|  |  |  |  |
| --- | --- | --- | --- |
| 1. Course code:
 | QM350 | 1. Course title:
 | Operations Research |
| 1. College: College of Business Administration
 |
| 1. Department: Management and Marketing
 |
| 1. Program: College Requirement
 |
| 1. Course credits: 3-credit hour
 |
| 1. Course NQF Level: 6,7,8
 |
| 1. NQF Credits: TBA
 |
| 1. Prerequisite: QM250
 |
| 1. Lectures Timing & Location: Online
 |
| 1. Course web page: Blackboard
 |
| 1. Course Instructor:
 |
| 1. Office Hours and Location: TBA
 |
| 1. Course coordinator: Prof. Muwafaq AlKubaisi
 |
| 1. Academic year: 2020-2021
 |
| 1. Semester:
 |  | **First** | X | **Second** |  | **Summer** |
| 1. Textbook(s):

An Introduction to Management Science: Quantitative Approach, 15th Edition, By David R. Anderson; Dennis J. Sweeney; Thomas A. Williams; Jeffrey D. Camm; James J. Cochran; Michael J. Fry; Jeffrey W. Ohlmann ISBN-10: 1-337-40652-X ISBN-13: 978-1-337-40652-9Learning ( [https://www.cengage.com/c/an-introduction-to-management-science-quantitative-approach-15e-anderson/9781337406529PF/](https://www.cengage.co.uk/books/9781285866314/) |
| 1. References from the Library (<http://www.ac-knowledge.net/uobv3/>):
 |
| 1. Other learning resources used (e.g., e-Learning, field visits, periodicals, software, etc.):

1) Introduction to Management Science, Bernard W. Taylor, 11th edition, Prentice Hall2) Introduction to Operations Research by F.S. Hillier, and G.J. Lieberman. 9th edition, McGraw Hill. |
| 1. Course description (as per the published):

Modelling, Linear programming, Linear programming, Linear programming applications, decision analysis, Simulation, Forecasting, Markov Process |
| 1. Course Intended Learning Outcomes (CILOs):
 |
| CILOs | *Mapping to PILOs* |
| Learning goals | **a. Knowledge** | **b. Globalization** | **c. Skills** | **d. Communication** | **e. Competencies** | **f. Values** |
| Learning objectives | **a1: General Knowledge** | **a2: Specific knowledge** | **b1: International cross-cultural** | **b2: Global Perspective** | **c1: Thinking skills** | **c2: Analytical skills** | **d1: Communication (Writing)** | **d2: Communication (Oral)** | **e1: Leadership skills** | **e2: Teamwork** | **f1: Ethics** | **f2: Social responsibility** |
| 1. Demonstrate an understanding of the theory behind the standard Operations Research formulae and algorithms presented | **X** |  |  |  |  |  |  |  |  |  |  |  |
| 2. Formulate and solve elementary problems requires using these formulae and algorithms, both analytically and using appropriate software. |  |  |  |  | **X** |  |  |  |  | **X** |  |  |
| 3. Develop a report that describes the model and the solving technique, analyzes the results and proposes recommendations in a language understandable to the decision-makers |  |  |  |  |  | **X** | **X** |  |  |  |  |  |
| 4. Develop critical thinking and objective analysis of decision problems |  |  |  |  |  | **X** |  |  | **X** |  |  |  |
| 5. |  |  |  |  |  |  |  |  |  |  |  |  |

|  |
| --- |
| 1. Course assessment:
 |
| *Assessment Type* | *Details/ Explanation of Assessment in relation to CILOs* | *Number* | *Weight* | *Date(s)* |
| Continuous Assessment (2-hour) | Quiz a1, a2, c2 |  | **15 %** |  |
| Engagement Activities (1-hour) | Class Participation  |  | **15 %** |  |
| Practical | - |  | **%** |  |
| Examinations |  |  | **10 %** |  |
| Projects/Case Studies | - |  | **20%** |  |
| Final Examination(Respondus) | c2, d1, e1 |  | **40%** |  |
| Total |  |  | **100%** |  |

