design, Problem Selection, Organization, and Uncertainty Measures), Introduction to Artificial Neural Networks, Introduction to Fuzzy Logic. Selected problems from the Mechanical Engineering field will be presented and students will be requested to develop inference engines and small expert systems for these problems. 1 Credit

**ME8108 Aircraft Turbine Engines**
Fluid mechanics, thermodynamics, and solid mechanics of aircraft turbine engines. Two-dimensional and three-dimensional flow theories of compressors and turbines. Unsteady flow and noise production in turbomachinery and in complete engines. Operational limitations and instabilities. Stress and associated temperature limits and influence of blade cooling techniques on turbines. 1 Credit

**ME8109 Casting and Solidification of Materials**
Melt Interactions. Fluid Dynamics, Mould Dynamics and Solidification Dynamics. Solidification Shrinkage. Near-net-shape Processes. Linear Contraction and Casting Accuracy. Structure, Defects and Properties of the Finished Casting. Cast Studies in Mathematical Modelling and Solidification Processing. 1 Credit

**ME8110 Chaotic Motion**
This class introduces the concepts of chaotic dynamics and provides the methods for identifying chaotic motions in nonlinear dynamic systems. It covers the following topics: fundamental concepts of chaos, review of analytical and numerical methods in nonlinear oscillation, chaotic motions observed in various physical systems, methods of identifying chaotic motions in experimental measurements and computer simulations, Poincare map, logistic map, bifurcation diagram, fractal dimension and Lyapunov exponent. 1 Credit

**ME8111 Corrosion Engineering**
Applications of thermodynamics and kinetics to engineering aspects of corrosion and corrosion control; introduction to forms and mechanisms of corrosion theory; applications of cathodic protection, anodic protection, corrosion inhibitors, coatings and materials selection for corrosion control and design. 1 Credit

**ME8112 Computat. Fluid Dynamics & Heat Transfer**
The finite difference discretization method is applied to the solution of the partial differential equations arising from the mathematical modelling of fluid flow, heat transfer and combustion processes. The equations can be parabolic, elliptic or hyperbolic. Items like convergence, stability, consistency, numerical diffusion and turbulence modelling will also be presented. 1 Credit

**ME8113 Design for Assembly & Manufacturing**
Principles of Automated Design, Principles of DFA (Design for Assembly), Projects on DFA, Principles of DFD (Design for Disassembly), Principles of DFM (Design for Manufacturability). Issues of Concurrent Design, Automated Design. 1 Credit

**ME8114 Energy Management**
The purpose of this class is to introduce the concepts and techniques of energy management and conservation. The subjects that will be discussed are energy supply and demand, energy pricing, scope of the energy problem and approaches to provide solutions; energy auditing; improving energy utilization in space conditioning and steam, hot water and compressed air systems; energy savings opportunities in refrigeration and cooling systems; insulation; and electrical energy conservation. An inter-disciplinary approach will be employed in this class to provide a wider understanding of the subject. 1 Credit

**ME8115 Finite Element Method in Engineering**
This class presents formulation and implementation of the Finite Element Method (FEM) in engineering applications. The theory of variational and weighted residual methods is introduced. Different types of elements used in FEM for discretization of PDEs, such as linear, quadratic, isoparametric and hybrid elements are covered. The numerical methods selected for spatial integration, solution of linear algebraic equations, evaluation of eigenvalues are addressed. 1 Credit

**ME8116 Flight Dynamics and Control of Aircraft.**
Various analyses and tools for designing a controllable aircraft. Six-degree-of-freedom flight simulation models. Classical and modem control system techniques. Adaptive control. Digital control. Pilot-in-the-loop considerations. 1 Credit

**ME8117 Fracture Mechanics**
This course introduces the principles and applications of engineering fracture mechanics. The emphasis is on topics that have found practical application, including: fracture and crack growth, Griffith energy criteria, applications of linear elastic fracture mechanics (LEFM), crack tip stress fields and plastic zones, calculation of stress intensity factors, fatigue cracking, elastic-plastic fracture and the J-integral, introduction to mixed-mode and interfacial fracture. 1 Credit

**ME8118 Information Systems Analysis and Design**
The foundations that underlie the development of information systems are presented. The concepts, strategies, techniques, and tools for identifying and specifying information systems requirements and for developing designs are covered. A major analysis and design project is required. 1 Credit

**ME8119 Introduction to Composite Materials**
Intended as a first course in polymer-based fiber-reinforced composite materials. Quasi-isotropic random reinforcement, orthotropic, anisotropic and sandwich construction. Classical laminate theory: lamina/laminate stress, buckling and vibration analysis. Hydrothermal, radiation and service effects on performance. Impact, delamination and fatigue failure. Overview of basic manufacturing methods and usage in the aerospace industry. 1 Credit

**ME8120 Introduction to Operations Research**
This class is a graduate level introduction to the fundamental ideas of operations research. The class focuses on mathematical modelling in deterministic and non-deterministic settings. The class covers topics in the theory and application of mathematical optimization, network analysis, decision theory, inventory theory, and stochastic processes including queuing processes. The class requires background in probability theory and linear algebra as well as some skills in computer programming. 1 Credit

**ME8121 High Speed Aerodynamics**
Planar and conical shock waves. Expansion and shock wave interference, shock tubes. Method of characteristics. Supersonic nozzle design. Airfoil theory in high subsonic, supersonic and hypersonic flows. Conical flows. Yawed, delta and polygonal wings; rolling and pitching rotations. Wing-body systems. Elements of transonic flows. 1 Credit

**ME8122 Mechanical Behaviour of Eng. Materials**
The physical and mechanical metallurgy of material behaviour; failure by yielding (Von-mises and Tresca criteria); ductile and brittle fracture; fracture mechanics and design; strong solids; strengthening mechanisms; strength-structure relationships; dislocation mechanics; application of theory to fatigue, creep and creep-fatigue interactions. 1 Credit

**ME8123 Mechanical Vibrations**
Free and forced vibrations of elastic bodies, such as beams, plates, and shells are examined. Response due to shock and random loading is introduced. Vibration measuring instrumentation is described and several laboratory experiments are carried out. Industrial applications are studied including vibration of machinery, ships, and the response of humans to whole body vibration. 1 Credit

**ME8124 Multiple Participant/Objective Dec. Making**
This course consists of two major components: multiple objective decision making and multiple participant decision making. Both compensatory and non-compensatory methods for multiple objective decision making are covered. For tackling multiple participant decision making problems, the graph model for conflict resolution is presented. 1 Credit

**ME8125 Neuro-Fuzzy Systems**
Introduction, Neural Networks, Fuzzy Systems, Modelling Neuro-Fuzzy Systems, Cooperative Neuro-Fuzzy Systems, Hybrid Neuro-Fuzzy Systems. Generic Fuzzy Perception, Neuro-Fuzzy Control, Neuro-Fuzzy Classification, Neuro-Fuzzy Function Approximation, Using Neuro-Fuzzy Systems. 1 Credit

