Enginyeria de Xarxes / Network Engineering | Escola d'Enginyeria – Universitat Pompeu Fabra

Boris Bellalta (boris.bellalta@upf.edu, Office: 55.222)
Costas Michaelides (costas.michaelides@upf.edu, Office: 55.228)

Lectures

Lecture 1 – Introduction, and WIFI networks
Lecture 2 – Stochastic Processes
Seminar 1 – Stochastic Processes
Lecture 3 – Markov chains I – Discrete Time Markov chains
Lecture 4 – Markov chains II – Continuous Time Markov chains
Seminar 2 – Markov chains
Lab 1 – Basic Communication System – Introduction to the simulator
Lecture 5 – Modelling Wi-Fi Channel Access
Lecture 6 – Modeling a network interface I – Definitions, Erlang notation, MMSK queues
Seminar 3 – Admission control WIFI
Lab 2 – Simulation of queueing systems: M/M/1/K, M/D/1/K, D/M/1/K, etc.
Lecture 7 – Modeling a network interface II – MM1 and MM1K systems
Lecture 8 – Modeling end-to-end communication
Seminar 4 – MM1 and MM1K queues, end-to-end communication
Lab 3 – Wi-Fi DCF in saturation conditions
Lab 4 – Wi-Fi DCF in non-saturation conditions
Lecture 9 – Mid-term exam
Lecture 10 – MG1 queues I – General service times, heterogeneous flows
Lecture 11 – MG1 queues II – Multiple flows, traffic differentiation
Seminar 5 – MG1 systems
Lab 5 – Lab Project: Traffic-differentiation in Wi-Fi
Lecture 12 – MG1 queues III – Low-latency region
Lab 6 – Lab Project: Traffic-differentiation in Wi-Fi

Evaluation

Mark 1 = 0.6 · Final Exam + 0.2 · Mid-term Exam + 0.2 · Labs
Mark 2 = 0.7 · Final Exam + 0.1 · Mid-term Exam + 0.2 · Labs
→ if Final Exam >= 4 then Course grade = max (Mark 1, Mark 2); else Course grade = Final Exam
In July, only the final exam can be recovered.

Main References

[Course notes] Boris Bellalta, Simon Oechsner; "Analysis of Packet Queueing in Telecommunication Networks". Last updated in January 2020.

[Book] Bertsekas D., R. Gallager; "Data Networks", Prentice Hall, 1992 (Second Edition).

[Online Book] Gast, Matthew S. *802.11 ac: a survival guide: Wi-Fi at gigabit and beyond*. " O'Reilly Media, 2013.

[Book] Kurose, James F., and Keith W. Ross. *Computer networking: a top-down approach*. Addison Wesley – Any edition is ok.