

## 2007-2008 Graduate Calendar

The information published in this Graduate Calendar outlines the rules, regulations, curricula, programs and fees for the 2007-2008 academic years, including the Summer Semester 2007, the Fall Semester 2007 and the Winter Semester 2008.

For your convenience the Graduate Calendar is available in PDF format.

If you wish to link to the Graduate Calendar please refer to the [Linking Guidelines](#).

The University is a full member of:

- The Association of Universities and Colleges of Canada

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## **Disclaimer**

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The Office of Graduate Program Services has attempted to ensure the accuracy of this on-line Graduate Calendar. However, the publication of information in this document does not bind the university to the provision of courses, programs, schedules of studies, fees, or facilities as listed herein.

## **Limitations**

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The University of Guelph reserves the right to change without notice any information contained in this calendar, including any rule or regulation pertaining to the standards for admission to, the requirements for the continuation of study in, and the requirements for the granting of degrees or diplomas in any or all of its programs.

The university will not be liable for any interruption in, or cancellation of, any academic activities as set forth in this calendar and related information where such interruption is caused by fire, strike, lock-out, inability to procure materials or trades, restrictive laws or governmental regulations, actions taken by the faculty, staff or students of the university or by others, civil unrest or disobedience, or any other cause of any kind beyond the reasonable control of the university.

The University of Guelph reaffirms section 1 of the Ontario Human Rights Code, 1981, which prohibits discrimination on the grounds of race, ancestry, place of origin, colour, ethnic origin, citizenship, creed, sex, sexual orientation, handicap, age, marital status or family status.

The university encourages applications from women, aboriginal peoples, visible minorities, persons with disabilities, and members of other under-represented groups.

## **Introduction**

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### **Collection, Use and Disclosure of Personal Information**

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Personal information is collected under the authority of the University of Guelph Act (1964), and in accordance with Ontario's Freedom of Information and Protection of Privacy Act (FIPPA) [http://www.e-laws.gov.on.ca/DBLaws/Statutes/English/90f31\\_e.htm](http://www.e-laws.gov.on.ca/DBLaws/Statutes/English/90f31_e.htm). This information is used by University officials in order to carry out their authorized academic and administrative responsibilities and also to establish a relationship for alumni and development purposes. Certain personal information is disclosed to external agencies, including the Ontario Universities Application Centre, the Ministry of Training, Colleges and Universities, and Statistics Canada, for statistical and planning purposes, and is disclosed to other individuals or organizations in accordance with the Office of Registrarial Services Departmental Policy on the Release of Student Information. For details on the use and disclosure of this information call the Office of Registrarial Services at the University at (519) 824-4120 or see <http://www.uoguelph.ca/registrar/registrar/index.cfm?index>.

### **Statistics Canada - Notification of Disclosure**

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For further information, please see Statistics Canada's web site at <http://www.statcan.ca> and Section XIV Statistics Canada.

### **Address for University Communication**

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Depending on the nature and timing of the communication, the University may use one of these addresses to communicate with students. Students are, therefore, responsible for checking all of the following on a regular basis:

#### **Email Address**

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The University issued email address is considered an official means of communication with the student and will be used for correspondence from the University. Students are responsible for monitoring their University-issued email account regularly.

#### **Home Address**

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Students are responsible for maintaining a current mailing address with the University. Address changes can be made, in writing, through Graduate Program Services.

#### **Name Changes**

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The University of Guelph is committed to the integrity of its student records, therefore, each student is required to provide either on application for admission or on personal data forms required for registration, his/her complete, legal name. Any requests to change a name, by means of alteration, deletion, substitution or addition, must be accompanied by appropriate supporting documentation.

### **Student Confidentiality and Release of Student Information Policy Excerpt**

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The University undertakes to protect the privacy of each student and the confidentiality of his or her record. To this end the University shall refuse to disclose personal information to any person other than the individual to whom the information relates where disclosure would constitute an unjustified invasion of the personal privacy of that person or of any other individual. All members of the University community must respect the confidential nature of the student information which they acquire in the course of their work.

Complete policy at <http://www.uoguelph.ca/policies>.



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## Land Resource Science

The objective of the MSc and PhD programs in land and atmospheric science is to provide opportunities for advanced studies and research on the lower atmosphere, soil, water, surficial geological deposits, the relationships among these resources, and their management within the context of sustainable development. Cross-disciplinary research with a focus on biophysical sciences is emphasized.