**ME8126 Nonlinear Vibrations**
This course provides students with the theoretical background to study: the dynamic behaviour and responses of SDOF or MDOF nonlinear systems in both time domain and phase plane, limiting circles, free and forced vibration of a Duffing

oscillator using various analytical methods, self-excited vibration, stability of a nonlinear system, perturbation method and application to multiple degrees of freedom (MDOF) systems. 1 Credit

**ME8127 Optimization Models**
This course is intended to give a broad treatment of the subject of practical optimization. Emphasis will be given to understanding the motivations and scope of various optimization techniques for constrained and unconstrained problems. Linear, nonlinear and combinatorial optimization problems with roughly equal emphasis on model formulation and solution techniques. Modelling emphasis is primarily on deterministic formulation of real world applications. Selected solution techniques for each type of problem will be discussed. 1 Credit

**ME8128 Prob. Models in Operations Research**
This course presents the formulation and analysis of probabilistic models in operations research. Topics to be covered include Poisson processes, renewal processes, Markov chains, queuing theory, Markovian decision processes, and time series analysis. Application areas include reliability, traffic flows, production, and inventory. 1 Credit

**ME8129 Rocket Propulsion**
Theory, analysis and design of rocket propulsion systems. Emphasis on liquid and solid propellant systems with an introduction to advanced propulsion concepts. Review of nozzle and fluid flow relationships. 1 Credit

**ME8130 Robot Mechanics**
This class provides a brief introduction to the field of Robotics, a brief review of selected topics from linear algebra, and an introduction to theoretical kinematics. The main part of the class includes such topics as: robot geometry; velocity Jacobians; derivation of equations of motion; force, manipulability, inertia and compliance analysis; position and force control; optimization of kinematic redundancy; multirobot coordination; robot calibration; performance testing and characterization. The class also provides an introduction to space robots, smart structures, and walking machines. 1 Credit

**ME8131 Simulation of Industrial Systems**
Computer simulation of industrial systems, design of discrete simulation models, and the generation of random variables are all covered by this class. Also included is the design of simulation languages such as GPSS, SIMSCRIPT, SINWLA and SLAM. Network models, using the SLAM language, and applications of simulation models in decision making situations arising in production, distribution and economic systems are studied. 1 Credit

**ME8132 Sequencing and Scheduling**
The class is concerned with the analysis of the following sequencing problems: single-machine, parallel, identical and different machines, general jobshop and special cases of the jobshop and flowshop under various objective functions and assumptions. Models and algorithms for the basic sequencing problem are formulated. 1 Credit

**ME8133 Space Mechanics**
Motion in outer space poses complex engineering problems, the solution of which require a thorough knowledge and understanding of the pertinent principles of mechanics and techniques of analysis. The class provides an introduction to such topics as astromechanics, satellite orbits, rotating structures with varying configuration and mass, optimization of spacecraft motion, launch dynamics, microgravity, space robotics, large displacement low frequency vibrations, ground-based and in-orbit testing. 1 Credit

**ME8134 Turbulence in Real Fluids**
The first part of this class deals in some detail with the theory of measurements and the analysis of random data. Statistically based functions such as turbulence intensities, correlation functions, energy spectra, are examined in relation to fluid processes. The second phase of this class examines the present level of knowledge of turbulence of fluids in rigid and visco-elastic ducts, without and with superimposed pressure gradients. Properties of real fluids are stressed and considerable emphasis is laid upon experimental results, applying the methods of measurement and analysis outlined above. Two and three-dimensional anemometry techniques are examined and applied. 1 Credit

**ME8135 Directed Studies in Mechanical Eng.**
This class is available to graduate students enrolled in a Master's Degree Program in Mechanical Engineering, who wish to gain knowledge in a specific area for which no graduate level classes are offered. Students are assigned an advisor and are required to present a formal report, or take a formal examination, at the end of the class. Registration approval is required from the Chair of the Department of Mechanical Engineering. 1 Credit

**ME8136 Advanced Fatigue Fracture Analysis**
This course is designed to cover specific areas: practical and analytical aspects of fatigue failure and fracture mechanics of engineering components and structures subjected to various fatigue fracture loading conditions. Topics covered include: fundamental concepts of fracture mechanics and fatigue behaviour of materials, structural damage assessment, fracture design and failure analysis for monotonic and cyclic loaded components, the stress intensity factor and J integral for monotonic and cyclic loading, fatigue and fracture data statistical analysis, practical case studies and applications, fatigue crack initiation, crack growth rate, and fatigue life prediction of both un-notched and notched engineering components subjected to the uniaxial and multiaxial fatigue loading conditions. 1 Credit

**ME8137 Advanced Systems Control.**
Overview of classical controls and introduction to modern control theory. Control system modeling and analysis in state space. System controllability and observability. Pole placement control design. State observers. Introduction to

nonlinear control systems. Fundamentals of Lyapunov theory. Lyapunov's direct method. System linearization. Adaptive control. 1 Credit

**ME8138 Computational Dynamics**
The objective of this course is to study the basic modeling and computational methods for rigid and flexible multi-body systems. Computational dynamics provides a fundamental tool for analyzing and computing the motion and force for large complex mechanical systems, such as robots, mechanisms, machines, and automobiles. Applications of computational dynamics include analysis, design and control. Analysis is to study system behaviors for given inputs through modeling and simulation. Design is to determine the prescribed functions through synthesis and optimization. Control is to control mechanical systems based on the dynamic model.
1 Credit

**ME8139 Mech. Engineering: Probability, Stats. & Stochastic Processes**
This course is an introduction to stochastic processes and probabilistic models. Statistical interference techniques are also discussed. Topics covered include: probability and random variables, Bernoulli, Binomial, Markov, Poisson, Wiener and Gaussian models, stationarity and cyclostationarity, spectra of various signals, linear mean-square estimation, representation of random signals and Karhunen-Loeve expansion, Markov chains and processes, parameter estimation, mean variance, confidence intervals, Bayesian models, hypothesis testing. (Antirequisite EN8910) 1 Credit

**ME8140 Simulation Theory & Methodology**
This course introduces simulation as a problem solving tool. Mathematical foundations: random variate generation, parameter estimation, confidence interval, simulation algorithm, Monte-Carlo simulation techniques and simulation languages. Examples: computers and protocols, urban traffic, harbours and airport capacity planning, manufacturing capacity planning, inventory systems.
(Antirequisite EN8912) 1 Credit

**ME8141 Transport Phenomena in Porous Media**
This course is designed to provide students with advanced knowledge of porous media phenomena. The following topics will be covered: the mechanics of fluid flow through porous media; heat and mass transfer in porous media; forced and natural convection; convection with change of phase; a porous medium approach for the thermal analysis of heat transfer devices; thermodiffusion in porous media; transport phenomena in petroleum reservoirs; the role of transport phenomena in biomedical engineering. 1 Credit

