*IE 322 Industrial Operations Analysis -2- 3(3, 1, 0))*

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| **Catalog Data** | Integer programming, Branch and Bound method, Dynamic programming, Nonlinear programming, Discrete time Markov chains and Queueing Models. | | | |
| **Prerequisite** | IE 222<br>MATH 244 | | | |
| **Co-requisites** | None | | | |
| **Level** | 7 | | | |
| **Textbook** | Operations Research, 9th Ed., H. A. Taha, Prentice Hall, 2011 | | | |
| **Reference** | Introduction to operations research, Frederick S. Hillier and Gerald J. Lieberman, McGRAW HILL International Editions, 1990 | | | |
| **Learning Objectives** | To provide the students the knowledge for phases of product design and its procedures, and carry out independent and creative product design and development project. | | | |
| **Topics (classes)** | | **Topic** | **Week** | **Contact, hr** |
| | ***1.*** | ***Integer programming:***<br>Formulations and industrial applications<br>Solution methodologies: Dakin's Branch and Bound method | **(3)** | **[12]** |
| | ***2.*** | ***Dynamic programming:***<br>Characteristics of dynamic programs<br>Formulation and applications | **(2)** | **[8]** |
| | ***3.*** | ***Nonlinear programming:***<br>Sample applications and graphical illustrations<br>One variable unconstrained optimization<br>Multivariable unconstrained optimization<br>Constrained optimization and Karush-Kuhn-Tucker conditions<br>Quadratic programming | **(3)** | **[12]** |
| | ***4.*** | ***Discrete time Markov chains:***<br>Markov chains-Basic concepts<br>Steady state distribution in Markov chains & applications<br>Absorption probability distribution & applications | **(2.5)** | **[10]** |
| | ***5.*** | ***Queueing Models:***<br>*Markovian Models with single servers*<br>*Markovian models with multiple servers*<br>*Models with limited capacities*<br>*Queuing decision models* | **(3.5)** | **[14]** |
| **Laboratory Topics** | | None | | |
| **Project work** | Selecting a real life problem and solving it by using computer | | | |
| **Computer Usage** | Solve problems by using Cplex software. | | | |

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| **Learning outcomes** | 1) To introduce the students to more deterministic models in operations research in addition to providing tools in stochastic environments and to their solution methods. ***[a,e,h,k]***<br>2) To emphasize the formulations of the industrial and engineering problems as integer, dynamic and nonlinear programs, and to learn the techniques to solve them. ***[a,e,h,k]***<br>3) To expose the students to the engineering applications of stochastic models, particularly of Markov chains, and queueing problems and their solutions methods. ***[a,e,h,k]*** |
| **Estimated Category Content** | Engineering Design: 3 credit hour or 100%. |
| **Prepared by** | *Dr. Mehdi Mrad* |
| **Preparation Date** | 23 May 2012 |