



# Course Specifications

<b>Course Title:</b>	<b><i>Stochastic processes and Queueing theory</i></b>
<b>Course Code:</b>	<b><i>OPER 472</i></b>
<b>Program:</b>	<b><i>Operations research</i></b>
<b>Department:</b>	<b><i>Statistics and Operations research</i></b>
<b>College:</b>	<b><i>Science</i></b>
<b>Institution:</b>	<b><i>King Saud University</i></b>

## A. Course Identification

<b>1. Credit hours:</b>	<b>4 (3+1)</b>
<b>2. Course type</b>	
a.	University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input type="checkbox"/> Elective <input type="checkbox"/>
<b>3. Level/year at which this course is offered:</b>	<b>Level 7 / 4<sup>th</sup> Year</b>
<b>4. Pre-requisites for this course (if any):</b>	<b>OPER 213 + STAT 215</b>
<b>5. Co-requisites for this course (if any):</b>	<b>None</b>

## B. Course Objectives and Learning Outcomes

<b>1. Course Description</b>
<i>Definition of stochastic processes. Finite Markov chains. One step and multi-steps transition probability matrices. Chapman-Kolmogorov equation. State classification. Long run distribution of Markov chains. Continuous-time Markov processes (Birth-and-death processes, Poisson process). Queuing theory and models: Cumulative diagrams of queues. Performance measures. Basic Markovian queuing models (single server queue, multi-server queue, finite capacity queues). Some Non-Markovian queues. Some Non-Markovian queues with bulk arrival and service</i>
<b>2. Course Main Objective</b>
<ul style="list-style-type: none"> <li>• Introduce students to basic stochastic processes tools</li> <li>• Elucidate the power of stochastic processes and their range of applications;</li> <li>• Demonstrate essential stochastic modelling tools including Markov chains and queuing theory</li> </ul>

## C. Course Content

No	List of Topics	Contact Hours
1	<i>Definition of stochastic processes.</i>	3
2	<i>Finite Markov chains. One step and multi-steps transition probability matrices. Chapman-Kolmogorov equations</i>	15
3	<i>State classification. Long run distribution of Markov chains.</i>	3
4	<i>Continuous-time Markov processes (Birth-and-death processes, Poisson process).</i>	6
5	<i>Queuing theory and models. Cumulative diagrams of queues. Performance measures.</i>	3

6	<i>Basic Markovian queuing models (single server queue, multi-server queue, finite capacity queues). Some Non-Markovian queues.</i>	15
<b>Total</b>		45

## D. Teaching and Assessment

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Midterm exam 1	7, 8, 9	30 %
2	Midterm exam 2	11, 12, 13	30 %
3	Final exam	15, 16, 17	40%

\*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

**Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :**

*Office hours : 6 hrs / week*

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	<i>Introduction to stochastic processes, Lotfi Tadj and Amar Sarhan, King Saud University Press, 2006.</i>
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