## NURSING

### CURRICULUM

### Master of Nursing

**First Offered Fall 2005**

| **DEGREE REQUIREMENTS** | | **Credits** |
|---|---|---|
| MN8901 | Quantitative Research Methods | 1 |
| MN8902 | Qualitative Research Methods | 1 |
| MN8903 | Nature & Devel of Nurs Knowlge | 1 |
| MN8904 | Seminar: Adv Nurs Practice | 1 |
| MN8905 | Practicum: Adv Nursing Practice | 1 |
| AND one of the following options: | | |
| | ***THESIS Option (available by permission only)*** | |
| MN8000 | Master's Thesis | |
| One course from either Field I Or Field II | | 1 |
| | ***COURSE Option*** | |
| Students must complete the requirements for either Field I or Field II | | 2 |
| Three elective credits | | 3 |
| **Field I - Leadership in Health Care Policy and Education** | | |
| MN8920 | Health Policy: Comparatv Anal | 1 |
| MN8921 | Leadership in Education | 1 |
| **Field II - Health and Illness of Individuals and Communities** | | |
| MN8910 | Health & Illness: Theoretc Pers | 1 |
| MN8911 | Population Hlth & Hlth Promtn | 1 |
| **Electives** | | |
| MN8930 | Advanced Nursing Ethics | 1 |
| MN8931 | Divers & Glbztn: Urban Hlth | 1 |
| MN8932 | Nursing Informatics | 1 |
| MN8933 | Selected Topics in Nursing | 1 |

### COURSE LISTING

**MN8000 Thesis**
Pass/Fail

**MN8901 Quantitative Research Methods**
Students will have the opportunity to explore and critique a variety of quantitative research methods utilized in the development of nursing science. They will study the different research designs, sampling strategies, data collection methods and statistical analyzes utilized when undertaking quantitative research studies. They will also discuss and critique research arising from a variety of practice settings that are conducive to quantitative methodologies. Frameworks and approaches to research utilization and evidence based practice will be discussed and students will explore strategies for translating results of quantitative research studies into practice settings. 1 Credit

**MN8902 Qualitative Research Methods**
This course will provide students with the opportunity to explore and critique a variety of qualitative research methods and approaches. Students will explore how the philosophical underpinnings of various research approaches inform the construction of research questions, selection of methods, and strategies for data analysis. Examples of qualitative research conducted in a variety of practice settings will be discussed and critiqued. Students will learn how qualitative and quantitative research methods can be used as either separate or complementary approaches in research design. 1 Credit

**MN8903 Nature & Development of Nursing Knowledge**
The students will explore the evolution of nursing theory and its accompanying philosophical foundations to understand the inter-relationship between theory, practice and research. In addition, they will examine the development and nature of

nursing's scientific body of knowledge and the art of nursing. Students will be able to critically analyze a variety of nursing theories related to their use for nursing practice and research. Through the process of theory analysis and evaluation they will examine selected nursing conceptual models/theories from the totality and simultaneity paradigms, and examine the value of theoretical pluralism. 1 Credit

**MN8904 Seminar in Advanced Nursing Practice**
Students will utilize a variety of philosophical and critical perspectives to analyze and synthesize theoretical perspectives of advanced practice nursing. Students will utilize case studies from their practicum to examine linkages between theory, research, advance practice and their specific population under study. Students will be expected to explore and critique the multiple domains of advanced practice nursing, including leadership, education, clinical practice, and research. Students will be expected to write a major paper and present it to faculty and students on a topic relevant to advance practice nursing that demonstrates their critical thinking, analytical and scholarly writing skills as this course, in conjunction with the Practicum course is seen as the capstone course of the Master's program. Co-requisite: MN8905
1 Credit

**MN8905 Practicum in Advanced Nursing Practice**
Students will focus on the synthesis and application of advanced practice nursing knowledge within a practice setting related to their field of study. They will be expected to successfully apply knowledge gained from practice, theory and research into their advanced practice role undertaken for their practicum experience. Students will be provided with opportunities to work with specialized populations to identify strengths, issues, and concerns and implement appropriate strategies through application of advanced concepts and utilization of varied comprehensive and holistic methodological approaches. Pass/Fail

**MN8910 Health & Illness: Theoretical Perspectives**
Students will examine broad conceptualizations of health and illness to provide a foundation for critical analysis of specific conceptual models (such as health beliefs, loss, quality of life, and recovery) relevant to the experience of individuals and families across a variety of illness groups. This will enable students to develop an advanced understanding of current theoretical perspectives and research related to biopsychosocial and cultural determinants of health and illness. Students will also examine models of psychosocial intervention applicable to their professional practice that support health for individuals and families. 1 Credit

**MN8911 Population Health & Health Promotion**
Drawing upon critical theory, the social determinants of health, and social justice frameworks, students will engage in an analysis of major primary health care, health promotion, and population health initiatives locally, nationally, and globally. Links to social, cultural, environmental, political, and economic contexts that impact on health, equity, and health disparities will be analyzed critically. Evidence-based research and ethical considerations central to community health and advanced community health nursing practice will be examined. Emphasis throughout will be placed on upstream, participatory, and collaborative approaches to the development of healthy public policy locally and globally.
1 Credit

**MN8920 Health Policy: A Comparative Analysis**
This course will provide students with the opportunity to examine the development of health policy in Canada. Public policy analysis will be introduced in a way that provides an overview of techniques and issues that are applicable to an understanding of how health care policy evolves. Students will use these techniques to critically analyze current issues and trends in Canada's health care system as well as other selected countries. The action of key interest groups who influence public policies which ultimately shape health priorities and goals will be examined with a particular focus on the role of the nursing profession, other professions and consumers. 1 Credit

**MN8921 Leadership in Education**
Students will examine the role of the advanced practice nurse in influencing the development and advancement of education in diverse professional practice environments. Students will develop advanced skills in the creation of a supportive learning/teaching environment respectful of the diversity of learners. Students will apply relevant theories and research to critique various approaches used in health education and health promotion. Students will examine strategies that facilitate the professional advancement of the educator in providing educational leadership within a variety of practice settings including, but not limited to, the community, hospitals and universities. 1 Credit

**MN8930 Advanced Nursing Ethics**
Students will examine ethical theory in health care and nursing, such as; Kantianism, virtue ethics, communitarianism, feminist bioethics, narrative ethics, principlism and casuistry. To demonstrate their understanding of theory and methods to conduct ethical analyzes, students will develop case studies arising from practice. Utilizing these case studies, students will be facilitators of their colleagues' learning through active and dynamic discussions and debates of key ethical issues relevant to advanced nursing practice. Students will be expected to synthesize the broader ethical concepts such as research ethics, organizational ethics and priority setting throughout these discussions and assignments. 1 Credit

**MN8931 Diversity & Globalization: Urban Health**
Using critical social theory as a framework, students will explore how urban health is impacted by factors related to diversity and globalization. Students will critically examine the intersections of the broad social determinants of health as influencing the experiences of individuals, families, and communities within urban environments. Students will investigate the impact of the health care system design and the various roles of health professionals on current urban health issues. Students will identify and critique a range of frameworks and strategies that can be utilized by advanced practice nurses in the community to engage individuals, families, and population groups in promoting urban health. 1 Credit

