Département de gestion
des opérations et de la logistique

HEC MONTRÉAL

OPERATIONS RESEARCH & DATA SCIENCE PH.D. SCHOLARSHIP

Keywords: mathematical programming, scheduling, assignment, electric buses

PROJECT MOTIVATION & GOALS: Electric buses (EBs) are expected to make up 50% of the global fleet in 2025. This deep transformation forces transit agencies to rethink the way our urban systems are designed and operated. For example, according to a recent Bloomberg NEF report, depending on the model, a state-of-the-art EB has a driving autonomy ranging between 50 and 300km, but 75% of the buses operating in Europe travel (on average) more than 300km per day. Therefore, replacing diesel-powered buses with their electric counterparts leads transit agencies to seek answers to questions such as: should they exploit EBs with large batteries and charge only at end-of-line terminals and central depots or EBs with smaller batteries or capacitors and take advantage of long stops to perform opportunity charging? how many chargers and what type of chargers should they install and where should they locate them? how should they schedule overnight charging operations taking into account charging infrastructure limitations (e.g., number of chargers and maximum grid power), time-dependent energy costs, and parking restrictions? how should they redesign the timetables to take into account the EBs' charging operations without degrading the quality of service or introducing major changes in the commuters' habits? This Ph.D. project aims at designing, implementing, testing, and disseminating optimization methods to help answer some of these questions.

CONTEXT: The project will be carried out in collaboration with Giro (www.giro.ca), the world-leading developer of optimization solutions for public transit. The student will be based at the Inter-University Research Center on Enterprise Networks, Logistics, and Transportation (CIRRELT) or the Group for Research in Decision Aanalysis (GERAD) in the city of Montreal (Canada). The thesis will be supervised by Professors Guy Desaulniers (Polytechnique Montréal) and Jorge E. Mendoza (HEC Montréal). The student will receive a scholarship of 24k CAD/year during the first 4 years (the expected duration of a Ph.D. thesis in Canada). Additional funding may become available via excellence scholarships (e.g., from the schools, the research center, and the provincial or federal governments). The student can choose to enroll in either of the three following Ph.D. programs: industrial engineering or mathematics at Polytechnique Montréal, or business administration at HEC Montréal.

DESIRED QUALIFICATIONS: The ideal applicant possesses strong computer programming skills; has inside knowledge of operations research modeling tools and solution methods including mathematical programming, decomposition techniques (e.g., column generation, Benders), meta and matheuristics; and can communicate comfortably in English. Such applicants may hold a master's degree in operations research, management science, industrial engineering, or applied mathematics.

CONTACT: Interested applicants should email Pr. Guy Desaulniers (guy.desaulniers@polymtl.ca) and Pr. Jorge E. Mendoza (jorge.mendoza@hec.ca) with the following attachments: an up-to-date CV, transcripts for both the undergraduate and the Master's program, and the name and contact information of two professional references. Please use "[GIRO] Ph.D. application" for the subject of the email. The deadline for applications is December 31, 2022.

3000, chemin de la Côte-Sainte-Catherine, Montréal (Québec) Canada H3T 2A7
Téléphone : 514 340-6716 Télécopie : 514 340-6834
www.hec.ca/gol www.hec.ca/chaine

École affiliée à
l'Université de Montréal