The objective of this course is to give an intermediate level of understanding in modeling and optimization of systems presenting stochastic behavior. To this end first the general modeling tools are presented. Then discrete and continuous time Markov chains are discussed in detail and Markov decision processes are introduced. In the second phase of the course Markovian analysis and optimization applications in queueing and inventory systems are studied.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Markov Chains: states and classes, transient and recurrent processes, branching processes</td>
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<tr>
<td>2</td>
<td>Poisson Process: definitions, properties, generalizations</td>
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<tr>
<td>3</td>
<td>Markov Processes: birth and death processes, limiting probabilities, properties, uniformization</td>
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<tr>
<td>4</td>
<td>Markov Decision Processes: states and decision epochs, stationary policies, expected discounted and expected average cost criteria</td>
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<tr>
<td>5</td>
<td>Queueing Theory: Markovian and non-Markovian models, control mechanisms, applications</td>
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<tr>
<td>6</td>
<td>Stochastic Inventory Theory: Markovian models of basic inventory control policies.</td>
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</table>

Monday 10:00-11:00(M2230), 15:00-16:00(M3120), Wednesday 9:00-11:00 (M2230),

Course Prerequisites:
IE 305 or equivalent

References:

Course Website: [http://moodle.ie.boun.edu.tr](http://moodle.ie.boun.edu.tr) (Enrolment Key: TBA)

Grading:
Midterms: 40%, Quizzes: 20%, Final: 40%

*In order to qualify for the final exam a student has to collect a minimum total of 18/60 points from quizzes and midterms. Missing both midterms results in an automatic F in the class. Make-up exams for midterms or quizzes will not be provided.*

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