|  |
| --- |
| 1. Description of Topics Covered
 |
| *Topic Title* *(e.g. chapter/experiment title)* | ***Description*** |
| Introduction to Operations Research (OR) | OR professionals aim to provide rational bases for decision making by seeking to understand and structure complex situations and to use this understanding to predict system behaviour and improve system performance |
| Linear Programing L.P. | **L.P.** is used for obtaining the most optimal solution for a problem with given constraints. In **L.P.**, we formulate our real-life problem into a mathematical model. It involves an objective function, **linear** inequalities with subject to constraints. |
| L.P. Sensitivity and Duality | L.P. sensitivity analysis is the study of the effects of changes in a linear programming problem's parameters on its optimal solution. Duality is one of the essential concepts in linear programming basically, associated with each linear programming problem. |
| Simulation | A simulation is an approximate imitation of the operation of a process or system that represents its operation over time. Simulation is used in many contexts, such as simulation of technology for performance tuning or optimizing, safety engineering, testing, training, education, and video games. |
| Decision Analysis | Decision analysis is a form of decision-making that involves identifying and assessing all aspects of a decision and taking actions based on the decision that produces the most favourable outcome. |
| Time series and Forecasting | Time-series analysis comprises methods for analyzing time-series data to extract meaningful statistics and other characteristics of the data. Time series forecasting is the use of a model to predict future values based on previously observed values. |
| Markov Process | A Markov process is a random process in which the future is independent of the past, given the present. Thus, Markov processes are the natural stochastic analogues of the deterministic processes described by differential and difference equations. They form one of the most important classes of random processes. |

|  |
| --- |
| 1. Weekly Schedule
 |
| *Week* | ***Date*** | ***Topics covered*** | ***CILOs*** | ***Teaching Method*** | *Assessment* |
| *1* | **7-2-2021** | **[1] Iintroduction (Chapter-1) Introduction to Management Science / Models**  | **a1** | *2-hour lecture:**1-hour lecture* | Quizzes, Assignments |
| *2* | **14-2-2021** |  **[2] An Introduction to Linear Programming (Chapter-2) A maximization problem / Graphical solution procedure / Extreme points and the optimal solution / Computer Solution**  | ***c1,e2*** | *2-hour lecture:**1-hour lecture* | Quizzes, Assignments, Midterm Exam |
| *3* | **21-2-2021** | **[2] A simple minimization problem / Special cases / General linear programming notation** | ***c1,e2*** | *2-hour lecture:**1-hour lecture* | Quizzes, Assignments, Midterm Exam |
| *4* | **28-2-2021** | **[3]Linear Programming: Sensitivity Analysis and Interpretation of Solution (CHAPTER 17,18)****Introduction to sensitivity Analysis/Objective Function Coefficients** | **c2,d1** | *2-hour lecture:**1-hour lecture* | *Quizzes, Assignments, Midterm Exam* |
| *5* | **7-3-2021** | **[3] Sensitivity of right-Hand-sides** | **c2,d1** | *2-hour lecture:**1-hour lecture* | *Quizzes, Assignments, Midterm Exam* |
| *6* | **14-3-2021** | **[4] Linear Programming Applications (Chapter 4)****Marketing and media applications / Financial Applications/** | **a2,c1,c2,d1** | *2-hour lecture:**1-hour lecture* | *Quizzes, Assignments, Midterm Exam* |
| *7* | **21-3-2021** | **[4] Linear Programming Applications/** **Blending Problem, Transportation Problem** | **a2,c1,c2,d1** | *2-hour lecture:**1-hour lecture* | *Quizzes, Assignments, Midterm Exam* |
| *8* | **28-3-2021** | **[5] Decision Analysis/** **(Chapter 13)****Problem Formulation/** **Decision making without probabilities** | **c2,e1** | *2-hour lecture:**1-hour lecture* | *Quizzes, Assignments, Final Exam* |
| *9* | **4-4-2021** | Mid-Semester Break |
| *10* | **11-4-2021** | **[5] Decision Analysis/ Decision making with probabilities/ Risk analysis and Sensitivity analysis**  | **c2,e1** | *2-hour lecture:**1-hour lecture* | *Quizzes, Assignments, Final Exam* |
| *11* | **18-4-2021** | **[6] Time Series Analysis and Forecasting** | **a2,c2,d1** | *2-hour lecture:**1-hour lecture* | *The project, Final Exam* |
| *12* | **25-4-2021** | **[6] Time Series Analysis and Forecasting** | **a2,c2,d1** | *2-hour lecture:**1-hour lecture* | *The project, Final Exam* |
| *13* | **2-5-2021** | **[7] SIMULATION WHAT-IF analysis/Simulation of Sanotronics Problem** | **a2,b2,c2** | *2-hour lecture:**1-hour lecture* | *Quizzes, Assignments, Final Exam* |
| *14* | **9-5-2021** | **[7] SIMULATION****Waiting Line Simulation** | **a2,b2,c2** | *2-hour lecture:**1-hour lecture* | *Quizzes, Assignments, Final Exam* |
| *15* | **16-5-2021** | **[8] MARKOV PROCESSES****Accounts Receivable Analysis** | a2,c2,e1 | *2-hour lecture:**1-hour lecture* | *Quizzes, Assignments, Final Exam* |
| *16* | 23-5-2021 | [8] MARKOV PROCESSESAccounts Receivable Analysis | a2,c2,e1 | *2-hour lecture:**1-hour lecture* | *Quizzes, Assignments, Final Exam* |

****

**Professor: Muwafaq Mohammed Fendi AlKubaisi**

**February 2021**