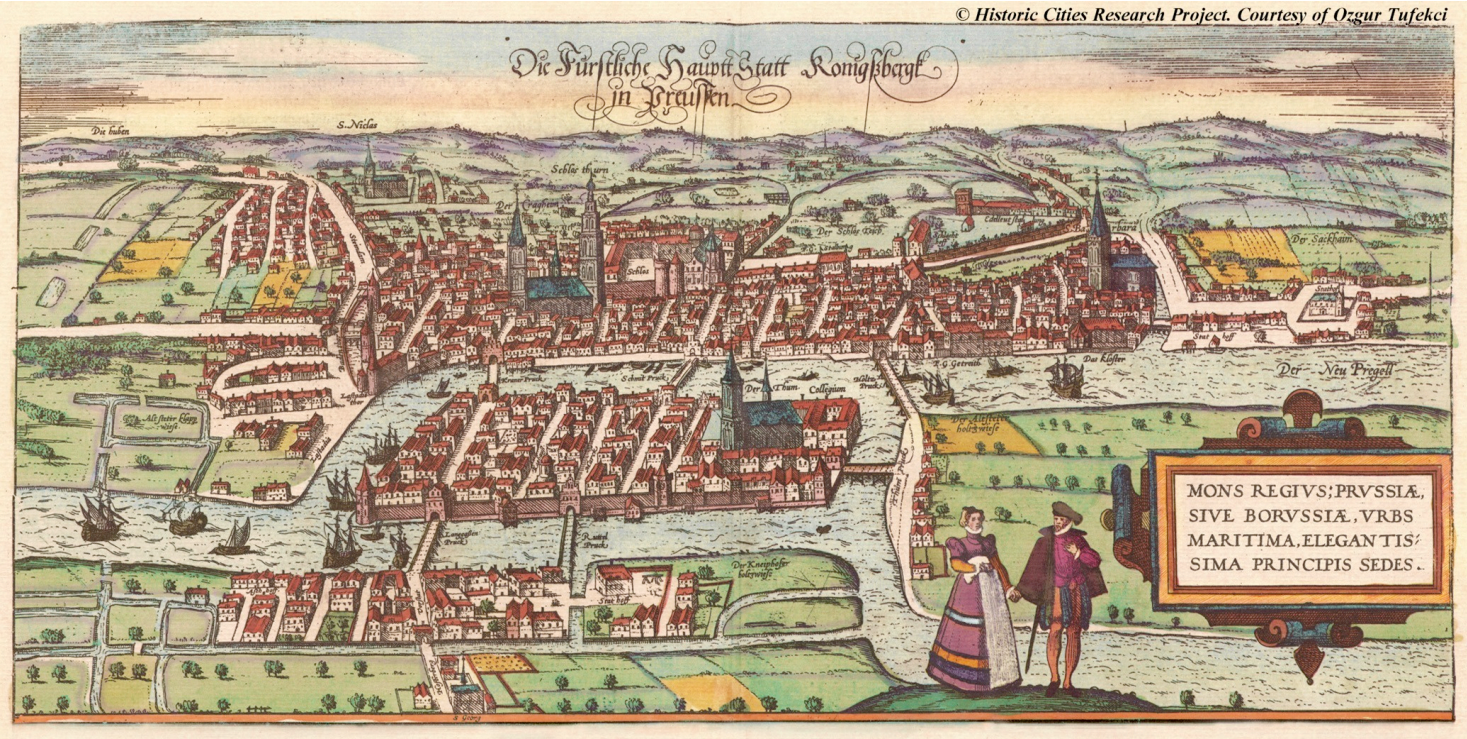
Network Optimization



ROYAL INSTITUTE OF TECHNOLOGY

Winter 2014

Course code: FEL3250

Instructors





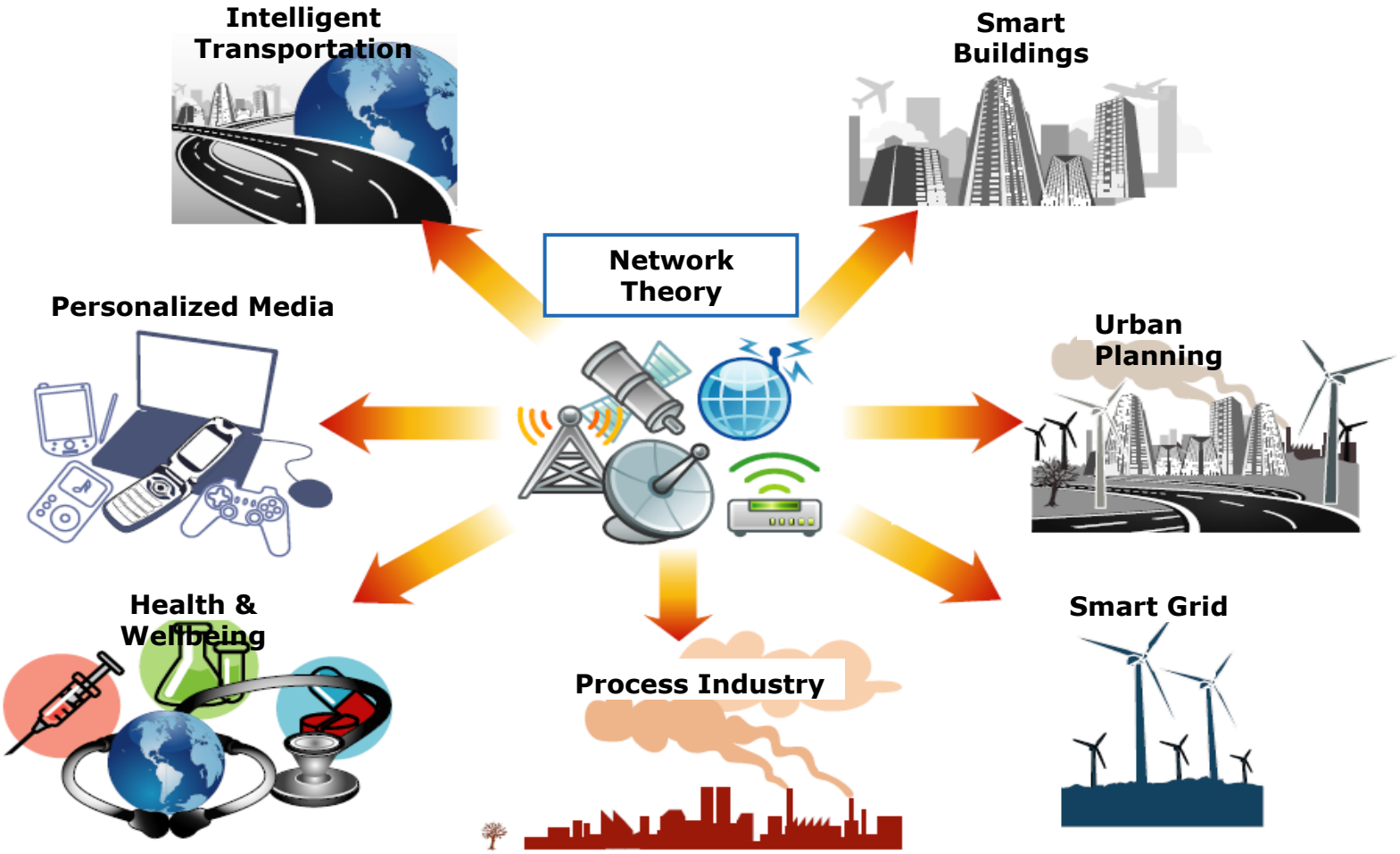

- Carlo Fischione, carlofi@kth.se
- Chathuranga Weeraddana, chatw@kth.se
- Michael Rabbat, michael.rabbat@mcgill.ca
- Themistoklis Charalambous, themisc@kth.se

Offices: Osquldas väg 10, floor 6

Office Times: By appointment

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Networks everywhere



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Course Goals

After finishing the course, the attendant will

- know the basics of linear, non linear, and discrete optimization
- know the essential aspects of network optimization theory
- know how to apply network optimization to practical engineering problems
- develop a research project

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Audience

- PhD students in areas of applied mathematics, communication, control, computer sciences, networking, civil engineering
- The course is self-contained. Simple mathematical maturity, i.e., familiarity with mono-dimensional mathematical analysis is enough

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Grading

- **Pass/Fail**
- To pass the course, at least 70% of the grades have to be achieved
- The course evaluation consists of the following grades
  - Attendance 20%
  - Homework 20%
  - Course project 30%
  - Final exam 30%

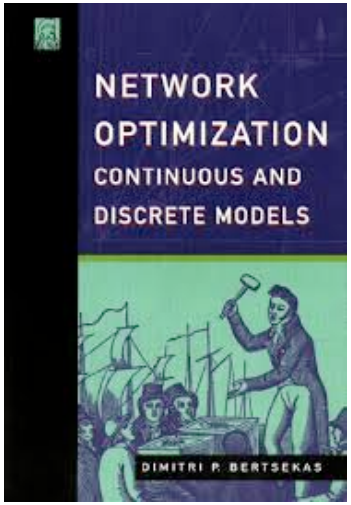
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Course Textbook

D. P. Bertsekas, *Network Optimization Continuous and Discrete Models*, Athena Scientific, Belmont, Mass., USA, 1998.

