Time	Column1	Workshop on Computational/Mathematical Finance
		Wed Feb.25, 2015
		Killarney Room - 210 University Centre
830-9am		***Registration and Welcome***
9-920am		***Greetings*** ***Prof. Gary Glavin, Associate Vice President (Research);*** ***Prof. Stefi Baum, Dean, Faculty of Science;*** ***Prof. Gady Jacoby, Associate Dean (Research) Asper School of Business*** ***Prof. Peter Graham, Computer Science***

920-950am		***Keynote presentation:*** ***Graeme Hay*** *Computational Finance in the Pension Context* Learn how investment managers are using computations to solve a billion dollar problem - delivering on the pension promise to Manitoba's teachers. Graeme Hay, Senior Manager, Strategy & Research, for the Teachers' Retirement Allowances Fund (TRAF) will provide examples of how computations are being used by a top 30 pension plan to enhance returns, while minimizing risk on a $5.8 billion portfolio providing retirement security to thousands of Manitobans. **Bio:** Graeme Hay joined the Teachers' Retirement Allowances Fund (TRAF) in 2013 and is currently the Senior Manager, Strategy & Research. Graeme is responsible for evolving the plan's overall investment strategy and investment policy framework. Graeme is also the leader of TRAF's public and fixed income program representing approximately $3.7 billion in assets. Prior to TRAF, he was a member of the investment team of Wellington West Asset Management, the internal portfolio management unit of one of Canada's largest independent brokerages. In this role, he carried out fundamental research for the firm's equity portfolios and participated in asset allocation decisions for the firm's multi-asset class mutual funds. He also led the firm's research effort on external investment managers employed across the firm. He began his investment career as a senior analyst in the asset-liability management unit of Great-West Life where he was involved in managing risk for the company's pension annuity line of business. Graeme is a Certified Management Accountant (CMA), having earned the Robert Syme Memorial Silver Medal and is a Chartered Financial Analyst (CFA) Charterholder. He is currently President of the CFA Society of Winnipeg and is the Chair of the Manitoba Regional Council of the Pension Investment Association of Canada (PIAC).
950-11am		***Computational/Mathematical Finance Research at University of Manitoba***

	950am	***Ruppa K. Thulasiram**, Computer Science, University of Manitoba* *Financial Analytics go Cloudy* Cloud computing is a resource platform that enables service of hardware/software resources (e.g., storage, network, server, application software) in a managed and scalable (elastic) fashion from a shared pool of configurable resources. Cloud has been successfully providing services to various businesses and individuals alike at various scales such as emails, payroll, website hosting to name a few. Current software services on Cloud do not provide financial analytics as a service on financial instruments traded in the market. This is mainly due to the fact that pricing of instruments such as financial options requires sophisticated algorithms in addition to deeper understanding of the mathematics behind the models. Option is one sector of derivatives market where many such financial products traded. The objective of this research is to study the feasibility of Financial Analytics as a Service (FAaaS) on Cloud. To study this we have been (1) building a Cloud computing environment in the Grid/Cloud Computing Lab in Computer Science (2) design and implement pricing algorithms based on ideas inspired from mathematical, engineering and evolutionary computing approaches to price financial derivatives such as financial options and (3) to integrate these two objectives and build an interface to interact with clients. Our goal through this FAaaS on Cloud is to provide investors scientifically derived results for them to make informed decision on investing in financial options.
	10am	***Shaun H.Lui**, Mathematics, Univeristy of Manitoba* *Numerical solution of fractional partial differential equations*, Fractional partial differential equations (PDEs) model non-local diffusion and have applications to all areas of science and engineering, including mathematical finance. This talk gives a brief overview of fractional PDEs and some numerical methods to solve such equations.
	1015am	***Xikui Wang, Statistics, University of Manitoba*** *Dynamic risk measures* Using the model of Markov decision processes, we discuss a new way of defining dynamic risk measures and illustrate their properties. This is joint work with You Liang

	1030am	**Parimala Thulasiraman, Computer Scinece, Universit of Manitoba** *Bio-Inspired algorithms and High Performance Computing in Finance* *Real world applications such as biological networks, social networks, finance applications, and medical imaging are/can be modelled as graphs that are irregular in nature. They exhibit unpredictable program flow and data access patterns at runtime. The pattern on data distribution is also non-uniform and sparse. The algorithms for these applications are usually asynchronous. One of the important problems considered in these applications is that of clustering (i.e. grouping a collection of objects such that objects in the same group are more similar to each other than those in the other groups). Clustering, however, is an NP-Hard problem and is usually solved using heuristic methods.* *In finance, clustering has been used in financial services to segment markets and provide better analysis of time series data. If has been shown that the performance of the problem could be improved through swarm intelligence heuristics inspired by nature. In this presentation, I consider one approach inspired by ants, called the ant brooding algorithm. Ant algorithms are ideal for many dynamic and real time problems.* *Since the problem is computationally intensive and irregular, it is very challenging to develop efficient parallel algorithms. I will briefly introduce some ideas on developing a scalable ant brooding algorithm on multi-core architectures.*
	1045am	***Sergio Camoringa Applied Computing, Univeristy of Winnipeg*** Complex Adaptive Systems Complex adaptive systems (CAS) are briefly overviewed. CAS ubiquity in nature is shown. Techniques and fundamental concepts utilized in the field are discussed, then the CAS applicability to finance and economics is highlighted, finalizing with the overarching goals of the field.
11-1145am		***Presentations by industry representatives***
	11am	***Iman Yahyaie, MITACS*** Opportunities for Collaboration with Industries.