**MN8932 Nursing Informatics**
Students will explore the integration of nursing, health information and computer sciences. Issues, challenges, opportunities and evaluations of the management and communication of: 1) data; 2) information; and 3) knowledge in a variety of practice settings (including clinical, education, research and administration) will be examined and critiqued by students. Students will also critically examine the social, legal and ethical impact of informatics within nursing and the health care system. 1 Credit

**MN8933 Selected Topics in Nursing**
Students will study a topic of current interest selected by the Nursing faculty which may vary from year to year. This course consists of lectures, seminars, and readings covering the latest advances and research in nursing and health care such as: death and dying; and, therapeutic communication. The course descriptions for the selected topics will be announced prior to scheduling of the course. 1 Credit

## MOLECULAR SCIENCE

### CURRICULUM

### Master of Science

**First Offered Fall 2006**

**DEGREE REQUIREMENTS**

Master's Thesis

MS8201 Master's Seminar 1

MS8202 Master's Seminar 2

Three credits from elective list

***ELECTIVES***

| | | *Credits* |
|---|---|---|
| ES 8909 | Environmental Biotechnology | 1 |
| MS8101 | Adv Analytical Chemistry | 1 |
| MS8102 | Adv Microscopy and Imaging | 1 |
| MS8103 | Genomics and Proteomics | 1 |
| MS8104 | Interfacial Phenomena | 1 |
| MS8105 | Molecular Recognition | 1 |
| MS8106 | Materials Science | 1 |
| MS8107 | Molecular Virology | 1 |

### COURSE LISTING

**Master's Thesis**
This is a laboratory-based research project. Students are required to conduct research, submit their completed research in a thesis format to an examination committee, and make an oral presentation and defence of the research thesis and results to this committee. Through the thesis, students are expected to demonstrate competence in oral and written communication, experimental design and scientific thought processes, as well as a sound understanding of the specialty area associated with the research. The Master's Thesis is a "Milestone." Pass/Fail.

**MS8201 Master's Seminar 1**
Master's Seminar 1: This seminar course features presentations by guest speakers and students in the program. Each student is required to present a seminar on a topic not directly related to the student's thesis research. All program students are required to attend and to actively participate in all seminars provided in this course. Pass/Fail

**MS8202 Master's Seminar 2**
This seminar course features presentations by guest speakers and students in the program. Each student is required to present a seminar on his/her thesis research including background, proposal and results. All program students are required to attend and to actively participate in all seminars provided in this course. Pass/Fail

**MS8101 Adv Analytical Chemistry**
This course focuses on the principles and applications of modern methodologies for identifying and qualifying molecular species. The contents will be divided into two sections, 1) sample collection, storage and preparation, and, 2) modern analytical techniques (e.g. atomic and molecular spectrometry, mass spectrometry). Applications of these methods and techniques in chemical, biochemical (including protein analysis), clinical, environmental (including water, air and soil), food and pharmaceutical analysis will be discussed, using case studies. 1 Credit

**MS8102 Adv Microscopy and Imaging**
This course will provide students with an understanding of modern microscopic methods in chemistry and biology. Emphasis will be on theory and application of confocal microscopy, atomic force microscopy (AFM), confocal Raman microscopy and ultrasound-based approaches. All topics will be discussed in the context of scientific research based on recent publications. 1 Credit

**MS8103 Genomics and Proteomics**
An introduction to genomics and proteomics; relationship between structure and function of a gene; tools used in discovering and identifying sequences in a particular genome; an overview of protein structure and function, tools for structural determination, analysis of protein-protein interactions, introduction to the high throughput identification and quantification of protein expression; review of the Human Genome project; application of genomics and proteomics to drug design. Graduate students will require additional evaluation to the undergraduate requirements and may give a seminar or lecture. Exclusion BLG800. 1 Credit

**MS8104 Interfacial Phenomena**

This course introduces fundamental concepts of interface science in relation to biological and chemical systems. Topics may include artificial assemblies of biomolecules (e.g. lipics, proteinds, polysaccharides) that perform novel functions, self-assembled monolayers, nanoparticles, stucture and physiochemical properties of membranes, electrical properties of interfaces, physiochemistry of microbial adhesion, the structure of water adjacent to interfaces. Selected experimental methods will also be discussed. 1 Credit

**MS8105 Molecular Recognition**
This course provides a selective introduction to topics in molecular recognition from a chemical and biological perspective. Model systems are used to understand fundamental principles of molecular recognition and these concepts are then used to examine topics as diverse as antibody-antigen interactions, adhesin-receptor recognition, drug-ligand interactions and macromolecular interactions in gene expression and signal transduction. Investigating techniques including molecular graphics and modeling, NMR, mass spectrometry, X-ray crystallography and circular dichroism will be discussed. 1 Credit

**MS8106 Materials Science**
This course focuses on the relationship between the synthesis, properties and function of specialty materials with extended structures. Topics may include important conducting materials such as charge-transfer salts, semiconductors, superconductors, and organic and inorganic polymers; optoelectric materials; zeolites and nonporous structures, supramolecular assemblies such as liquid crystals and piezoelectric thin films. Biological topics may include artificial bone, synthetic blood, bio-polymers for drug delivery. Graduate students may be required to give a seminar or lecture. 1 Credit.

**MS8107 Molecular Virology**
An overview of virology, with emphasis on the contribution virology has made to molecular biology will be presented. Detailed analysis will be done of molecular structure/function relationships of specific viruses with impact on societal issues. Included will be viruses causing the AIDS, common cold, influenza, hepatitis, SARS, herpes and adenovirus infections, and others. Molecular pathogen-host interactions will be examined and current and/or potential therapeutic targets and uses will identified. 1 Credit

## PHOTOGRAPHIC PRESERVATION AND COLLECTIONS MANAGEMENT

**CURRICULUM**

### Master of Arts

| DEGREE REQUIREMENTS | | Credits |
|---|---|---|
| PP8000 | Professional Practice Project | |
| PP8010 | Internship | 2 |
| PP8100 | History of Photography I | 1 |
| PP8101 | History of Photog Materials | 1 |
| PP8102 | Research Methods | 1 |
| PP8103 | Photographic Collections | 1 |
| PP8104 | 19th Cent Photo Mater/Proc | 1 |
| PP8105 | Chem of Photogr Deterioration | 1 |
| PP8106 | 20th Cent Photo Materials & Proc | 1 |
| PP8107 | Digital Appl for Collectn Mgmt | 1 |
| PP8108 | History of Photography II | 1 |
| PP8109 | Photographic Preservation | 1 |
| PP8110 | Cataloguing & Registrn Methods | 1 |
| PP8111 | Exhibition and Publication | 1 |
| One elective credit | | |

| ELECTIVES | | |
|---|---|---|
| PP8200 | 19th Cent Photo Pres | 1 |
| PP8201 | 20th Cent Photo Pres | 1 |
| PP8202 | New Media Photo Pres | 1 |
| PP8203 | Albums & Books Phot Pres | 1 |
| PP8204 | Negatives Photo Pres | 1 |
| PP8205 | France Workshop | 1 |