Available online

http://web.mit.edu/dimitrib/www/netbook_Full_Book.pdf



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Schedule

Lecture (L) / Exercise session (E)	Week	Date	Time	Place	Instructor
L1	4	Thursday 23 Jan	10:00–12:00	L22	Carlo Fischione
E 1	5	Tuesday 28 Jan	10:00–11:00	Q24	Themistoklis Charalambous
L2	5	Thursday 30 Jan	10:00–12:00	E33	Carlo Fischione
E 2	6	Tuesday 04 Feb	10:00–11:00	M37	Themistoklis Charalambous
L3	6	Thursday 06 Feb	10:00–12:00	Q11	Themistoklis Charalambous
E 3	7	Tuesday 11 Feb	10:00–11:00	M37	Themistoklis Charalambous
L4	7	Thursday 13 Feb	10:00–12:00	D42	Chathuranga Weeraddana
E 4	8	Tuesday 18 Feb	10:00–11:00	M37	Chathuranga Weeraddana
L5	8	Thursday 20 Feb	10:00–12:00	M37	Chathuranga Weeraddana
E 5	9	Tuesday 25 Feb	10:00–11:00	Q26	Chathuranga Weeraddana
L6	9	Thursday 27 Feb	10:00–12:00	L21	Michael Rabbat
L7	10	Tuesday 04 Mar	10:00–12:00	Q24	Michael Rabbat

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Course Content

- Introduction to Network Optimization (L1)
- Shortest path problems (L2)
- The Max-Flow problem (L3)
- The Min-Cost Flow problem (L4)
- Auction algorithm for Min-Cost Flow (L5)
- Network flow arguments for bounding mixing times of Markov chains (L6)
- Accelerated dual descent for network flow optimization (L7)

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Today's learning outcome

- What is Network Optimization?
- What are graphs, paths, cycles, flows, arcs?
- What is a Minimum Flow Problem?
- What are the solution algorithms?
- What is the basic optimality condition?