### Administrative Staff

#### Chair

Stewart Hilts (140 Richards, Ext. 52447)  
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#### Graduate Co-ordinator

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#### Graduate Secretary

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### Graduate Faculty

#### Emmanuelle Arnaud

BA McMaster; MSc British Columbia; PhD McMaster - Assistant Professor

#### Michael E. Brookfield

BSc Edinburgh, PhD Reading - Professor

#### Robert Brown

BSc Saskatchewan, MLA Guelph, PhD Guelph - Adjunct Professor

#### Nigel Bunce

BA, MA, DPHIL Oxford - Adjunct Professor

#### Terry Daynard

BSc, MSc, PhD Guelph - Adjunct Professor

#### Kari Dunfield

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#### Leslie J. Evans

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#### Susan Glasauer

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#### Michael J. Goss

BSc London, MSc Birmingham, PhD Reading - Professor and Director, Kemptville College

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BSc, MSc Toronto, PhD Guelph - Professor

#### Richard J. Heck

BSA, MSc, PhD Saskatchewan - Associate Professor

#### Stewart G. Hilts

BA Western Ontario, MA, PhD Toronto - Professor and Chair

#### John D. Lauzon

BSc, MSc, PhD Guelph - Assistant Professor

#### Ray A. McBride

BSc (Agr), PhD Guelph - Professor

#### Ivan O'Halloran

BSc MSc Guelph, PhD Saskatchewan - Associate Professor

#### Gary W. Parkin

BSc, MSc Western Ontario, PhD Guelph - Associate Professor

#### Peter van Straaten

Dipl Geol, Dr. rer nat Gottingen (Germany) - Associate Professor

#### R. Paul Voroney

BSc Calgary, MSc, PhD Saskatchewan - Professor

#### Claudia Wagner-Riddle

BSc, MSc Sao Paulo, PhD Guelph - Associate Professor

#### Jon S. Warland

BSc Cornell, MSc British Columbia, PhD Guelph - Assistant Professor

### MSc Program

#### Admission Requirements

In addition to the minimum requirements stated elsewhere in the Graduate Calendar, admission to the graduate program is dependent on the availability of an advisor, space and funding.

Students entering the MSc program will be expected to have taken, or be familiar with the content of, introductory courses in atmospheric science, soil science, earth science and land resource management, either through appropriate courses or a program of self study.

### Degree Requirements

All students in the MSc program are required to enroll in the two-course sequence Research Issues I and II. The objectives of these courses are to enhance the skills needed for a research career (including cross-disciplinary research); foster the development of superior communication skills; increase the student's awareness of major issues related to land resources, and current research; and provide an environmental, social and economic context for this research. It is recommended that students enrol in the courses during their first year.

### PhD Program

#### Admission Requirements

Students who are applying for admission to the PhD program, and who have completed an MSc in another program (at Guelph or at a different University), will follow the application procedures prescribed by Graduate Program Services. Students lacking the same level of understanding across fields and within fields as graduates from the MSc program will be expected to correct this deficiency early in their PhD program.

Students intending to continue directly into a PhD program after the completion of an MSc within the program must complete a full application for the PhD degree. This application should be submitted at least two months before meeting the requirements of the MSc degree. Superior MSc students may be permitted to transfer to the PhD program without completing the master's degree.

#### Degree Requirements

Students must pass a qualifying examination and successfully prepare and defend a thesis, as specified under the general regulations for the PhD degree. Students must complete the following courses as the minimum course requirements. Additional courses will be determined by the advisory committee.

LRS*6900	[0.25]	Research Issues I
LRS*6910	[0.25]	Research Issues II

Students are encouraged to develop an advanced level of understanding of two or more additional areas of specialization which are related to the area of their research and to participate in cross-disciplinary or collaborative research programs where opportunities permit.

### Interdepartmental Programs

#### Toxicology Program

Land Resource Science participates in the interdepartmental program in Toxicology. Students register in both the department and the collaborative program.

### Courses

#### Atmospheric Science

##### LRS\*6000 Physical Environment of Crops and Forests F [0.50]

Recent literature on temperature, humidity, radiation, wind, gases and particles in crop and forest environments; evapotranspiration and photosynthesis of plant communities; modification of microclimates; applied micrometeorology. Offered in even-numbered years.

##### LRS\*6040 Micrometeorology W [0.50]

Exchanges of mass, momentum and energy between the surface and the atmosphere will be studied in the context of larger-scale meteorology. Diffusion and turbulence in and above plant canopies will be examined from theoretical and practical perspectives. Topics include time-series analysis, micrometeorological measurement theory, and basic principles of atmospheric science. Offered in even-numbered years.