**COURSE LISTING**

**PP8000 Professional Practice Thesis/Project**
The thesis/project provides students with the opportunity to explore, in considerable detail, an issue or problem dealing with an aspect of photographic preservation or collection management, and whose resolution requires successful integration of theoretical, historical, and practical thinking. The project can be presented either as a written report or in another form (such as an interactive digital production), which would permit students to address and report on advanced work in non-traditional ways. Regardless of form, the project must be accompanied by a paper, which documents the work involved, situates it within the appropriate intellectual context, and indicates
its contribution to the field. This is a “Milestone.” Pass/Fail

**PP8010 Internship**
The internship allows the student to participate in the current activities or long-term plans of an institution. The internship is normally a minimum of eight and a maximum of twelve consecutive weeks in length, spent in placement at the host institution. Students are strongly encouraged to undertake the placement in the summer after the second term. The institutional supervisor and the intern will establish start and end dates. As staff members, interns are expected to work regular staff hours so that they will be integrated into the daily work environment of the institution. Pass/Fail

**PP8100 History of Photography I**
This course provides a survey of the medium's history from early experiments to present. It provides an overview of photography's development and its impact on society as both a cultural and sociological phenomenon. It also familiarizes students with existing histories of photography, and addresses some of the problems of defining a visual history through photographic collections. Photographic theory is introduced to provide a critical context for discussion of these issues. 1 Credit

**PP8101 History of Photographic Materials**
Conceived as a parallel to History of Photography I, this course provides a technical and social history of photographic materials from 1839 to present. It describes various materials and techniques used in photography so that their composition, date of origin, and social context can be understood and used in defining approaches to photographic

preservation. Laboratory sessions are used to provide students with the ability to identify and date major photographic processes and formats. 1 Credit

**PP8102 Research Methods**
This course complements material presented in previous courses and provides theoretical and methodological foundations for conducting graduate research in the history, preservation, and conservation of photographs. The course addresses research design, bibliographic construction, cataloguing and archival methods, content and process analysis, textual analysis, historiography, and documentary research. 1 Credit

**PP8103 Photographic Collections**
This course is concerned with photographic collections as specialized repositories of historical knowledge and cultural value. It identifies different types of public and private photographic collections as reflections of governmental, commercial, cultural, and societal needs, and describes their histories, purposes, intellectual organization, and physical management. The course includes the history of the preservation movement and explains the relationship of preservation to conservation both historically and today. 1 Credit

**PP8104 Photographic Materials and Processes: The Nineteenth Century**
This course provides detailed investigation of the history and practice of major nineteenth century photographic negative and positive processes, including photogenic drawings, calotypes, cased images (daguerreotypes, ambrotypes, and tintypes), wet-plate collodion negatives, and albumen prints through lectures, practical demonstrations, darkroom and studio experimentation, and relevant historical literature. 1 Credit

**PP8105 Chemistry of Photographic Deterioration**
In conjunction with two courses on nineteenth and twentieth centuries processes (5 and 6 above), and as an outgrowth of History of Photographic Materials (4 above), this course surveys environmental factors and underlying chemical mechanisms that cause both black and white and colour photographs to stain, fade, or otherwise deteriorate while in storage or on exhibition. Laboratory sessions are used to illustrate the effects of deterioration through exposure to heat, light, humidity, and pollutants. The course provides a fundamental basis for decisions concerning storage conditions, remedial measures, and long-term preservation planning. 1 Credit

**PP8106 Photographic Materials and Processes: The Twentieth Century**
This course provides detailed investigation of the history and practice of major twentieth century photographic negative and positive processes, including platinum prints, gum bichromate prints, gelatin silver negatives and prints, and colour negatives and prints through lectures, practical demonstrations, darkroom and studio experimentation, and relevant historical literature. 1 Credit

**PP8107 Digital Applications for Collection Management**
This course is closely allied to the Cataloguing and Registration Methods course (11 below), designed to provide students with specific digital technologies currently in use in most museums. Image capturing, database entry/management, and issues surrounding search engines are explored in detail. Through a series of hands-on assignments, students become familiar with computer hardware and software applications in the above-mentioned areas. 1 Credit

**PP8108 History of Photography II**
Using the collection of George Eastman House as its basis, this seminar provides the forum for students to investigate specific historical, cultural, or artistic issues arising out the history of photography. This course allows students to gain a greater understanding of history of the medium through detailed examination and interpretation of original materials. Issues of museum collecting and curating are also explored throughout the course. 1 Credit

**PP8109 Photographic Preservation**
This course provides an overview of the history of philosophy, ethics, concerns, and methods of preservation. It covers materials, tools, sources of supply, and methods of providing protection for photographs through proper mounting, housing, and stabilization procedures. It also covers the purposes and procedures for compiling standard condition reports, and conducting preservation surveys. Students will also be introduced to conservation procedures in order to facilitate their interaction with conservators and their practices. 1 Credit

**PP8110 Cataloguing and Registration Methods**
This course provides an overview of the purpose and function of collection registration and cataloguing. It includes an overview of the function of registration and cataloguing staff, developing cataloguing systems, role and usage of computer technology, collection management procedures, shipping and receiving, insurance and conditions reports. Digital applications are also discussed. 1 Credit

**PP8111 Exhibition and Publication of Photographs**
This course is designed to provide students with an overview of issues and policies related to the exhibition and publication of photographs. It covers preservation issues involved in preparing, installing, monitoring, and circulating photographic exhibitions, as well as copyright and reproduction issues. Digital applications and issues are also discussed. 1 Credit

**PP8200 Topics in Photographic Preservation: Nineteenth Century Materials**
Seminar devoted to an issue or aspect of the care and preservation of nineteenth century photographic materials. 1 Credit

**PP8201 Topics in Photographic Preservation: Twentieth Century Materials**
Seminar devoted to an issue or aspect of the care and preservation of twentieth century photographic materials. 1 Credit

**PP8202 Topics in Photographic Preservation: New Media**
Seminar devoted to an issue or aspect of the care and preservation of new photographic digital image materials. 1 Credit

**PP8203 Topics in Photographic Preservation: Photographic Albums and Books**
Seminar devoted to the history and structure of bound books, and their materials and technology (including the photograph album). Factors in deterioration, analysis of condition, need for intervention; treatment proposals, stabilization, and repair are covered. Methods of display, handling, and storage are also covered. 1 Credit

**PP8204 Topics in Photographic Preservation: Negatives**
Seminar devoted to an issue or aspect of the care and preservation of photographic negatives. 1 Credit

