

CanQueue 2017 University of Windsor

Room B04 Odette Building (i.e. lower level)

Friday (August 18, 2017):

11:00- 11:30 Yang Song (Carleton)

11:30-12 Barb Margolius (Cleveland State)

12:00-1:00 lunch

1:00-1:30 Ping Zhong (Waterloo)

2:00- 2:30 Ding Chen (Waterloo)

2:30-3:00 Armann Ingolfsson (Alberta)

3:00-3:15 Break

3:15 -3:45 Ke Zhou (Carleton)

3:45-4:15 Walid Abdul-Kader/Hani Zayat (Windsor)

4:15- 4:30 Discussion of CORS queueing SIG

6:45 Supper

Saturday(August 19, 2017)

9:00-9:30 Ehssan Ghashim (Carleton)

9:30-10:00 Qi Ming He (Waterloo)

10:00-10:30 Rasha Kashef (Ivey)

10:30-10:45 break

10:45-11:15 Fengtian Gu (Windsor)

11:15-11:45 Vincent Maccio (McMaster)

11:45-12:50 Lunch

12:50-1:15 Minjian Yuan (Windsor)

1:15-1:40 Liza Chetina (Windsor)

1:40-2:05 Robert Aidoo (Windsor)

Titles and Abstracts are on the following pages.

Yang Song, (Carleton Univ/Nanjing Univ. of Aeronautics and Astronautics), postdoc, supper Yes
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Title: Asymptotic Behavior of the Absorption Probability in a Random Walk in the Quarter Plane --
Revisit to the Voter Model

Abstract: In this talk, we present a spatially homogeneous random walk in the quarter plane which corresponds to the voter model. Given that a particle starting from any arbitrary point in the interior of the quarter plane, we are interested in the hitting time about the particle eventually reaches the horizontal or vertical boundary. This problem has been considered by Kurkova and Raschel (2013). In their work, an analytic method is developed to study the generating functions with an additional parameter concerning the time variable, and the integral representation of the absorption probability is finally obtained. Motivated by this, here we propose to characterize the asymptotic behavior of the absorption probability by Kernel method. This work can also be seen as an extension of Kernel method since it is the first time to handle a functional equation of the trivariate generating functions

Barbara Margolius.(Cleveland State U), Supper Yes.

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Title: The ergodic random walk in the quarter plane with periodic transition rates is asymptotically geometric in space and periodic in time

Abstract: Many processes vary periodically with time. Some examples include: the level of water in the Great Lakes, the amount of a pollutant in the air, the volume of calls to a call center, emergency service demands, the number of airplanes arriving and departing from an airport, and many, many others. In this talk, we explore the asymptotic behavior of several processes with time-varying periodic transition rates. In particular, we consider the random walk in the plane, and some quasi-birth and death processes. We show that under certain conditions, the distribution is asymptotically geometric (in the distance from the origin) and provide numerical examples (and movies!).

Ping Zhong (U of Waterloo) postdoc, supper Yes.

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Title: Estimates for compression norms and additivity violation in quantum information.

Abstract: Estimates for compression norms and additivity violation in quantum information
I will describe some basic results in free probability theory (a highly noncommutative probability theory) and applications to quantum information theory. As an example, I will discuss an estimation of certain operator norm (called (t)-norm) using techniques in free probability and its application to the additivity violations of the minimum output entropy for random quantum channels. The talk is based on joint work with B. Collins and M. Fukuda.

Ding Chen (U Waterloo), student, supper Yes
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Title: Spare parts demand forecasting model of repairable queuing system based on gray birth and death process

Abstract: During the life cycle, the failure rate and repairable rate of repairable parts shows uncertain characteristics. The birth and death process based on the determined failure rate and repair rate may not meet the demand forecasting of spare parts. The traditional repairable spare parts demand forecast model ignores the case of queuing maintenance, which is inconsistent with engineering practice. By using gray numbers to represent the failure rate and repair rate of repairable parts, the gray state transition matrix is constructed. A spare parts demand forecasting model of repairable queuing system based on gray birth and death process was raised. The memoryless and existence conditions of steady solution of the process based on gray birth and death are studied. The characteristics of failure-repair ratio, repair worker numbers, spare parts quantity and guarantee rates were discussed. To some extent, the spare parts demand law with the uncertain information of the failure rate and the repair rate is revealed. The practical case study verifies the validity and practicability of the model.

Armann Ingolfsson (U Alberta), faculty, supper Yes
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Title: A Delay-Differential Equation Model of a Service System with State-Dependent Service Rates and Return Probabilities

Co-authors: Eman Almehdawe, Monica Tran

Abstract: We investigate a fluid model of a service system, in which the rate of service completion depends on the current system occupancy, and the proportion of customers that require rework after a delay also depends on the system occupancy at the instant when the customer completed service. We use simulation and the numerical solution of ordinary and delay differential equations to study the transient and equilibrium behaviour of the system.

Ke Zhou (Carleton Univ/ Univ. of International Business and Economics), visiting scholar, supper Yes
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Title: Scaling limit of local time of the near-critical nearest neighbor random walk

Abstract: Consider the near-critical nearest neighbor random walk, Lamperti proved the Donsker-type invariance principle that a sequence of these random walks converges weakly to a diffusion by proper scaling in the 1960s. Motivated by this result, we study the scaling limit of the local times. Under certain conditions, we prove that the local times converge to Feller's diffusion by corresponding scaling. Our proof is based on the intrinsic branching structure of the random walk and the convergence of the time-inhomogeneous branching processes.

Walid Abdul-Kader (U of Windsor), faculty, supper ?

