Graduate Courses

Computer Science

Course Code	Course Title	Course Description
CS 860	**Introduction to Kolmogorov complexity and its applications**	Possible topics are: plain Kolmogorov complexity, randomness, prefix Kolmogorov complexity, incompressibility method, information distance, applications in various fields ranging from average-case analysis of algorithms to bioinformatics and from document comparison to google search. We will not be able to cover the complete textbook, rather we will focus more on recent developments and especially the recent exciting applications of Kolmogorov complexity.
CS 764	**Computational Complexity**	To give the student further exposure to the classification of problems based on their computational requirements, and to mathematical tools designed to explore the structural consequences of such classifications. Students are expected to have basic knowledge of complexity theory (P, NP, NP-completeness).

Environment and Resource Studies

Course Code	Course Title	Course Description
ERS 701	**Complexity and Sustainability in Social-Ecological Systems**	ERS 701 is intended to help its participants establish a reasonable working base from which to explore different fields of interest within environment and resource studies. The course focuses on the theme of creating and maintaining a sustainable society in a world of complex socio-ecological systems and interactions.
ERS 680	**Implications of a Sustainable Society for Environment and Resource Studies**	ERS 680 examines why sustainability and complex systems thinking have arisen as a critique of and alternative to prevailing ideas, institutions and behaviour, what their essential foundations are, what different forms a sustainable

		society might take and what main considerations guide development of appropriate strategies for response. The course also addresses central implementation considerations, especially respect for complexity and uncertainty, understanding of the main theories of change and appreciation of the range of possible applications. It looks carefully at actions that can be taken to help meet essential requirements for sustainability in campaigns for positive change locally and globally, with attention to the problems to be faced and the barriers to be overcome as well as the opportunities available.
ERS 475 & ERS 675	**Biosphere Reserves as Social-Ecological Systems**	ERS 475/675 will look at Parry Sound and the Georgian Bay Biosphere Reserve as a set of social-ecological systems. With over 500 UNESCO biosphere reserves in the world and 16 in Canada, these sites provide an ideal setting to learn about sustainable community development, adaptive resource management, and social and ecological resilience. The main objective is to link practical experience “on the ground” with some of the theoretical concepts related to sustainability and complex systems. Case studies for this include: (1) the historic fisheries collapse, (2) the shift to sustainable forestry, and (3) reporting on ecosystem health.