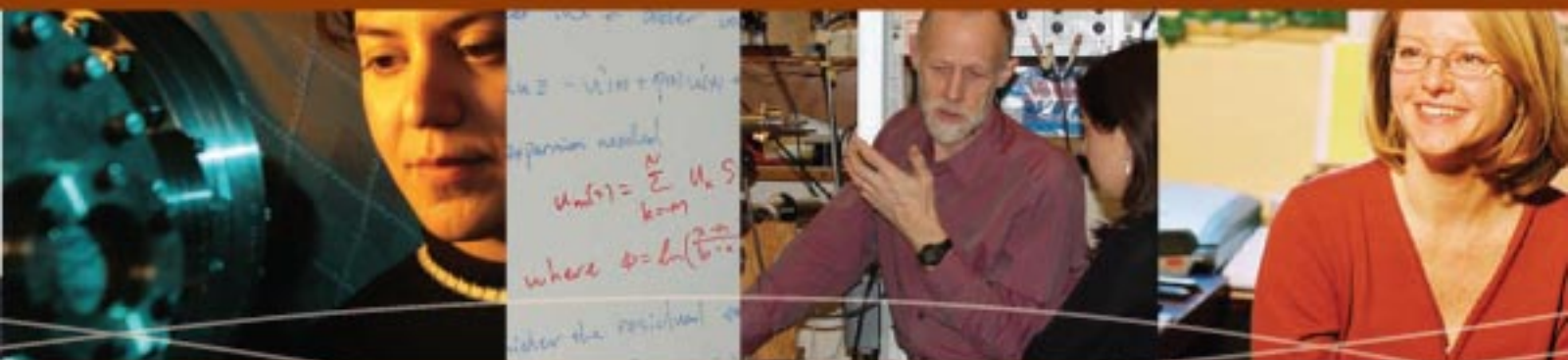


GRADUATE STUDIES AT TRENT UNIVERSITY



Applications of Modelling in the Natural and Social Sciences M.Sc., M.A.

TRENT 
UNIVERSITY

LEARNING TO MAKE A WORLD OF DIFFERENCE.™

Applications of Modelling in the Natural and Social Sciences at Trent University

This challenging interdisciplinary program draws students and faculty together from a cross-section of departments. It leads to an M.Sc. or M.A. degree through the application of techniques and theory of modelling in the natural and social sciences. As the scientific modelling field continues to emerge and expand, researchers engage in leading research alongside students and faculty from a broad base of companion disciplines including mathematics, computer science, physics, psychology, physical geography, environmental and resource science, chemistry and economics.



Trent's dedicated approach to advanced research, together with our emphasis on strong student-faculty interaction, means students get the experience and insight to excel in their chosen field. As an interdisciplinary program, students are involved in research and coursework in both their "home" discipline and in interdisciplinary study, giving them a well-rounded foundation from which they can progress in many different directions.

Course Goals and Framework

The program is based mainly on a thesis-research project with supporting coursework. Students are expected to dedicate up to two years to complete and be examined on their thesis, while maintaining a grade of at least B- (70%) in their graduate courses. The program involves two required program core courses as well as two courses in their home discipline. Candidates are required to make at least one presentation at a modelling seminar each year.

Overall, the program targets three central objectives:

- Teach fundamental and common analytical modelling techniques required for research in a large number of quantitative fields.
- Encourage the sharing of ideas with researchers in other disciplines to broaden the scope of experience and develop stronger communication skills.
- Train students in a specific discipline, which includes coursework and a research thesis, to allow them progress to a Ph.D. program in that discipline, if desired.

Test the limits of conventional disciplines,
and participate in a culture of intellectual
questioning and exchange – explore your
graduate studies options at Trent.

A man with a beard and glasses, wearing a dark suit and tie, is speaking and gesturing with his hands. He is in the foreground, looking towards a group of people whose backs are to the camera. The background is slightly blurred, showing an indoor setting with warm lighting. The word 'Innovative.' is overlaid in large white text on the right side of the image.

Innovative.