##### LRS\*6060 Agrometeorological Instrumentation W [0.50]

Theoretical and practical aspects of electronic circuits, sensors, and equipment used in agrometeorological research.

##### LRS\*6241 Special Topics in Atmospheric Science F,U [0.25]

The content is determined by the interests of the students and the availability of instructors. Topics may include aspects of statistics for climatology, animal biometeorology, air pollution meteorology, and hydrometeorology.

##### LRS\*6242 Special Topics in Atmospheric Science F,U [0.50]

See LRS\*6241

#### Soil Science

##### LRS\*6250 Soil Genesis and Classification F [0.50]

A discussion of world soil regions for students not specializing in soil genesis.

##### LRS\*6280 Soil Physics W [0.50]

The soil as a physical system with special regard to soil water movement and the diffusion and dispersion of chemical substances. Numerical techniques and computer solutions will be developed.

**LRS\*6300 Applied Soil Physics F [0.50]**

The application of soil physical principles to practical problems concerning soil physical quality, erosion, land reclamation and industrial-waste disposal on land

*Prerequisite(s):* SOIL\*3070.

**LRS\*6320 Non-equilibrium Thermodynamics of Porous Media W [0.50]**

Transport processes in porous media such as soils, clays, and membranes are dealt with in the framework of non-equilibrium thermodynamics with emphasis on the coupling between water, solutes, heat and electric charge transport. Offered in even-numbered years.

**LRS\*6340 Soil Organic Matter and Biochemistry F [0.50]**

(1) Soil organic matter characterization, (2) dynamics of soil organic matter, (0.5) nutrient cycling. Offered in odd-numbered years.

**LRS\*6360 Soil and Water Chemistry F [0.50]**

Thermodynamics of soil solutions; solution-solid phase equilibria; reaction kinetics; computer modelling of solute-mineral interactions.

**LRS\*6380 Advanced Soil Chemistry W [0.50]**

The mathematical development of solute speciation models for aqueous solutions, surface complexation models for inorganic soil constituents and discrete and continuous functional group models for humic materials.

**LRS\*6400 Soil Nitrogen Fertility and Crop Production W [0.50]**

Emphasis will be placed on soil N transformations and processes, and N sources for crops; field experimentation methods; environmental issues.

**LRS\*6420 Soil Productivity F [0.50]**

Soil physical, chemical and biological characteristics as they influence crop growth with emphasis on processes and mechanisms.

**LRS\*6440 Field Sampling Strategies and Geostatistics W [0.50]**

Concepts and practical aspects of collecting, synthesizing and interpreting data from spatially and temporally variable and/or correlated fields. Hands-on experience in describing spatial structure of large data sets (supplied by student or instructor) using available software. Offered in even-numbered years.

**LRS\*6581 Special Topics in Soil Science U [0.25]**

Issues that are relevant to the current research of faculty or visiting faculty. Generally presented as a combination of lectures, student seminars and written projects.

**LRS\*6582 Special Topics in Soil Science U [0.50]**

See LRS\*6581

**Environmental Earth Science****LRS\*6280 Soil Physics W [0.50]**

The soil as a physical system with special regard to soil water movement and the diffusion and dispersion of chemical substances. Numerical techniques and computer solutions will be developed.

**LRS\*6360 Soil and Water Chemistry F [0.50]**

Thermodynamics of soil solutions; solution-solid phase equilibria; reaction kinetics; computer modelling of solute-mineral interactions.

**LRS\*6730 Special Topics in Environmental Earth Science U [0.50]**

A study of principles and analyses of local environmental problems involving the application of geological and soil information of land use applications and possible hazardous conditions.

**Land Resources Management****LRS\*6760 Advanced Remote Sensing W [0.50]**

Critical review of the latest research papers on the use of remotely sensed data for temporal monitoring of the biosphere. Offered in odd-numbered years.

**LRS\*6881 Special Topics in Land Resources Management U [0.25]**

Issues that are relevant to the current research of faculty or visiting faculty. Generally presented as a combination of lectures, student seminars and written projects.

**LRS\*6882 Special Topics in Land Resources Management U [0.50]**

See LRS\*6881

**Other****LRS\*6900 Research Issues I F [0.25]**

Principles and philosophy of scientific research including the development of superior communication skills.

**LRS\*6910 Research Issues II W [0.25]**

A continuation of Research Issues I.

**LRS\*6941 Analytical Instrumentation and Techniques U [0.25]**

Equipment and techniques of soil and plant analyses. Variable credit will be assigned based on the number of laboratory units covered.

**LRS\*6942 Analytical Instrumentation and Techniques U [0.50]**

See LRS\*6941