Form (H)
Short course description

Course title: Stochastic Processes and Queueing Theory	Course number and code: OPER 371
Previous course requirement: STAT 215 , MATH 201	Language of the course: English
Course level: Third year	Effective hours: 4.0 (3 + 2 + 0)

Course description

The course is intended to provide the student with knowledge on Stochastic Processes and their applications. Focus on Discrete time Markov Chain with its definitions and popular applied examples. Student will be able to define and classify the states of a given Markov chain. Student will be able to compute the long run distribution of Markov Chain and its interpretation. Later, the student will be given a general knowledge on continuous time Markov Chain. Special focus on Poisson Process as an example of continuous time Markov Chain. Finally, the course covers the Birth and death processes as an introduction to queueing systems and modeling. The course covers a number of Markovian Queues: Single-server Markovian queue M/M/1, Multi-server Markovian queue M/M/s, Queueing models with zero buffer and some special types of queueing models.

Course objectives

1. To familiarize students with basic knowledge of stochastic processes.
2. To familiarize students with basic knowledge of queueing theory and its applications.
3. Provide student with tools and methods needed to evaluate queueing system through pure data.
4. Introduce the fundamental queueing models to the student.
5. To develop in the student the ability to identify the most important performance measures in the queueing system.
6. To develop in the student the ability to identify the alternatives possible in a queueing system in order to optimize the system

Learning outcomes (understanding, knowledge, and intellectual and scientific skills)
After studying this course, the student is expected to be able to:

Knowledge

1. Modeling arrival process using raw data
2. Modeling service distribution using raw data
3. Computing performance evaluation measures from data.
4. Identify the elements of queues in real-life problems.
5. Using the proper mathematical model for the problem.
6. Defining alternatives for queueing systems and evaluating them.
7. Testing the accuracy of the mathematical model.

Cognitive Skills 1. Ability to build mathematical models of real life problems related to queueing situations 2. Ability to use appropriate mathematical techniques to solve and evaluate these models 3. Acquire additional mathematical models of real life systems
Interpersonal Skills & Responsibility 1. Work independently and as part of a team. 2. Manage resources, time and other members of the group 3. Communicate results of work to others
Communication, Information Technology, Numerical 1. Capability to recognize queueing models and its main elements 2. Ability to build mathematical models of real life queueing problems 3. Ability to use computer software to solve these models 4. Acquire additional mathematical models of real life systems

Textbook adopted and supporting references

Title of the book	**Author's name**	**Publisher's name**	**Date of publication**
Operations Research: Applications and Algorithms	Wayne L. Winston, Jeffrey B. Goldberg	Cengage Learning	2004
Introduction to Operations Research, F. Hillier & G. Lieberman	F. Hillier & G. Lieberman	McGrow Hill	2005
Introduction to Probability Models	Sheldon M. Ross	Elsevier	2014