Healthcare Operations Management

Tues/Thurs 4:00pm- 6:00pm (**EDT**) – January 4 – April 8, 2011

Locations:

Montreal: McGill Bronfman 310
Edmonton: U. Alberta Humanities 2-33

Instructors:

MGMT-721	
Vedat Verter, Ph.D. Professor, Operations Management Desautels Faculty of Management Director, NSERC CREATE Program on Healthcare Operations & Information Management Co-Director, McGill MD-MBA Program **Office:** Bronfman 542 **Phone:** 514 398-4661 **E-mail:** Vedat.Verter@mcgill.ca **Coordinator:** Kristen.oliver@mcgill.ca	**Armann Ingolfsson, Ph.D.** Associate Professor, Operations Management Alberta School of Business Director, Centre for Excellence in Operations Room 4-30K Business Building 780 492 7982 armann.ingolfsson@ualberta.ca

Objectives and Structure of the Course:

The objective of this course is to provide advanced research training to doctoral students in the area of healthcare operations management. To this end, the course is focused on the design and improvement of healthcare processes and facility networks. An initial segment of the course will be devoted to a review of fundamental queueing models and their applications healthcare. The use of empirical methods in healthcare operations management will also be discussed. Building on this methodology framework, the course will then focus on the phases of the healthcare continuum, highlighting the differentiating characteristics of each phase. In particular, the design and improvement of preventive care, ambulance services, emergency care, acute care and chronic care systems will be studied. The lectures will be grounded in the care practices for several medical conditions including stroke and breast cancer.

Evaluation:

Assignments	20%
Midterm Exam	20%
In-class Presentations	20%
Research Paper	40%

Course Material:

The assignments will be a mixture of problems focusing on the methodology that is being covered in the lectures and problems requiring the students to build on the content of the papers assigned for reading. The mid-term exam will be scheduled in mid-March so that the students can focus on their research paper at the end of the term. Each student will be assigned two papers to read in detail and present in class for discussion. Contributing to the students' training in writing a research paper is among the main objectives of the course. The research paper can be a review of the academic and practitioner literature on a well defined domain or a research piece on one of the topics covered in class. The students are encouraged to discuss their interest with the instructors early on in the semester.

Academic Integrity:

It is the student's responsibility to comply with the rules of academic integrity at McGill University. For further information, please consult the Handbook on Student Rights and Responsibilities (2003) at http://www.mcgill.ca/integrity/students/ (see p. 17).

Class Schedule:

The schedule below lists the Thursday classes that will be allocated to lectures through videoconferencing. The PhD students taking the course for credit will have additional Tuesday classes for the in-class presentations and the exam. The Tuesday classes will be scheduled during the second half of the course in consultation with the students.

Date	Topic	Lead Instructor
Jan. 6	*Health care operations management – An overview* **Reading:** Brandeau et al 2004, Chapter 1	Verter
13	*Empirical Research in Health Care Operations* **Reading:** Channouf et al., 2007, Matteson, 2010, Budge et al., 2010, Kc and Terwiesch, 2009	Ingolfsson
20	*Basic Queueing Models* **Reading:** Gans et al., 2003, Larson and Odoni, 1981, Ch. 4	Ingolfsson
27	*Queueing Applications in Healthcare* **Reading:** Green et al. 2006b	Ingolfsson
Feb 3	*No Class*	
10	*Queues with Time-varying Parameters* **Reading:** Green et al., 2007, Zhang et al., 2010a, Yom-Tov and Mandelbaum, 2010	Ingolfsson
17	*Designing Healthcare Facility Networks* **Reading:** Brandeau et al 2004, Chapter 3; Castillo et al. 2009, Baron et al., 2008	Verter
24	*No Class – Spring Break*	
Mar. 3	*Designing Preventive Care Facility Networks* **Reading**: Zhang et al., 2009., Zhang et al. 2010b, Mayo et al. 2008	Verter
10	*Clinical Decision making for Preventive Care* **Reading:** Kucukyazici et al. 2009	Verter
17	*Emergency Medical Services* **Reading:** Erkut et al., 2008, Alanis et al., 2010, Larson and Odoni, 1981, Chapter 5	Ingolfsson
24	*Management of Emergency Departments* **Reading:**, Schull et al. 2001, Schwartz et al. 2005, Schwartz et al. 2006	Verter
31	*Emergency Department Simulation* **Reading:** Brandeau et al 2004, Chapters 4, 8, Sinreich and Marmor 2005	Verter
Apr. 7	*Capacity Planning for Acute Care* **Reading:** Brandeau et al 2004, Chapter 2; Green et al., 2006a. de Vericourt and Jennings, 2010	Ingolfsson

Reading List

Alanis, R., A. Ingolfsson, B. Kolfal. 2010. A Markov chain model for an EMS system with repositioning [working paper].