LEARNING TO MAKE A WORLD OF DIFFERENCE

Careers & Choices

For many students, this program is a precursor to doctoral studies in their home discipline, while others have gone directly into careers in a range of relevant fields, including:

- Government / Private lab Technicians and Researchers
- Information Technology
- Scientific and Technical Consulting Services
- Financial and Business Industry




Educators and Innovators

The AMINSS program draws on an accomplished faculty from a number of departments in the natural and social sciences at Trent. With the University's emphasis on research and interdisciplinary study, it has also built a reputation for small group teaching and, especially, a strong tradition of mentoring of students by faculty. The personal attention that students receive from faculty is a distinguishing feature of Trent's graduate programs, and is central to helping students achieve their academic goals and prepare for doctoral studies or professional options in fields requiring quantitative modelling.

Financing Your Future at Trent

To help offset program costs, Trent Graduate Studies offers a majority of its students Graduate Teaching Assistantships (GTAs), Research Fellowships, and support from faculty research grants*. Support is also provided for minor overhead research costs, such as laboratory and computing supplies, equipment and some conference travel. Canadian students are encouraged to apply for national and provincial (NSERC, and Ontario Graduate Scholarships) awards before December of the year before beginning their graduate studies.

* Check for updates on new increased funding rates at www.trentu.ca/graduatestudies/financialsupport.php

A photograph of three people in a laboratory. A young man is in the background, a woman is in the middle ground, and an older man with a beard is in the foreground, leaning over a piece of equipment. The scene is dimly lit with blue and orange tones.

Our programs offer opportunities to collaborate with experts in their fields, inspiring new understanding while pushing the boundaries of academic possibility and discovery.

Progressive.

One of Canada's Most Research Intensive Universities

Trent University has consistently been recognized as a centre of high calibre research and scholarship. The total research funding to Trent has more than doubled over a five year period and the success of Trent faculty in attracting research funding from diverse sources continues to be remarkable. Trent's eleven Canada Research Chairs and NSERC Industrial Research Chairs cover a broad spectrum of disciplines, reflecting the institution's careful balance between research in the humanities, sciences, and social sciences. As federal and provincial governments continue to make knowledge transfer and outreach a priority for post-secondary institutions, Trent will continue to draw on its key strengths to further its research accomplishments and reputation nationally and internationally.

The Scope of Research

To offer an idea of the range of research at Trent, the research of some faculty members is listed below:

■ Computer Science

Dr. Wenying Feng works on computer system performance analysis by mathematical and simulation modelling. Dr. Richard Hurley studies resource management strategies for distributed systems and web caching, and speech recognition (SR) technology for barrier-free learning environment. Drs. Richard Hurley and Jim Jury study digital technology of gamma cameras for diagnostic imaging. Dr. Brian Patrick investigates job scheduling strategies for parallel processing and is developing of a new object-oriented programming language. Dr. Sabine McConnell researches in data mining, analysis and visualization of astronomical data, astroinformatics, distributed systems and astrophysical simulation.

■ Mathematics

Dr. Kenzu Abdella works in mathematical models involving ordinary and partial differential equations with the main focus in environmental and climate modelling, applied fluid mechanics and Mathematical biology. Dr. Nikolai Dokuchaev is in mathematical finance, stochastic analysis, stochastic control, and stochastic partial differential equations. Dr. Wenying Feng studies boundary value problems for nonlinear differential equations and their applications. Dr. Marcus Pivato investigates the dynamical modelling of microeconomic disequilibrium (e.g. agent-based price adjustment models) as well as cellular automata and multidimensional symbolic dynamics. Dr. Marco Pollanen is in the areas of mathematical and computational finance, monte carlo and quasi-monte carlo methods, applied probability and mathematical knowledge management.

■ Physics and Astronomy

Physics and Astronomy represent the archetype of modern modelling, the development of a mathematical description of natural phenomena in an interplay between observation and theory. Drs. Rachel Wortis, Bill Atkinson and Al Slavin work theoretically and experimentally on superconductivity, strongly-correlated electrons, and nanosurfaces. Observational astronomer Dr. Dave Patton studies merging galaxies, while optical physicist Dr. Ralph Shiehl manipulates quantum states using laser radiation, a possible route to a quantum computer. Dr. Jim Jury studies photonuclear reactions and medical imaging using nuclear physics techniques.