**PP8205 France Workshop**
Through 12 days of on-site lectures by, and consultations with, curators of the most distinguished photographic collections, archives, and conservation laboratories in Paris, the course provides students with special access to a broad range of French state and municipal photographic collections and preservation practices. Ryerson has developed strong working relationships with a number of the most important curators and conservationists in Paris including those at the Louvre, the Musée d'Orsay, the Bibliothèque Nationale, and the Musée Carnavalet among others. They allow students behind-the-scenes access to their collections, work spaces, and storage vaults that are unavailable to the general public. An extra fee of approximately CDN $4,185 (subject to change) is levied for this course and the course will be offered subject to enrollment. 1 Credit

## PUBLIC POLICY AND ADMINISTRATION

**CURRICULUM**

### Master of Arts

**First Offered Fall 2005**

| **DEGREE REQUIREMENTS** | | *Credits* |
|---|---|---|
| PA8100 | Public Admin & Governance | 1 |
| PA8101 | Approaches, Anal & Challenges | 1 |
| PA8102 | The State & the Economy | 1 |
| PA8103 | Research Methods | 1 |
| Two elective credits | | 2 |
| AND one of the following Options: | | |
| | ***THESIS Option:*** | |
| Master's Thesis | | |
| | ***Major Research Project Option:*** | |
| Master's Research Project | | |
| Two elective credits | | 2 |
| | ***COURSE Option:*** | |
| Four Elective credits | | 4 |

***ELECTIVES***

| | | |
|---|---|---|
| PA8200 | Bureaucracy & Organization | 1 |
| PA8201 | Citizen Oriented Gov & Globlzn | 1 |
| PA8202 | Comparative Public Policy | 1 |
| PA8203 | Comparative Public Admin | 1 |
| PA8204 | Intergovernmental Relations | 1 |
| PA8205 | Prov Gov & Politics in Ont | 1 |
| PA8206 | Urban Governance | 1 |
| PA8207 | Public Sector Financial Mgmt | 1 |
| PA8208 | Public Sect Union-Mgmt Relatns | 1 |
| PA8209 | Public Sect: Chng Boundaries | 1 |
| PA8210 | Public Serv: Diversity & Equity | 1 |
| PA8211 | Selected Topics: Public Admin | 1 |
| PA8212 | Directed Studies: Public Admin | 1 |

**COURSE LISTING**

**Master's Thesis**
In the thesis option, students conduct an advanced examination of a topic in public policy or public administration. Students propose and carry out the research under the direction of a faculty supervisor and a thesis supervisory committee. On completion, the research is submitted in a thesis format to the supervisor and defended by the student before a thesis examining committee. This is a "Milestone." Pass/Fail

**Master's Research Project**
The research project option is intended for students following a professional career path in public policy or public administration. In the project, students propose and carry out research or applied work related to an issue or problem they are interested in studying. The project is conducted under the direction of a faculty supervisor and a project supervisory committee. The research project is submitted in a written report to the faculty supervisor and is evaluated by a project examining committee. This is a "Milestone." Pass/Fail

**PA8100 Public Administration & Governance**
This course focuses on the principles, organizational features and decision making processes of Canadian public administration in the broader context of shared governance, public sector reform and globalization. The course covers the relationship between the political and administrative institutions and actors of government; the role of public administration in a diverse democracy; the role of values and ethics in public administration; and the structures and processes of accountability for governance and public sector management. The course also introduces the enduring and current challenges facing public sector organisations and public administrators in Canada. 1 Credit

**PA8101 Approaches, Analysis & Challenges**
This course focuses on current challenges in public policy. It situates contemporary Canadian public policy in the environment in which it is lived and developed: first by examining the contemporary context of policy making (its key ideas, institutions and interests); secondly by introducing some of the theoretical and methodological underpinnings and tools of policy analysis and lastly by examining contemporary challenges faced by policy makers and advocates (e.g. policy capacity and autonomy, intergovernmental and democratic challenges, challenges related to scale: global/national/regional/local, and challenges related to diversity) by using a problem-based approach. 1 Credit

**PA8102 The State & the Economy**
This course examines the changing nature of Canadian public finance and state-economy relations within the context of globalization. Emphasis will be placed on the shifting role of government in the economy, on the challenges of public financing in an era of fiscal crisis and tax restraint, and on the application of economic models in policy formulation. The role of the state within market society in providing public goods, in particular the balance struck between social policy and economic development, will be given special attention with a focus on macro level economic policy analysis. Topics include: the structural context in which state budgeting occurs, the role of federalism and global institutions such as NAFTA and WTO in shaping the limits of Canadian public finance, and new economic models and their impact on public policy. 1 Credit

**PA8103 Research Methods**
This course provides students with an understanding of the range of research methods applicable to public policy and administration, encourages them to think critically about research methods and approaches, and assists them in developing concrete research strategies. The topics covered include research design, quantitative and qualitative modes of inquiry, measurement, statistical analysis, survey research, content analysis, field research, archival and documentation research, the case study approach, and historical and comparative research. The course examines these various methods and statistical techniques in the context of how they are used in public policy and public administration. 1 Credit

**PA8200 Bureaucracy and Organization**
This course surveys different theoretical approaches to organization and bureaucracy in advanced industrial societies. While this course surveys the major theoretical contributions to the field of organization theory and covers the classics in the public administration literature, it also examines a number of areas about which traditional approaches have been relatively silent, especially organization theories having to do with race, gender and class. It examines the relationships between the processes of bureaucratization, industrial and economic change and the evolution of democracy. A major focus of the course is on the exercise of power, control and accountability in bureaucratic organizations.
1 Credit

**PA8201 Citizen Oriented Governance & Globalization**
This course examines contemporary struggles for democratization at a variety of scales in light of the historical struggles and debates of the last half of the 20th century. Topics include: the political economy of welfare states, including the achievements, limits, and struggles for social citizenship and political inclusion; the political economy of “development” and citizenship in the global South; Aboriginal struggles for sovereignty; alternative traditions of governance and the challenge to liberal notions of citizenship; contractions in democracy and citizenship under neoliberalism; emerging institutions and practices of “global governance” and globalized struggles for democratization; the crisis of legitimacy and new experiments in citizen-oriented governance in liberal representative democracies including citizen-centred public sector reforms, e-governance and global movements to include “stakeholders” in policy and public administration. 1 Credit

**PA8202 Comparative Public Policy**
Comparative public policy is the study of how, why and to what effect different governments pursue particular courses of action or inaction. In the context of globalization, this course discusses some of the major theoretical and methodological approaches in the comparative study of public policy. It focuses on Canada in comparative perspective and examines how different perspectives explain the divergence or convergence of public policy responses to common social, political, economic and environmental issues and the challenges posed by a diverse citizenship. The course examines the changing role of the state in comparative perspective and the factors that account for differences in policy choices among states. 1 Credit

**PA8203 Comparative Public Administration**
Comparative public administration is the study of how, why and to what effect governments select certain instruments and organizational arrangements to implement policy decisions. These decisions have put public administration at the core of evolving neoliberal definitions of good governance and have resulted in a growing literature on comparative public administration. This course focuses on the varying impact of globalization on developed and developing countries, public sector reform in comparative context, emerging supra-national and global bureaucracies, and the role of international organizations in public administration and public sector reform. 1 Credit