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Title: Cross-Border Delays Modeling and Evaluation,

Authors: Hani Zayat, Farshad Jarrahi and Walid Abdul-Kader

(Mechanical, Automotive and Materials Engineering, Faculty of Engineering, U. of Windsor)

Abstract This work highlights the dual-phase queueing system and considers the varying congestion rates in an aim to recommend methods to reduce waiting times and system throughput for commercial trucks. The desire is to improve system performance of commercial traffic at border crossings, without incurring further costs and without imposing infrastructure changes. The long queueing times may cause traffic delays and thus economic losses and high emissions of pollutants. A discrete-event-simulation model is built to study wait times preceding each of the two phases. Arrival rate is Poisson, with a variable mean that changes between different time intervals throughout the day (24-hours period). Therefore, the arrival rate follows Non-Stationary Poisson Process (NSPP). Transient demand peaks of congestion would be simulated instead of considering a steady state flow of the journey of the trucks or any traffic vehicle under study (Kaczynski, 2012). This can be achieved by slicing the day or week into small intervals of time across the whole period under analysis. The use of transient queueing analysis will enable the simulation model to mimic the actual process and thus would portray the system behavior of congestion under study. The model will consider different service times while trucks begin service at both phases, in as much as the number of booths allocated to different truck types.

Ehssan Ghashim, (Carleton Univ.) student, supper Yes

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Title: JSQ with incomplete information /Bayesian Approach

Abstract:

Join the Shortest Queue (JSQ) is a popular routing policy for server farms. However, complete data are not always available. One reason for this is that the performance cost of recording detailed data about every request can be unacceptable in a system that receives millions of requests per day. Another reason is that systems are built using hardware components and software libraries from outside sources. For this problem, a Bayesian approach for queues is to be introduced to estimate the uncertainty of the JSQ parameters. Brief introduction to Bayesian inference and why Bayesian method is good for queues, are to be shown during this talk. Finally, an application on how to apply Bayes to queues and a plan for my current research problem on JSQ with incomplete information are to be presented.

Qi-Ming He, (U of Waterloo) faculty, supper Yes

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Title: Optimal Control of State-Dependent Service Rates in a MAP/M/1 Queue

Abstract: In this paper, we study the optimal control of service rates in a queueing system with a Markovian arrival process (MAP) and exponential service times. The service rate is allowed to be state dependent. The cost function consists of holding cost and operating cost. The goal is to find the optimal service rates that minimize the long-run average total cost. To achieve that, we use the matrix-analytic methods (MAM) together with the sensitivity-based optimization (SBO) theory. We show that the long-run average total cost is monotone in the service rate and the optimal control is a bang-bang control. By utilizing the MAM theory, we propose a recursive algorithm to compute the value function related quantities. An iterative algorithm to efficiently find the optimal policy, which is similar to policy iteration, is proposed based on the SBO theory. Finally, a number of numerical examples are presented to demonstrate the main results and explore the impact of the phase of the MAP on the optimization in the MAP/M/1 queue.

Rasha Kashef (Ivey Business School), faculty, supper Yes
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Title: Simulation and Risk Assessment: Real Time Business Applications

Fengtian Gu (U of Windsor), student, supper Yes
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Fengtian Gu and Walid Abdul-Kader

Mechanical, Automotive and Materials Engineering, U. Of Windsor

Title: Performance improvement of remanufacturing systems operating under N-policy

Abstract: This paper deals with N-Policy M/G/1 queueing remanufacturing system with general server breakdown and start-up time, where the value of return products exponentially deteriorates since received. The server will instantly turn on the system but the system requires a start-up period to prepare for remanufacturing when return products in the queue reach the value of N. Otherwise, the system keeps in turn-off status. During the remanufacturing process, the machines may break down and will return to service immediately after repairing. The procedures that we will use to achieve the target. Firstly, we will derive the expression of system performance measures. Next, a cost function which based on the performance measures will be developed. The optimal value of N should be found to minimize the cost function. Finally, we will use the numerical method to validate it and make a sensitive analysis.

Vincent Maccio, (McMaster U) student, Supper Yes
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Title: On Slowdown Variance as a Measure of Fairness

Abstract: When considering fairness one must ask two fundamental questions. Firstly, what does it mean to be fair? And secondly, how does one measure that fairness? Different authors have offered different notions and metrics to address these questions. We provide arguments identifying where past metrics fall short, and offer our own metric to address these issues. That is, we propose using a system's slowdown variance as a measure for its fairness.

Minjian Yuan (U of Windsor), student, supper Yes
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Title: Strategies for a Bus Queueing Model

Abstract: Two strategies for a bus queueing model are compared. One strategy has the customer wait in line for consecutive buses until accepted. Another strategy takes a bus in the opposite direction where it may be easier to board the bus to go forward.

Liza Chetina (U of Windsor), student, supper Yes
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Title: Square roots of 2x2 Markov Transition Matrices

Abstract: 2x2 Markov transition matrices are examined geometrically, and geometric conditions are found for the existence of 0,1,2 square root matrices that are still transition matrices.

Robert Aidoo (U of Windsor), student, supper Yes
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Title: Comments on Queues with Utility Factor equal to 1

Abstract: The general condition for queue stability is that the utility factor be less than 1. Queues when the utility factor is equal to 1 are discussed.

OTHER ATTENDEES

Myron Hlynka (U of Windsor) faculty, supper Yes
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Mehrdad Nozohour Yazdi (McMaster Univ), student,, supper Yes
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Yiqiang Zhao (Carleton Univ) faculty, supper Yes
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Amir Rastpour (UOIT), Supper Yes
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Haoran Wu (U Waterloo) student, supper Yes
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Maryam Mojalal (Western U) supper ?
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Qian Jiang (U Windsor, supper No
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Hani Zayat (U of Windsor), supper ?
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