■ Psychology

Dr. James D. A. Parker (Canada Research Chair in Emotion and Health) is involved in a number of research projects on personality and affect regulation, particularly mental and physical health problems and/or academic achievement. Dr. Kevin Ross Peters investigates the relationship between sleep and memory, and cognition changes in normal and pathological aging, and how this research can identify the early stages of dementia. Dr. Laura J. Summerfeldt studies the relationships among personality, mental health, and psychopathology. Dr. Elaine Scharfe focuses on how early caregiving relationships (our attachment relationships) influence adult mental health, lifestyles choices, and physical health. Dr. Teresa L. DeCicco's research focuses on the areas of health, identity in relationship to health and disease, abnormal psychology and dream therapy.

■ Geography

Dr. Raul Ponce-Hernandez investigates land-based processes in agricultural systems, the cycles of carbon and nutrients, biodiversity, land degradation, and desertification through computer modeling, GIS and remote sensing techniques. Dr. Cheryl McKenna Neuman uses a boundary layer wind tunnel to simulate atmospheric turbulent flows and particle transport under varied climate conditions. Dr. Peter Lafleur specializes in ecosystem-atmosphere exchange of energy, water and trace gases, with an emphasis on measurement and modelling of ecosystem processes and environmental change. Dr. James Conolly uses GIS and agent based modeling to understand long term human ecology and culture change.

■ Environmental Resource Science and Chemistry

Dr. David Ellis (Director of the Canadian Environmental Modelling Centre) and, with Dr. Donald Mackay (Director Emeritus), develop and evaluate mass balance models to understand and to quantitatively predict the pathways of contaminant transport and resulting exposure. Dr. Holger Hintelmann is mostly based in analytical chemistry and environmental analysis.

Life at Trent University

Trent University has earned a reputation for exceptional teaching and innovative research activity. The University as a whole nurtures a collaborative atmosphere in which students from across the country and around the world are encouraged to engage in interdisciplinary learning while enjoying a variety of social and cultural activities. For graduate students in particular, Trent affords a rich research and learning environment that facilitates an interdisciplinary perspective on just about any topic of interest - resulting in a broader range of options upon completion of your Trent degree. Graduate students at Trent also have access to a college dedicated primarily to graduate studies. Located in downtown Peterborough, Catharine Parr Traill College is a hub of activity for all graduate students.



The Peterborough Lifestyle

Trent University is located in Peterborough, Ontario on the banks of the Otonabee River just 90 minutes from downtown Toronto. A friendly, mid-sized city, Peterborough boasts a vibrant arts and music scene, a varied selection of restaurants, cafés and pubs, and a full complement of services combined with affordable accommodation and easy access to the surrounding lakes and wilderness of the world famous Kawartha Lakes region. It's no wonder so many people are recognizing the benefits of living and studying in Peterborough.

Admission Requirements

Applicants to this program should hold an upper second class standing (77%; B+ at Trent) or its equivalent in a joint or single honours B.Sc. or B.A. degree in one of the relevant disciplines (biology, chemistry, computer science, economics, environmental science, geography, mathematics, physics, psychology, or sociology). Prospective students will also be expected to have the following:

- University course in differential and integral calculus
- Capable of programming at an elementary level in at least one computational language (such as MATLAB, FORTRAN, C++, depending on the discipline)
- Course in probability and statistics (or equivalent knowledge)
- Course in differential equations or advanced statistics (depending on focus of research)

Students must have acceptable proof of facility in English if it's their second language. Applications for this program are due by February 1.

To learn more about the range of disciplines in the Applications of Modelling in the Natural and Social Sciences program, as well as the many benefits of earning an M.Sc. or M.A. at Trent University, please visit our program web site at www.trentu.ca/aminss.



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