



Aalto University  
School of Electrical  
Engineering

# ELEC-E7450

## Performance Analysis P (5 cr)

### Spring 2021

Pasi Lassila

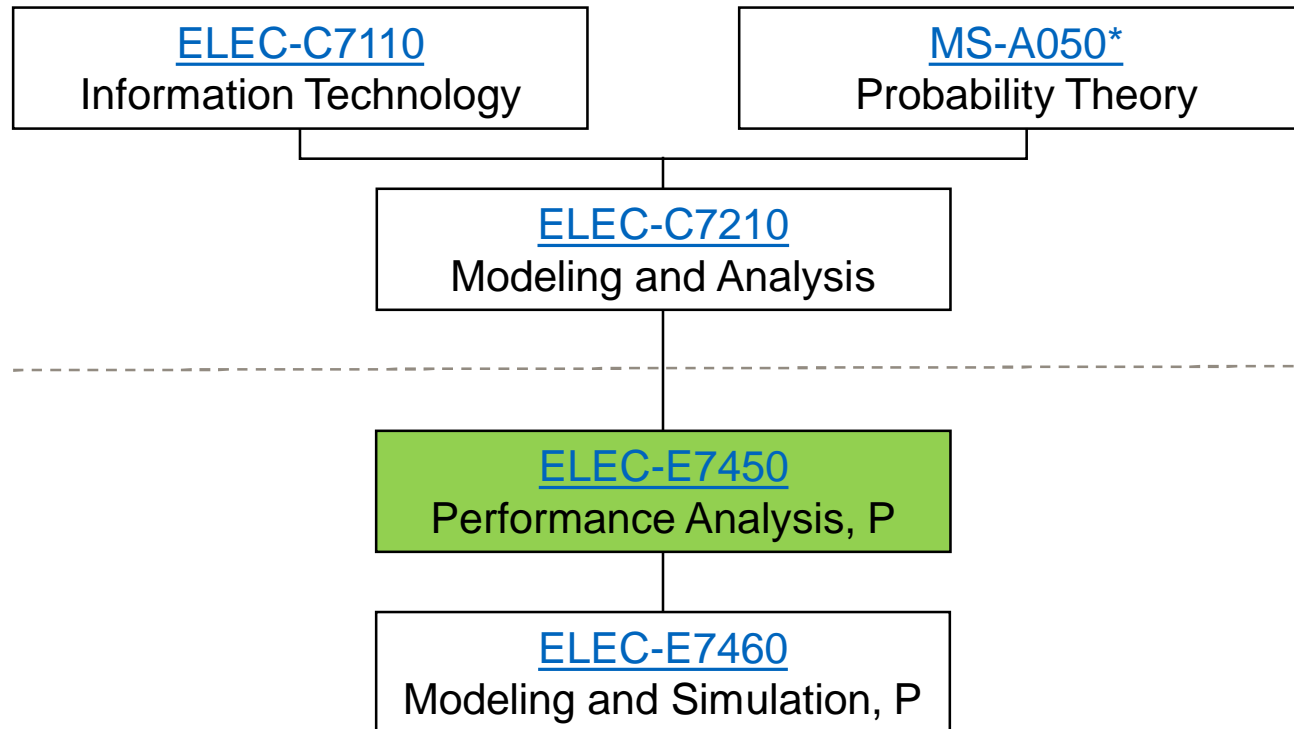
Department of Communications and Networking

# General information

- Objective of the course:
  - *ELEC-E7450 Performance Analysis* covers basic queueing models (such as M/G/1) used to analyse and optimise the performance of various computer and communication systems.
  - It replaces earlier courses *S-38.3141 Teletraffic Theory* and *S-38.3143 Queueing Theory*
- Lectures and exercises:
  - Pasi Lassila, [Pasi.Lassila@aalto.fi](mailto:Pasi.Lassila@aalto.fi)
- Course material:
  - lectures and exercises available on *MyCourses*

<https://mycourses.aalto.fi/course/view.php?id=28568>

# 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

- All lectures and exercise sessions organized remotely using Zoom
  - You can find the schedule in MyCourses home page in Section “Schedule and lecture material”
  - Just click on the link in the schedule and you should be able to join the event through your browser (might require installing a plugin). Note, you can also install Zoom software through Aalto IT.
- **Lectures** (6 hours/week):
  - on Tuesdays at 9:15-12 (starting on **Apr 20**)
  - on Thursdays at 9:15-12
- **Exercises** (2 hours/week):
  - on Wednesdays at 16:15-18 (starting **already** on **Apr 21**)
- **Examination** (3 hours):
  - on Wednesday, **June 2**
  - 5 problems, max. 30 points
  - at least one retrieval examination (Aug/Sep)

# More details on the exercises

- Homework exercises:
  - 6 problems per week
  - All problems are retrieved and graded
  - available on *MyCourses* about a week before the exercise class
- Retrieved problems:
  - Upload your solutions to the *exercise folder in MyCourses* before the beginning of the exercise session
  - Note the possibility to upload ends exactly 16:15 when the exercise session begins
  - Please make sure that your scans are readable so that grading is possible
  - Grading: {0, ½, 1} homework points per problem
  - Total maximum points from exercises: 36

# More details on the exercises (cont.)

- Bonus points:
    - 12 homework points = minimum requirement to pass the course
    - 12 – 14 homework points = 0 bonus points in the examination
    - 15 – 17 homework points = 1 bonus point in the examination
    - 18 – 20 homework points = 2 bonus points in the examination
    - 21 – 23 homework points = 3 bonus points in the examination
    - 24 – 26 homework points = 4 bonus points in the examination
    - 27 – 29 homework points = 5 bonus points in the examination
    - 30 – 36 homework points = 6 bonus points in the examination
  - Bonus points valid until April 2022
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# Course completion

- Get at least 12 homework points, and
- pass the examination
- Final evaluation and grading may still change!



# Schedule

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

# Planned contents

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