	1115am	***Bhanu Sharma, Computer Science, University of Manitoba*** *Optimizing Business Process of Collateral Management System using SQL* *Dodd-Frank regulations require all derivative contracts to be collateralized to eliminate the counter-party risk. Most of the financial institutions maintain a pool of eligible collateral and the objective is to find a security to pledge that adheres to a Collateral Service Agreement (CSA). In other words the terms of CSA dictate which security could be pledged. Finding this security from a pool of thousands of securities translates to finding an optimized solution for a multi-variant function. The key highlights of this study are first, use a pool of around 10000 securities comprising of government and cooperate bonds, coupons and residuals. Second, formulate different sample CSA's each with different specifications and haircuts. Third, find the most eligible security based on the terms of CSA.*
	1130am	***Sameer Singh,*** *Manitoba Hydro and Computer Science, University of Manitoba* *Pricing Transmission Rights in Electricity Market using Financial Option Theory* Ever wondered what is common between ants and hedging? Financial risk management is high priority for participants in wholesale deregulated electricity markets due to substantial price and volume risks. Due to high complexity of a wholesale electricity market, prices can exhibit high volatility at times of peak demand and supply shortages. Transmission Rights (TRs) are designed to provide financial hedge for markets participants in a deregulated electricity market. Ant Colony Optimization (ACO) is a nature inspired meta-heuristic algorithm, based on forging behaviour of real ants. This work involves using ACO to compute future payouts from Transmission Rights.
12 – 1 pm		***Lunch break***
1-145pm		***More presentations from Faculty Members***

	1pm	***Yuvraj Gajpal*** *Management Science, Asper School of Business, Univ. Manitoba* *Polynomial-time heuristic for finance-based scheduling of construction project* *co-author: Ashraf Elazouni* Typically, construction contractors operate under cash-constrained operating conditions. The lag between the time contractors spend money to accomplish work on site and the time payments are actually made by clients, which partially compensate contractors for the accomplished work, constantly creates finance deficit. Contractors often supplement finance deficit using external fund procured through establishing credit-line bank accounts which typically allow contractors to withdraw cash up to specified credit limits. This makes the task of project scheduling considering the constraint of specified finance very effective for financial and operational planning. This scheduling concept and technique is referred to as finance-based scheduling. This paper proposes a polynomial-time heuristic to devise finance-based schedules of multiple projects within contractor portfolio. The proposed heuristic introduces a major enhancement of an existing heuristic in the literature which substantially diminishes the computation time. The results, in terms of the project completion time, of the proposed heuristic were compared with the exact solutions of the integer programming technique. In addition, the scalability of the proposed heuristic in terms of the number and size of the projects was evaluated.
	115pm	***C.R. Bector****, Management Science, Asper School of Business, Univ. Manitoba* *co-author Raj Appadoo* *EXTENDED SIMPLEX METHOD FOR LINEAR AND LINEAR FRACTIONAL PROGRAMS* The paper deals with linear programming (LP) and linear fractional programming (LFP) problems in which the primal initial basic solution is neither feasible nor optimal. To solve such problems we suggest extension of simplex method. The approach presented also works, as a special case both for LP and LFP, when the initial basic feasible solution is infeasible but optimal, and thus is a possible candidate to compete with the dual simplex method.

	130pm	***Ji Zhou,*** *Finance, Asper Scholl of Business, Univ. of Manitoba* *co-author: Alex Paseka* *Unconditional Tests of Linear Asset Pricing Models with Time-Varying Betas* Lewellen and Nagel (2006) propose that, in conditional affine factor models, the estimated risk prices should satisfy certain unconditional constraints. The estimated unconditional slope associated with the risk factor should equal the average risk premium on that factor in the unscaled model. The estimated slope associated with the product of risk factor and instrument should be equal to the second moment of the factor risk premium with instrument. We test this proposition on two different types of conditional factor model and the results show that the proposition only applies to the conditional models with time-varying betas. Also, from the functional relationship between conditional and unconditional betas, we identify an unconditional constraint on unconditional betas for time-varying beta models and develop a testing procedure to incorporate this unconditional constraint. The results show that imposing this unconditional constraint changes estimates of unconditional betas and risk prices significantly.
145-2pm		*Based on the presentations, brief the participants to form 4 or more groups for break out sessions identifying possible sub topics for discussions*
2-3pm		***Breakout Sessions***
3-315pm		***Break***
315-345pm		*Summary presentation by breakout session group representatives and a final presentation by the organizer on overall outcome and plans for further activities.*
345-4 PM		*Further discussions and Closing of the workshop.*