Laboratory overview

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18 February, 2020





Laboratories

Aims:

- Become familiar with simulation and optimization approaches
- Apply statistical techniques and heuristic algorithms
- Use simulation-based optimization methods

How:

- Guided exercises associated with lectures (Python)
- Group work to solve a real world problem (Project)

Laboratory organization

LABORATORIES

Date	Торіс	Room	Material
18.02.2020	Overview	TBD	-
	Random number generation, Poisson process		-
25.02.2020	Discrete event simulation	TBD	
	Statistical analysis and bootstrapping	TBD	
03.03.2020	Variance reduction	TBD	
	Introduction to group project	TBD	
10.03.2020	Markov chain Monte Carlo methods	TBD	
17.03.2020	Simulation project	TBD	
24.03.2020	Simulation project	TBD	
31.03.2020	Simulation project	TBD	
07.04.2020	Optimization exercises	TBD	
14.04.2020	~~ Spring break ~~	TBD	
21.04.2020	Optimization exercises	TBD	
28.04.2020	Optimization exercises	TBD	
	Introduction to optimization project	TBD	
05.05.2020	Optimization project	TBD	
12.05.2020	Optimization project	TBD	
19.05.2020	Theoretical quiz	TBD	
	Optimization project	TBD	
26.05.2020	Project presentations	TBD	

Laboratories:

- 7 weeks for simulation
- 6 weeks for optimization

Theoretical quiz:

19 May

• Presentation exam:

- 30 minutes presentation + Q&A
- 26 May

Laboratory materials

- Find on the webpage.
- Material will be uploaded before the class.

Lectures	Laboratories	Readings	Exam						1	
	Optimiza	ation an	d simulatio	n						
	Transport a	Michel Bier and Mobility	laire .aboratory, ENAC							
	8	P	FL							
	The objectives of the course are:									
	Haster the state of the art methods in continuous optimization and simulation; Understand the thererise foundations of the algorithms and methods; Learn statistical techniques for interpreting simulation results; Use simulation for complex optimization problems.									
	Work involves:									
	 Reading t Class hou Class and 									
	SCHEDULE									
	Date 18.02.2020	Introduction - Random nu	Topic to simulation mber generation	Room TBD	Slides					

Evaluation

Presentation of the project

- Both simulation and optimization parts must be presented.
- The evaluation criteria, group and project description will be announced in the third lab on 3 March.
- Everyone must be present on 26 May.

Output: Contract of the second sec

- Written exam date: 19.05.2020
- The written exam accounts for 25% of the final grade.
- It consists of both simulation and optimization questions.
- It includes theoretical questions from the lectures, and is mainly designed to check if each student understands the theory behind the project on which s/he is working.
- Students are not allowed to bring any materials during the exam.
- The exam is in English.
- Solass & group involvement
- Quality of the code, it should:
 - Work properly.
 - Be neat and clearly commented.

Simulation laboratories

• Exercises:

- Random number generation
- Poisson process
- Oiscrete event simulation
- Statistical analysis and bootstrapping
- Solution variance reduction techniques
- **6** Markov Chain Monte Carlo method
- Simulation project:
 - Announced on 3 March (at the end of the third laboratory).

Textbooks for simulation

- Ross (2012). Simulation. Fifth Edition. Academic Press.
- Gelman et al. (2013) Bayesian Data Analysis. CRC Press.

