Aalto University
School of Electrical
Engineering

ELEC-E7450
Performance Analysis P (5 cr)
Spring 2023

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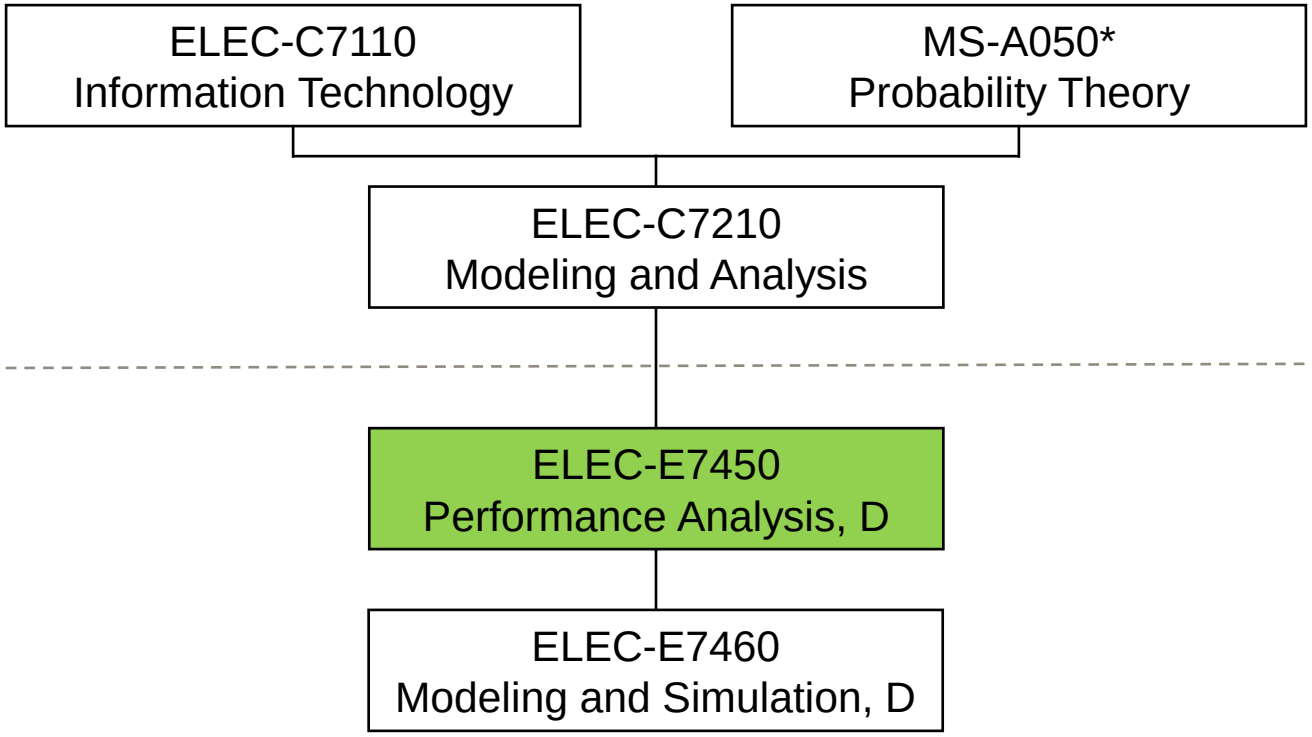
General information

- Objective of the course:
  - *ELEC-E7450 Performance Analysis* covers basic queueing models (such as M/G/1 and queueing networks) used to analyse and optimise the performance of various computer and communication systems.
- Lectures and exercises:
  - *Samuli Aalto*, **samuli.aalto@aalto.fi**
- Course material:
  - lectures and exercises available on *MyCourses*:

https://mycourses.aalto.fi/course/view.php?id=36962

Status


ELEC-C7110
Information Technology
MS-A050*
Probability Theory
ELEC-C7210
Modeling and Analysis
ELEC-E7450
Performance Analysis, D
ELEC-E7460
Modeling and Simulation, D

Learning outcomes

- After taking the course, the student ...
  - Is able to apply Markov processes and regenerative processes to model various computer and communication systems
  - Is able to construct, analyse and optimise stochastic queueing models to evaluate the performance of the system
  - Comprehends selected applications of the performance analysis of modern computer and communication systems

Lectures, exercises, and exam

- Lectures (6 hours/week):
  - on Tuesdays at 9-12 in TUAS room TU5 (starting on 25 Apr)
  - on Thursdays at 9-12 in TUAS room AS3
- Exercises (2 hours/week):
  - on Wednesdays at 16-18 in TUAS room TU5 (starting on 26 Apr)
- Examination (3 hours):
  - on Wednesday, 7 Jun
  - 5 problems, max. 30 points
  - at least one retrial examination (Aug/Sep)
- Course completion:
  - get at least 12 homework points, and
  - pass the examination

More details on the exercises

- Homework exercises:
  - 6 problems per week to be solved before the exercise class
  - available on *MyCourses* about a week before the exercise class
- Grading of problems:
  - no retrieval of solutions
  - instead, you have to be present at the exercise class
  - in the beginning of the exercise class,
    mark the problems you have solved
  - you are allowed to mark
    if you are ready to present and defend your solution
  - 1 homework point per mark

More details on the exercises (cont.)

- Bonus points:
  - 12 homework points = minimum requirement to pass the course
  - 18 homework points = 1 bonus point in the examination
  - 24 homework points = 2 bonus points in the examination
  - 30 homework points = 3 bonus points in the examination
- Bonus points valid until December 2023

Schedule

Week	17	18	19	20	21	22	23
Lectures	1,2	3,4	5,6	7 (Tue)	8,9	10,11	Exam
Exercise classes	1	2	3	4	5	6	

Planned contents

- Week 17: ELEC-C7210 recap
  - basic queueing models, Poisson process, Markov processes, M/M/1
- Week 18: Single server queue M/G/1
  - regenerative processes, analysis, FIFO, PS
- Week 19: Queueing networks
  - tandem queue, open queueing networks, closed queueing networks
- Week 20: Processor sharing networks
  - elastic traffic, fairness concepts
- Week 21: Processor sharing networks (continues)
  - Whittle networks, balanced fairness
- Week 22: Summary and exam demos
- Week 23: Exam