

 <b>Lebanese American University</b>	<b>COE</b>	<b>555/755</b>
School of Engineering	Queuing Theory (Elective)	3 credits
<b>Department of Electrical and Computer Engineering</b>	T 02:00PM-04:50PM	ENG 404
Course syllabus	Dr. Wissam F. Fawaz	Spring 2020

### 1. Course Description and Course Prerequisite

This course introduces simulation and queueing modelling techniques. The following topics relating to simulation and queueing theory are covered: random variables, probability distribution of functions, single queue Markovian systems, semi-Markovian queueing systems, pseudo-random number generation, estimation techniques for analyzing endogenously created data, and validation of a simulation design.

The course prerequisite is: GNE 331 Probability and Statistics.

### 2. Course Objectives

Upon successful completion of this course, students are expected to be able to:

- Gain a mastery of Markovian queueing systems.
- Construct queueing models for engineering problems and solve queueing problems.
- Become familiar with the derivation techniques used to measure system performance.
- Write simulation programs enabling them to solve real life engineering problems.

### 3. Contribution of course to meeting the professional component

Professional Component	Credits
Mathematics and Basic Sciences	2
Engineering Topic	1
General Education	0

### 4. Relationship of course to program outcomes

**SO 1:** An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

### 5. Course Outline

Topics to be covered include:

- Preliminaries (Week 1)
- Discrete random variables (Week 2)
- Continuous random variables (Week 3)
- Birth and death process (Weeks 4 & 5)
- Introduction to queueing systems (Weeks 6 & 7)
- Machine interference problem (Week 8)
- Hypo and Hyper-exponential distributions (Week 9)
- Coxian and Erlang distributions (Weeks 10 & 11)
- Markov chains (Weeks 12 & 13)
- Queueing Networks (Week 14)

### 6. Required tools / software / skills

Good command of the Java language

### 7. Textbook[s]

Chee Hock Ng and Soong Boon-Hee, *Queueing Modelling Fundamentals: with Applications in Communication Networks*, 2<sup>nd</sup> edition, John Wiley & Sons, 2008.

### 8. Additional References

L. Kleinrock, *Queueing Systems, Volume 1: Theory*, Wiley publishers, 1<sup>st</sup> edition, 1975.  
 Robert Cooper, *Introduction to Queueing theory*, North Holland, 2<sup>nd</sup> edition, 1977.  
 Donald Gross and Carl M. Harris, *Fundamentals of Queueing Theory*, Wiley series, third edition, 1998.

**9. Schedule of Exams & Grading Percentage**

Topic Presentations/Projects:	25%
Exam I:	20%
Exam II:	25%
Final:	30%

**10. Course Policies**

Cheating is considered to be a very serious breach of the cheating policy of the faculty and will not be tolerated. Students are expected to submit their own solutions to all homework assignments and programming projects. Solutions must be handed in at the beginning of the class in which they are due. Late assignments will not be accepted.

**11. General Comments**

Instructor: Dr. Wissam FAWAZ email: [wissam.fawaz@iau.edu.lb](mailto:wissam.fawaz@iau.edu.lb)  
 Office: 103, Bassil Bldg, ext: 2414  
 Office Hours: TTh from 11:00 am – 12:30 pm and W from 10:00 am – 12:00 pm  
 Course webpage: [http://www.wissamfawaz.com/queueing\\_theory.htm](http://www.wissamfawaz.com/queueing_theory.htm)

**12. General Rules & Regulations**

- A student can miss no more than the equivalent of 5 weeks of instruction. Students who exceed the allowed number of absences must withdraw from the course; otherwise, the course grade will be recorded as "F".
- Plagiarism: students caught cheating on an exam receive a grade of Zero on the exam in the first cheating attempt and a warning. Students caught cheating for the second time in the same course receive an F grade in the course and a second warning. A grade of zero on an exam resulting from cheating must be counted in the student's course grade. The zero cannot be dropped in computing the final grade in case the instructor has a policy of allowing students to drop their worst exam grade.
- Any student who receives 3 warnings will be suspended.
- **In order to improve the effectiveness of the educational process, all students are expected to submit their course evaluations by the last day of classes. Students who fail to complete the evaluation of ALL registered courses by the set deadline:**
  - will not be able to access their course grades from Banner or Portal until two weeks after the end of the final exams period; and
  - will not be able to request transcripts.

The anonymity of the process and the students will be maintained at all times.

**13. General Rules & Regulations**

Dr. Wissam Fawaz prepared this syllabus in January 2020.