# Pietro-Luciano Buono, PhD

**Associate Professor, Mathematics, Faculty of Science at University of Ontario Institute of Technology**
Oshawa, ON, CA

Using symmetry and dynamics to analyze mathematical models of complex ecological systems and micro-devices networks

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## Description

Complex spatio-temporal or space-time phenomena often generate intricate and surprising patterns observed in ecological settings such as flocks of birds or schools of fish. On a larger scale, human disturbances can lead to fragmented habitats that can disturb the movement patterns of some species such as the threatened woodland caribou. Conversely, spatio-temporal patterns can be also leveraged to improve the performance of large coupled systems of devices, such as lasers and gyroscopes.

An Associate Professor of Mathematics in the Faculty of Science, Pietro-Luciano Buono, PhD, focuses his research on the development of innovative mathematical tools to build and analyze mathematical models of complex spatio-temporal phenomena, mostly via the interplay of dynamical systems and symmetry methods. Passionate about demonstrating the impact of mathematics in science and technology, he has teamed up with mathematicians, biologists and engineers to bring his expertise to the forefront of current trends in mathematical modelling across several disciplines.

Notably, his most recent collaborations aim to develop and apply mathematical approaches to the challenges of predicting animal movement and distribution. A better scientific understanding of these patterns will help optimize the management of boreal forest ecosystems essential to the economy of Canadaâ€™s northern regions while mitigating the impact of human activity on caribou populations.

Inspired by the principles and possibilities of blending mathematics and science, Dr. Buono earned his both his Bachelor of Science and Master of Science in mathÃ©matiques from the UniversitÃ© de MontrÃ©al in MontrÃ©al, QuÃ©bec, and received his Doctorate in Mathematics from the University of Houston, in Houston, Texas. He returned to Canada as a Canadian Mathematical Society Instructor at the University of Ottawa, then spent 18 months as a post-doctoral fellow at the University of Warwick and Imperial College London (UK), before receiving a two-year NSERC post-doctoral fellowship at the Centre de recherches mathÃ©matiques of the UniversitÃ© de MontrÃ©al.

Dr. Buono joined UOIT as an Assistant Professor in 2004, and was appointed to his current role in 2009. He has been instrumental in the development and growth of graduate programs in Modelling and Computational Science. Dr. Buono is an Adjunct Professor in the Department of Mathematics and Statistics at Queenâ€™s University in Kingston, Ontario and UniversitÃ© Laval in QuÃ©bec.

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## Industry Expertise

Education/Learning, Research

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## Topics

Bifurcation Theory, Ordinary Differential Equations, Delay-Differential Equations, Hamiltonian Equations, Mathematical Biology, Cells and Networks, Symmetric Dynamical Systems, Ecology - Animal Movement and Space Use, Animal Gaits, N-Body Problem, Laser Dynamics

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## Affiliations

Canadian Applied and Industrial Mathematics Society , Society for Industrial and Applied Mathematics

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## Past Talks

**Synchronization and Dynamics in Symmetric Networks of Dï¬€erential Equations: with Applications to Sensing and Power Devices**
Departmental Colloquium, Department of Mathematics and Statistics

**Dynamique du mouvement animal: isolÃ© ou en groupe, une seule approche mathÃ©matique suï¬ƒt!**
Midis des sciences naturelles. DÃ©partement de biologie, chimie et gÃ©ographie, UniversitÃ© du QuÃ©bec Ã  Rimouski

**Patterns in Collective Motion and Space Use of Animal Populations: A Mechanistic Approach**
Joint Mathematical Meetings

**Stability Analysis and Bifurcations of the Hip-Hop Orbit and Beyond**
Joint Mathematical Meetings

**Stability Analysis and Bifurcations of the Hip-Hop Orbit and Beyond**
Banff International Research Station Spectral Analysis, Stability and Bifurcation in Modern Nonlinear Physical Systems

**Bifurcation in Symmetric Delay Coupled Ring of Lasers**
International Conference on Theory and Application in Nonlinear Dynamics (ICAND) 2012

**Robust Heteroclinic Cycles in Delay Differential Equations**
9th American Institute of Mathematical Sciences (AIMS) Conference on Dynamical Systems, Differential Equations and Applications

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## Education

**University of Houston**
PhD Mathematics

**UniversitÃ© de MontrÃ©al**
MSc MathÃ©matiques

**UniversitÃ© de MontrÃ©al**
BSc MathÃ©matiques

## Accomplishments

**Adjunct Professor, Department of Mathematics and Statistics, Queen's University**
Dr. Buono has co-supervised two MSc students and one PhD student, and serves on several graduate examining committees at Queen's University.

**NSERC Post-doctoral Fellowship, Centre de recherches mathématiques, Université de Montréal**
During this two-year post-doctoral fellowship. Dr. Buono collaborated with researchers in Canada and the U.S. on delay-differential equations.

**Editorial Board, Accromath**
Appointed to the editorial board of this Québec journal for the popularization of mathematics.

**Board of Directors, Canadian Applied and Industrial Mathematics Society**
In this role, Dr. Buono has been appointed Communications Officer of the Executive Committee to 2019.

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