**PA8204 Intergovernmental Relations**
This course examines the division of political and administrative power and the nature of relations between governments which result from Canadian federalism, including federal-provincial-municipal or "tri-level" relations. Specific topics will include the role of the courts in constitutional interpretations, the instruments of "fiscal federalism” (including equalization payments, conditional grants, tax sharing arrangements and shared cost programs), regional, cultural and linguistic differences, administrative relationships, the intergovernmental challenge of Aboriginal self-government and the concept

of "executive federalism". Finally, an investigation of intergovernmental policy capacity will provide an opportunity for a more intensive examination of the impact of intergovernmental relations on public policy and administration in Canada. 1 Credit

**PA8205 Provincial Government & Politics in Ontario**
This course examines the recent dramatic changes in Ontario politics. It evaluates both the historical and contemporary development of the government of Ontario, and the economic, social and political features which have shaped the evolution of this province and influenced its governance. The course looks at ideological, economic, social and political factors. Attention is devoted to: the political economy and political culture of Ontario; the determinants and structures of policy making and public administration; public policy fields and processes; the interactions and roles of government institutions including the premier, the cabinet, the legislature and the bureaucracy; the place of interest groups and social movements; mass media; elections; and specific policy issues. A comparative approach to other Canadian provinces will also be employed throughout the course. 1 Credit

**PA8206 Urban Governance**
Decisions affecting citizens in their daily lives are increasingly being made both at the level of global organizations and at the level of local organizations. Through the lens of contemporary urban policy issues and the Greater Toronto Area, this course examines the phenomenon dubbed “glocalization” and explores the role of urban governance and urban citizenship in addressing a selection of problems facing modern urban areas. The interplay of institutions, interests and ideas in shaping urban policy will be of particular concern. Topics to be examined include: municipal government restructuring, intergovernmental and third-sector relations, municipal finance, urban form, sustainable urban development, civic participation and social inclusion in cities. 1 Credit

**PA8207 Public Sector Financial Management**
This course examines public sector budgeting: the raising of revenue, the allocation of expenditures and the evaluation of the efficiency and effectiveness of spending. A central theme of the course is the “politics” of the budgetary process. This includes the process of making budgetary decisions within government, the role of public sector organizations and interest groups in the budgetary process, and how government evaluates its direct spending and monies allocated to fund programs and services delivered by hospitals, schools and other public sector institutions through program evaluation, performance management, auditing and public reporting. The course will focus on what the study of public sector budgeting reveals about changes in the scope and nature of government responsibility and the potential for both greater public participation in the budgetary process and improved accountability. 1 Credit

**PA8208 Public Sector Union-Management Relations**
Public administration is conducted in a highly unionized environment. Public policies and services, therefore, are significantly affected by union-management relations. This course explores current issues and trends in public sector union-management relations. Particular emphasis is placed on the state's dual role as law-maker and employer, and whether this is compatible with labour rights, diversity and equity, and the public interest. Topics explored include: the rise of public sector unionism, current public sector labour relations legislation, employment restructuring in the public service, and public sector union resistance to government policy. Another major theme of the course will involve an analysis of the changing nature of work, focusing on how new information technologies and public sector reform have affected the distribution of power and control in the workplace with a focus on recent organizational changes in the public sector. 1 Credit

**PA8209 The Changing Boundaries of the Public Sector**
This course offers an in-depth examination of one of the most significant developments in public administration since the advent of the post-war welfare state - the restructuring of relationships between the state, civil society and the market under Alternative Service Delivery (ASD) and public-private partnerships. Informed largely by the insights of the reinventing government perspective within public administration, ASD and partnership models are portrayed as more effective and efficient approaches to the production and delivery of public goods and services. Moreover, as ASD makes claims to a more ‘front-line’ and ‘community-based’ delivery structure, it is characterized as more client-centred and responsive in comparison to traditional public sector organizations. Through a detailed analysis of the issues, questions and problems raised by these changing boundaries, these assumptions will be analyzed and critiqued. Topics covered include: the New Public Management and the role of managerialism in restructuring service delivery; the anatomy of partnership models; partnership and the emerging role of the third sector; partnership and the remaking of social policy governance; managing public private partnerships; and the implications of partnerships for democracy, citizenship, and accountability. 1 Credit

**PA8210 Diversity & Equity in the Public Service**
Diversity and equity are important features of public policy and are central to the debate about the renewal of the public service in Canada. An increasing concern with human rights, significant demographic developments, and a citizenry conscious of both the democratic deficit and the need for a representative public service workforce, call into question the values and ethos of public service in Canada. The broader public sector has an opportunity now to make up ground in the representation of historically disadvantaged groups in ways that will help to create an exemplary workplace. The imperative to renew and rejuvenate the public service is matched with the reality of a labour market that is increasingly diverse. The Charter of Rights and Freedoms, the Multiculturalism Act, the federal Human Rights Act and provincial Human Rights Codes have embedded in them a core set of rights, values and responsibilities. Part of the challenge in a democratic society like Canada is navigating between competing rights, claims and values. In this course specific emphasis is devoted to the following policy fields: immigration policy, multiculturalism, native self-government, human rights, employment equity, gender relations and language rights. 1 Credit

**PA8211 Selected Topics**
This course focuses on selected topics in public policy and public administration. The content may vary from year to year. Through an examination of one or more policy areas this course will focus on an analysis of the political, legal, social, economic, and administrative complexities of various public policies and their implementation. 1 Credit

**PA8212 Directed Studies**
This course is designed for individual students with specialized interests that may not be satisfied through course offerings in a given year. It will normally be a directed reading course under the direct supervision of an assigned faculty member with expertise in the chosen subject field. It is also designed for students wishing to pursue research on a policy or public administration topic where there are no related course offerings in the program. Individual directed study of subject areas in public policy and administration not addressed in the current curriculum will be carried out under the supervision of a faculty member. A program of supervised, advanced study related to the student's area of concentration will be negotiated on an individual basis with the supervising faculty member. The directed study course is normally intended for students in the final semesters of study. 1 Credit

## SPATIAL ANALYSIS

### CURRICULUM

### Master of Spatial Analysis

| DEGREE REQUIREMENTS | | *Credits* |
|---|---|---|
| Research Paper | | |
| SA8902 | Database Mgmt & Spat Technol | 1 |
| SA8903 | Anal Methods & Spatial Data | 1 |
| SA8904 | GIS Project Mgmt Applications | 1 |
| SA8905 | Digital Cartography | 1 |
| *SA8991 | Practicum | 1 |
| Two elective credits | | |
| ***ELECTIVES*** | | |
| SA8901 | Spat Databases Models & Struct | 1 |
| SA8906 | Spec Topics: Spatial Analysis | 1 |
| SA8907 | Health in Urban Environments | 1 |
| ***Business/Commercial Stream*** | | |
| SA8911 | Geodemographics | 1 |
| SA8912 | Spatial Tech. in Strat Planning | 1 |
| ***Physical/Landscape Stream*** | | |
| SA8921 | Spatial Anal of Land Resources | 1 |
| SA8922 | Remote Sensing & Spatial Data | 1 |
| SA8923 | Land/Geographic Info Systems | 1 |
| SA8924 | Sedimentatn & Fluvial Geomorph | 1 |
| SA8925 | Advanced Hydrology & Water Quality | 1 |

* The Practicum (SA8991) will be waived for part-time students who are in program-related employment.

