



Aalto University
School of Electrical
Engineering

ELEC-E7450

Performance Analysis P (5 cr)

Spring 2022

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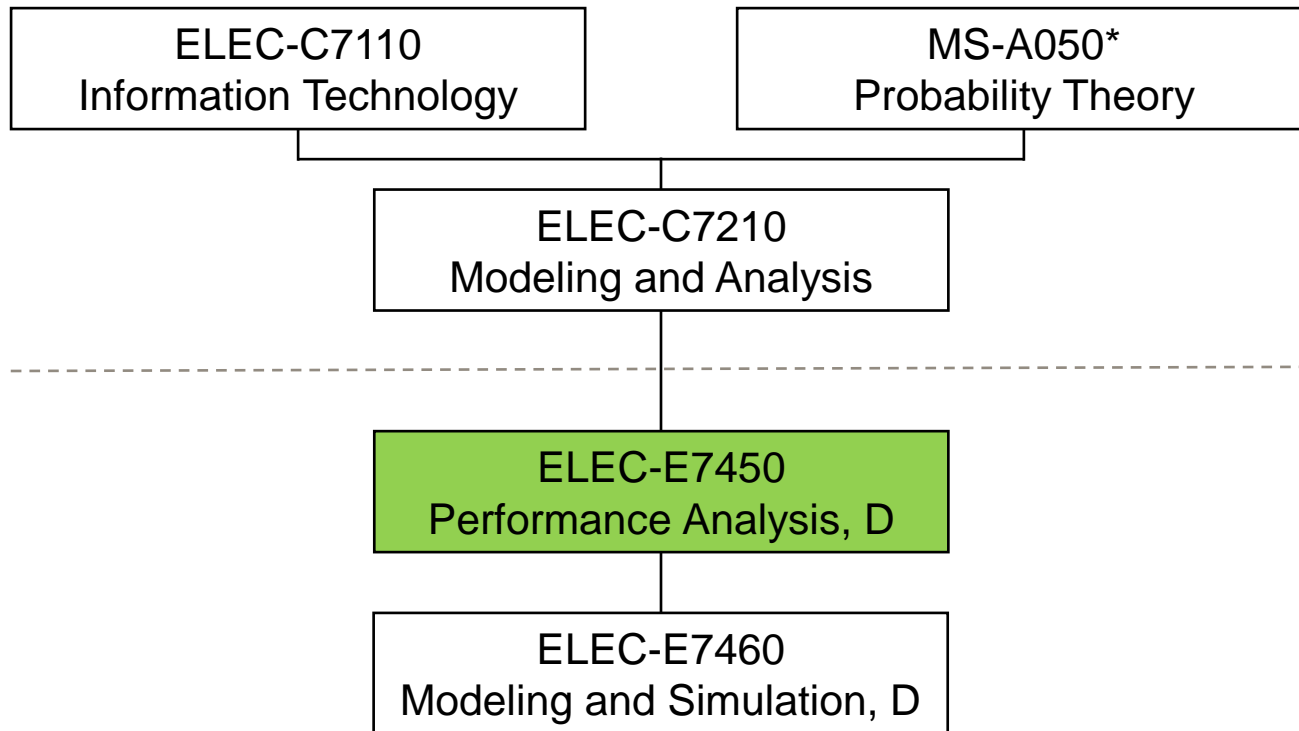
Department of Communications and Networking

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=32134>

Status



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:TU5 (starting on **19 Apr**)
 - on Thursdays at 9-12 in TUAS:AS4
- **Exercises** (2 hours/week):
 - on Wednesdays at 16-18 in OIH:A113 (starting **already** on **20 Apr**)
- **Examination** (3 hours):
 - on Wednesday, **1 Jun**
 - 5 problems, max. 30 points
 - at least one retrieval 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 2022

Schedule

Week	16	17	18	19	20	21	22
Lectures	1,2	3,4	5,6	7,8	9,10	11 (Tue)	Exam
Exercise classes	1	2	3	4	5	6	

Planned contents

- **Week 16: ELEC-C7210 recap**
 - basic queueing models, Poisson process, Markov processes, M/M/1
 - **Week 17: Single server queue M/G/1**
 - regenerative processes, analysis, FIFO, PS
 - **Week 18: Queueing networks**
 - tandem queue, open queueing networks, closed queueing networks
 - **Week 19: Processor sharing networks**
 - elastic traffic, fairness concepts, Whittle networks, balanced fairness
 - **Week 20: Multiserver queueing systems**
 - multiserver queues, parallel queues, optimal control
 - **Week 21: Summary**
 - **Week 22: Exam**
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