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Optimization and its **A**pplications in **L**earning and **I**ndustry (OptALI)

IRSES

Ongoing Deliverable D1.2

Description of Research Seminars

Start date of the Workpackage:	December 2010
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Participants:	UGOE UNIKL DTU UOA UC
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Research Seminar

offered by Antony Phillips (UOA)

in October 2014,

in Copenhagen, Denmark

Subject: Minimal Perturbation Problems in University Course Timetabling

Problem: University course timetabling requires finding a time and a room for every class meeting (or *event*) out of limited university resources.

A minimal perturbation problem (MPP) arises when an existing timetable contains hard constraint violations, or infeasibilities, which need to be resolved. The objective is to resolve these infeasibilities while minimising the disruption or perturbation to the remainder of the timetable. This situation commonly occurs in practical timetabling, for example when there are unexpected changes to course enrolments or available rooms. Our method attempts to resolve each infeasibility in the smallest neighbourhood possible, by utilising the exactness of integer programming. Operating within a neighbourhood of minimal size keeps the computations fast, and does not permit large movements of course events, which cause widespread disruption to timetable structure.

Main Results: We demonstrate the application of this method in several practical timetabling scenarios which arise in both the construction and maintenance phases of timetabling. Examples are based on real data from the University of Auckland.

This method is shown to find high quality solutions within a short timeframe. The broader methodology is versatile, as there are many possibilities for customisation in the way the neighbourhoods are constructed and expanded.

Participants: students and researchers from DTU.

Publication: Phillips, A. E., Walker, C. G., Ehrgott, M., and Ryan, D. M. (2014). Integer programming for minimal perturbation problems in university course timetabling. In Ozcan, E., Burke, E. K., and McCollum, B., editors, *Practice and Theory of Automated Timetabling X*, Lecture Notes in Computer Science, pages 366–379.