جامعة الملك عبدالله
للعلوم والتقنية
King Abdullah University of
Science and Technology

Course Syllabus: Information Networks - CS 337

Division	Computer, Electrical and Mathematical Sciences & Engineering
Course Number	CS 337
Course Title	Information Networks
Academic Semester	Fall
Academic Year	2019/2020
Semester Start Date	08/25/2019
Semester End Date	12/10/2019
Class Schedule (Days & Time)	10:30 AM - 12:00 PM | Tue Thu

Instructor(s)

Name	Email	Phone	Office Location	Office Hours
Basem Shihada	basem.shihada@kaust.edu.sa	+966128080332	4252, 1, Al-Khawarizmi (bldg. 1)	10:30 AM - 12:00 AM | Sun Mon

Teaching Assistant(s)

Name	Email
Wiem Abderrahim	wiem.abderrahim@kaust.edu.sa

Course Information

Comprehensive Course Description	Network structure of the Internet and the Web, performance modeling, experimental design, performance measurement, model development, analytic modeling, single queue facility, networks of queues, stochastic systems, deterministic systems, birth-death model analysis, closed network model, bottleneck, interactive networks, M/M/m queues, M/G/1 priority queues, Markovian queuing model, random numbers, discrete event simulation, verification and validation of simulation models, workload characterization and benchmarks.
Course Description from Program Guide	Modeling, experimental design, performance measurement, model development, analytic modeling, single queue facility, networks of queues, stochastic systems, deterministic systems, birth-death model analysis, closed network model, bottleneck, interactive networks, M/M/m queues, M/G/1 priority queues, Markovian queuing model, random numbers, discrete event simulation, verification and validation of simulation models, workload characterization and benchmarks. Also, advanced research papers on using queuing theory for networking systems. The course consists of a final modeling and simulation project on a novel idea that leads to publication
Goals and Objectives	Students will obtain a full knowledge of how to conduct a system performance measurements and translate the results to a system performance modeling. Also, obtain a sense of analytic modeling using queueing models. Students will also obtain a knowledge on how to apply queuing models in complex networking problems. Finally, students will understand the concept of event-based simulations through practical coding and also verification methods.
Required Knowledge	Students must have already obtained a strong knowledge in computer networks, excellent skills in programming e.g., C/C++ or Java, understanding of probabilities and stochastic systems, general background on network simulators, Matlab simulation, and working with Linux systems.

Reference Texts	- Leonard Kleinrock, Queueing Systems, vol. 1: Theory, John Wiley, 1975 - E. Lazowska, J. Zahorjan, G. Graham, K. Sevcik, Quantitative System Performance, Computer System Analysis using Queueing Network Models, Prentice-Hall, [Available Online] - Thomas G. Robertazzi, Computer Networks and Systems, Springer, 2002 - Andrew S. Tanenbaum , Computer Networks, Prentice Hall, 2002 - Selected research papers.
Method of evaluation	**40.00**% - Homework /Assignments **50.00**% - Research Project **10.00**% - Oral presentation
Nature of the assignments	Assignments are of a mix of theory and practical coding in nature. The course will also include a major modeling and simulation project component that requires performing several paper reviews and simulations.
Course Policies	Assignments, including contributions to discussion, submitted by students in the course of this class should be work written by themselves specifically for this class. Students must clearly cite and reference each and every source that was used in their development. Where students use the actual words of a source, they must put those words inside quotation marks.
Additional Information	**Student must obtain the passing grade (70%) in the Homework and the final project to pass the course.**

Tentative Course Schedule

(Time, topic/emphasis & resources)

Week	Lectures	Topic
1	Tue 08/27/2019 Thu 08/29/2019	Introduction to queueing theory concepts
2	Tue 09/03/2019 Thu 09/05/2019	Introduction to system performance evaluation methods
3	Tue 09/10/2019 Thu 09/12/2019	Introduction to system performance measurement methods
4	Tue 09/17/2019 Thu 09/19/2019	Performance modeling
5	Tue 09/24/2019 Thu 09/26/2019	Analytic modeling and stochastic systems
6	Tue 10/01/2019 Thu 10/03/2019	Birth-Death stochastic model
7	Tue 10/08/2019 Thu 10/10/2019	Markovian queuing model
8	Tue 10/15/2019 Thu 10/17/2019	Queuing network model
9	Tue 10/22/2019 Thu 10/24/2019	M/G/1 queuing model analysis
10	Tue 10/29/2019 Thu 10/31/2019	Mid-semester break
11	Tue 11/05/2019 Thu 11/07/2019	Open queuing network model
12	Tue 11/12/2019 Thu 11/14/2019	Closed queuing network model
13	Tue 11/19/2019 Thu 11/21/2019	Application to computer networks
14	Tue 11/26/2019 Thu 11/28/2019	Verification and validation
15	Tue 12/03/2019 Thu 12/05/2019	Event-based simulations
16	Tue 12/10/2019	Exams

Note

The instructor reserves the right to make changes to this syllabus as necessary.