

Laboratory classes

Telecommunication Network Design

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It is recommended that you read the **entire** document before attending the first class.

Revision history

- October 5, 2017 — The first version of the document.
- October 13, 2017 — Modified the requirements related to the two optional revision tests at the end of the semester.
- November 17, 2017 (the week of the first class) — Modified the schedule of classes; clarified the grading rules of the final test; office hours.

Goals

The goal of the laboratory classes is to acquire the following skills:

- be able to formulate different network design problems using mathematical programming (with an emphasis placed on linear programming and its derivatives),
- be able to model different network design optimization problems with the aid of CPLEX/OPL,
- be able to find the exact solutions of optimization tasks using standard methods (e.g., simplex, branch-and-bound).

Contact with the instructor

- Instructor: Andrzej Kamisiński, Ph.D.
- E-mail: andrzejk@agh.edu.pl
- Office hours: Monday, 4:00-5:30 PM (please make an appointment via e-mail)

Basic rules and the schedule

- Laboratory classes are organized according to a fixed schedule (see the table below¹).
- According to the AGH UST Bylaw §11.3, presence at the laboratory classes is **obligatory**. Therefore, all students present in the classroom will be asked to sign the attendance list.
- The tests may only be taken during the scheduled classes.
- The students are expected to prepare to each class based on the lecture and other related materials provided on the course webpage.
- The laboratory classes include the practical exercises with the aid of CPLEX/OPL software (6 classes, 90 minutes each), and the final practical test at the end of the semester (90 minutes; students will be allowed to use CPLEX/OPL and their own materials).

¹Should a change be introduced into the schedule, the instructor will notify the students in advance.

- The final test will be assessed by the instructor; the possible results are as follows: 0 pts.; 10 pts.; 18 pts.; 26 pts.; 34 pts.; 42 pts.
- Some classes **start with a short test (quiz)** to verify the level of student’s preparation to the class. The related scope includes the respective content of the lectures and the obligatory research papers. Quizzes are taken during **the first 10 minutes** of the classes and consist of five single-answer tasks. The grading scheme is as follows: zero or one correct answer → 0 pts., two correct answers → 2 pts., three correct answers → 4 pts., four correct answers → 6 pts., five correct answers → 8 pts.
- The main components of the final grade: the results of quizzes (40%), activity during classes (18%), the results of the final test (42%). The grade is determined according to the AGH UST Bylaw §13.1 with the assumption that 100%=100 pts.
- Two optional revision tests are planned at the end of the semester. The revision test 1 can only be taken by students who have obtained at least 21 points from quizzes, while the revision test 2 can only be taken by students who have obtained at least 25% of the total number of points during the semester. In both cases, the result can either be *passed* (grade 3.0) or *failed* (grade 2.0).
- Prior to the first class, students will need to analyze and understand the basic use of CPLEX and the OPL language. The related tutorials are available on the Internet ([the instructor recommends this tutorial](#)).
- Below, you will find the schedule of the laboratory classes, as well as information about points that can be obtained during each class — short quizzes at the beginning of classes (Q), activity during classes (A), and the final test at the end of the semester (T):

Date	Topic	Q	A	T
November 13	Introduction to CPLEX and OPL	0	3	0
November 20	Examples of typical optimization problems modeled with CPLEX/OPL	8	3	0
November 27	Scripting in CPLEX/OPL	8	3	0
December 4	Simple network design problems based on linear programming using CPLEX/OPL	8	3	0
December 18	Network dimensioning and resource allocation based on discrete programming using CPLEX/OPL	8	3	0
January 15	Network optimization based on duality theory	8	3	0
January 22	Final test involving formulation of network design problems and implementation of the corresponding models using CPLEX/OPL	0	0	42