Baron, O., Berman, O. and Krass D., 2008 Facility Location with Stochastic Demand and Constraints on Waiting Time, *Manufacturing & Service Operations Management*, **10**(3), 484-505.

Budge, S., A. Ingolfsson, D. Zerom. 2010. Empirical analysis of ambulance travel times: The case of Calgary Emergency Medical Services. *Management Science* **56**(4) 716-723

Brandeau, Margaret L., F. Sainfort and W. P. Pierskalla (editors) *Operations Research and Health Care: A Handbook of Methods and Applications*, Kluwer Academic publishers 2004.

Castillo, I., A. Ingolfsson, T. Sim. 2009. Socially optimal location of facilities with fixed servers, stochastic demand, and congestion. *Production and Operations Management* **18**(6) 721-736

Channouf, N., P. L'Ecuyer, A. Ingolfsson, A. N. Avramidis. 2007. The application of forecasting techniques to modeling emergency medical system calls in Calgary, Alberta. *Health Care Management Science* **10** 25-45.

de Vericourt, F., O. Jennings. 2010. Nurse-to-Patient Ratios in Hospital Staffing: A Queueing Perspective. [Working paper]

Erkut, E., A. Ingolfsson, G. Erdoğan. 2008. Ambulance deployment for maximum survival. *Naval Research Logistics* **55** 42-58.

Gans, N., Koole, G., Mandelbaum, A. 2003. Telephone Call Centers: Tutorial, Review, and Research Prospects. *Manufacturing & Service Operations Management* **5** 79-141.

Green L., Sergei Savin, Ben Wang 2006a Managing Patient Service in a Diagnostic Medical Facility, *Operations Research*, 54, 11-25.

Green, L., Soares, J., Giglio, J. F. Green, R. A. 2006b Using Queueing Theory to Increase the Effectiveness of Emergency Department Provider Staffing. *Academic Emergency Med.* **13** 61–68.

Green, L., Kolesar, P. J. Whitt, W. 2007. Coping with Time-Varying Demand When Setting Staffing Requirements for a Service System. *Production and Operations Management*, **16** 13–39

Kc, D. S., Terwiesch, C. 2009. Impact of Workload on Service Time and Patient Safety: An Econometric Analysis of Hospital Operations. *Management Science*, published online before print July 6, 2009.

Kucukyazici, B., V. Verter and M. Blostein 2009. Designing Optimal Therapy for Prevention of Stroke from Atrial Fibrillation, [Working paper]

Larson, R., Odoni. A. (1981) *Urban Operations Research*, Prentice Hall available at http://web.mit.edu/urban_or_book/www/book/

Matteson, D. S., McLean, M. W., Woodard, D. B., Henderson, S. 2010. Forecasting Emergency Medical Service Call Arrival Rates. [Working paper]

Mayo N., Nadeau L., et al. 2008. Bridging the gap: the effectiveness of teaming a stroke coordinator with patient's personal physician on the outcome of stroke, *Age and Ageing*, **37**, 32-38.

Schull, M., Szalai, J.P. et al 2001, Emergency Department Overcrowding Following Systematic Hospital Restructuring: Trends at Twenty Hospitals over Ten Years, *Academic Emergency Medicine*, **8**(11), 1037-1044.

Schwartz et al., 2005, Improving Access to Emergency Services: A System Commitment, [Report to the Minister of Health and Long Term Care]

Schwartz et al. 2006. Improving Access to Emergency Care: Addressing System Issues [Report of the Physician Hospital Care Committee]

Sinreich, David and Marmor, Yariv 2005. Emergency department operations: The basis for developing a simulation tool, *IIE Transactions*, 37:3, 233 -245.

Yom-Tov, G., A. Mandelbaum. 2010. The Erlang-R Queue: Time-Varying QED Queues with Reentrant Customers in Support of Healthcare Staffing. Extended Abstract for the MSOM 2010 Conference.

Zhang, Y., O. Berman, and V. Verter 2009. Incorporating Congestion in Preventive Healthcare Facility Network Design", *European Journal of Operational Research,* Vol. 198 No. 3, pp. 922-935.

Zhang, Y., Puterman, M., Nelson, M., Atkins, D. 2010a. A Simulation Optimization Approach for Long-Term Care Capacity Planning. [Working paper.]

Zhang, Y., Berman, O., Marcotte, P., Verter, V. 2010b. A Bilevel Model for Preventive Healthcare Facility Network Design with Congestion. *IIE Transactions*, Vol 42 No 12 pp. 865-880.