Department of Industrial Systems Engineering and Management
Faculty of Engineering

SEMINAR

Title: **Two-Level Telecommunication Network Design Under Vulnerability Aspects**

Speaker: **Dr Alessandro Hill**

Date: **15 January 2018**

Start Time: **03.30 p.m**.

End Time: **05.00 p.m. (including Q&A session)**

Venue: Executive Room Block **E1-07-21**, Faculty of Engineering

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Abstract:

We introduce bi-objective models for ring tree network design with a focus on network vulnerability within telecommunication applications. Our approaches generalize the capacitated ring tree problem (CRTP) which asks for a partially reliable topology that connects customers with different security requirements to a depot node by combined ring and tree graphs. While the CRTP aims at optimizing the edge installation costs, we propose alternative, reliability-oriented objective functions. We study the case of service interruptions due to single-edge failures, and consider the overall number of tree customers and tree edges, the maximal number of subtree customers, and the maximal number of tree hops from rings as additional measures. To model the corresponding novel bi-objective problems, we develop mathematical multicommodity flow formulations and identify relationships between the new objectives. For identifying the Pareto fronts, we apply an epsilon-constraint method based on integer programming. The computational efficiency is increased by employing local search heuristics in order to tighten upper bounds and by valid inequalities to strengthen lower bounds in the subproblems. We report results from a computational study, illustrate solution network topologies and analyze the algorithm performance for hard literature instances.

Biography:

Alessandro Hill studied mathematics and computer science at University of Augsburg (Germany) and Iowa State University (USA). He obtained his Ph.D. in Operations Research from the University of Hamburg (Germany), specializing in network optimization. In research and industry projects he worked for industries such as automotive, railroads, telecommunications, logistics and chemicals with a focus on optimization, simulation and analytics to provide practical decision support for large companies such as Case New Holland, Daimler, CSX Transportation, Telekom Austria, and Kuwait Petroleum Corporation. His main research areas are computational optimization and applications to networks and scheduling, and his work has been published in Journals such as Networks, Discrete Applied Mathematics, and European Journal of Operational Research. Currently, he is a postdoctoral researcher in the Operations Research Group at Universidad Adolfo Ibanez (Chile), conducting research on efficient scheduling techniques for strategic underground mine planning.