### COURSE LISTING

All "SA" courses have University of Toronto course numbers indicated in brackets following the Ryerson University codes.

**Research Paper (MSA1100)**
The research paper requires the student to investigate independently a particular issue or application in his/her field of interest. The research paper may emanate from class work, from work associated with research funding, and/or the practicum experience. Pass/Fail.

**SA8901 (MSA9010) Spatial Databases, Models and Structures**
This course focuses on the statistical nature of geographical databases; their information content, reliability, usability and closeness to (what we think to be) true. Lecture and seminar formats are used with significant amount of reading and discussion. Familiarity with basic statistics, GIS and S-PLUS (or some other statistical software) is a definite advantage, because each student will complete several small assignments and a research project. 1 Credit

**SA8902 (MSA9020) Database Mgt./Spatial Technologies**
This course examines Geographic Information Science (GIScience) concepts and practice in real-world applications. Geospatial analysis, database management, statistical analysis, and data integration are the major course themes. Arc/Info (including GRID) and ArcView will be the principal Geographic Information System (GIS) software packages that are utilized. There will also be some emphasis on the PCI Geomatics software products. The integration of GIS functionality in the WWW will also be investigated. 1 Credit

**SA8903 (MSA9030) Analytical Methods and Spatial Data**
This course uses a case study approach to explore the use of various types of spatial statistical analysis. It involves the application and critical assessment of the use of selected univariate and multivariate modelling approaches in the analysis of spatial distributed data. 1 Credit

**SA8904 (MSA9040) GIS Project Management Applications**
This course involves team case study analysis of the strategic and operational use of various digital technologies in selected workplace situations, including an exploration of the sociological implications and concerns of such technologies.

The format of the course will involve site evaluations, corporate presentations, student case assessments, seminars and lectures. The first half of the course will focus on the current and potential use of GIS and related spatial technologies in three distinct corporate environments – a financial institution, a fast-food retailer, and a major media corporation). The second part of the course will examine selected conceptual and theoretical issues that relate to the application of GIS in both the private and public sector environments. 1 Credit

**SA8905 (MSA9050) Digital Cartography**
The design and production of maps using GIS/cartographic software and graphics/publishing software. The lecture portion of the course focuses on questions of map perception and map use, principles and elements of cartographic design, different types of data representation and the graphic choices controlling their success, and the production and reproduction of maps in various media. Concurrent with the lectures a series of 2-hour labs give students hands-on experience with the software and hardware in the department GIS lab. ArcInfo and Arcview are used for map production and Coreldraw is used to refine graphic output. Antirequisite: GGR1913H (University of Toronto). 1 Credit

**SA8907 (JPG1421) Health in Urban Environments**
This course explores ways of theorizing, evaluating, and improving health in urban areas. Through readings, group discussion, and individual and group inquiry, students will examine the key mechanisms by which urban environments (broadly defined) impact on the people
living in them, and how - and to what extent - urban residents can in turn alter their environments to facilitate health. While this course is grounded in the practice-oriented discourses of urban planning and health promotion, a critical awareness of, and debate about, the strengths and limitations of various approaches to promoting and maintaining the health of urban residents in both developed and developing countries will be encouraged. 1 Credit

**SA8911 (MSA9110) Geodemographics**
This course surveys practical, conceptual, and methodological issues associated with the application of spatial techniques to marketing and segmentation. Stress is given to the use of a range of socioeconomic and demographic data variables. Methods include a variety of multivariate techniques for market definition and segmentation, focusing on the application of cluster analysis. The course also addresses the management issues associated with the use of geodemographics and associated spatial analysis within the commercial environment. 1 Credit

**SA8912 (MSA9120) Spatial Tech. in Strategic Planning**
The course examines the application of spatial technologies, particularly GIS, to strategic planning issues that affect the commercial sector of the economy. The focus is on analysis of retail and service activities from the perspective of both the private and public sector policy makers. Specific issues include: spatial impact analyses, use of GIS as a corporate management system, retail and services network planning, and location-allocation modeling. The course will adopt a variety of presentation formats including lectures, seminars and site visits to retail/commercial companies that use spatial technologies in a corporate planning context. 1 Credit

**SA8921 (MSA9210) Spatial Analysis of Land Resources**
Simple approaches to modelling the energy transfer and evaporation from individual types of surfaces are explored, and comparisons with field data are made. The problem of transfer between adjacent surfaces is also examined to introduce the multiple surface problem in environmental modelling. Although use of existing models will be made, it is helpful to know a computer language. Antirequisite: GGR1921H (University of Toronto) 1 Credit

**SA8922 (MSA9220) Remote Sensing and Spatial Data**
Advanced image processing, theory and applications of spatial resolution effects on classification monitoring and interpretation of landscapes. From field spectrometric data to simulated images. Antirequisite: GGR1911H (University of Toronto) 1 Credit

**SA8923 (MSA9230) Land/Geographic Information Systems**
The course concentrates on using geographical information systems (GIS) technology for environmental spatial problem solving. The Geographical Resources Analysis Software System (GRASS) is used extensively. Hands-on assignments are the emphasis in this course. In addition to essential fundamental concepts of GIS, topics that will be covered include spatial interpolation, logic of spatial analysis, line-of-sight analysis, cartographic modeling, landscape analysis, route selection, and site selection. 1 Credit

**SA8924 (MSA9212) Sedimentation & Fluvial Geomorphology**
Elements of drainage basin morphology and hydrology, classification of rivers, stream patterns, and hydraulic geometry. Elements of open channel flow, sediment transport, channel change mechanisms and human impacts on river development. 1 Credit

**SA8925 (MSA9214) Advanced Hydrology & Water Quality**
This course will take a hydraulic perspective in examining the landscape controls on surface water quality. We will consider how the study of surface water and ground water hydrology leads to an understanding of stream water chemistry through the examination of hydrological flowpaths and the chemical interaction of water and the matrix/matrices through which it flows. An advanced understanding of hydrological processes will be emphasized. Pertinent field and laboratory techniques will be introduced. 1 Credit

**SA8991 (MSA4444) Practicum**
The practicum is designed to be an unpaid field placement to provide students with an understanding of the types of problems, policies, and issues that are (or should be) addressed utilizing spatial analysis in specific public or private

sector situations. The placement will be arranged by the Program Director in discussion with the student. While students may present suggestions for placements to the Program Director, they cannot arrange their practicum independently. Pass/Fail. 1 Credit