Future Academy
Higher Future Institute for Specialized Technological Studies

Course Specification

1- Course information:

Course Code:	BSC303
Course Title:	Operation Research
Year/level	3rd level
Academic Programs	Computer Science Program (B.Sc.)
Contact hours/ week	(Theoretical= 2hrs, Tutorial= 1hr), Total= 3hrs

2- Course aims:

This course aims to provide students with a survey of fundamental methods of operations research and their applications describing a real-life problem. The emphasis is on applications and the details of methodology. Solutions of various linear programming, transportation, assignment, queuing, inventory, and game problems related to real life.

3- Intended learning outcomes of the course (ILOs):

a- Knowledge and understanding:

On successful completion of this course, the student should be able to:
al- **Define** the meaning of operations research.
a2- **Recognize** the various techniques of operations research.
a3- **Recognize** the techniques used in operations research to solve real life problems.
a4- **Determine** an optimum solution with maximization profit or minimization cost.

b- Intellectual skills:

On completing this course, the student should be able to:
b1- **Formulate** mathematical models to solve real life problems.
b2- **Design** real life problems with mathematical models.
b3- **Describe** (an optimum solution, techniques, etc.).
b4- **Compare the different methods of techniques** with large-scale models.

c- Professional and practical skills:

At the end of this course, the student will be able to:
c1- **Illustrate** knowledge of the various applications of operations research.
c2- **Solve** problems using appropriate modeling techniques.

d- General and transferable skills:

On successful completion of this course, the student should be able to:
d1- **Compute** different applications with various modelling methods.
d2- **Managements** how to do Brainstorming discussions for a problem solution.
d3- **Working in groups** for construct appropriate abstractions to manage complexity and think creatively about new problems.
d4- **life-long learning** the ability to gain numeracy skill.

4- Course contents

Week No.	Topics/units	Number of hours		ILO's
		Lecture hours	Practical/ Tutorial hours	
1	Introduction to Operation Research (Origin- Definition- Scope of O.R.- Techniques- Advantage and Limitation of O.R.) Convex Region- Extreme Points- Feasible Solution- Infeasible Solution- Optimum Basic Feasible Solution	2	1	a1, b1
2	Linear Programming Problem (Advantage and Limitation of LPP – Mathematical Formulation – Canonical and Standard Forms of LPP).	2	1	a1, a2, b1, b2, c1, d1
3	Solve of LPP by Graphical Method	2	1	a3, b1, b2
4	Revision 1 on solution of LPP by Graphical Method + **Quiz 1**	2	1	b1, b2
5	Solve of LPP by Simplex Method	2	1	a2, a3, b1, d4
6	Transportation Problem (Definition- The Basic Feasible Solution of Transportation Problem by: (1) North – West Corner Rule method. (2) Least Cost method. Vogel's Approximation method.	2	1	a1, a2, a3, b3, b4, d2
7	**Midterm Exam**			
8	Explain the algorithm of the Stepping- Stone method of obtaining the optimal solution to a transportation problem.	2	1	a3, a4, b3, c2, d1
9	Assignment Problem (Structure and Solution)	2	1	a2, a3, b1, b2, c1, d1, d3
10	Assignment Problem (Hungarian Method)	2	1	a2, a3, a4, b3, b4, c1, c2, d1
11	Revision 2 on solution of Assignment Problem + **Quiz 2**	2	1	a4, b3, b4, c1, c2, d1
12	Assignment Problem (Case of Maximization of an Assignment Problem)	2	1	a4, b3, b4, c2, d2, d4
13	Assignment Problem (Travelling Salesman Problem)	2	1	a3, a4, b3, b4, c2, d2, d3
14	Revision 3 on solution of transportation and Assignment Problems	2	1	a3, a4, b3, b4, c2, d2, d3, d4

5- Teaching and learning methods

Methods	ILO's																			
	a1	a2	a3	a4	a5	b1	b2	b3	b4	b5	c1	c2	c3	c4	c5	d1	d2	d3	d4	d5
Lectures	√			√		√			√		√	√					√		√	
Practical sections		√	√				√	√									√		√	
Self-learning							√	√	√			√						√	√	
Discussion groups		√	√				√	√									√		√	
Brainstorming																				
Blended-learning																				
E-learning	√			√														√	√	

6- Teaching and learning methods for Low-achieving students

- Extra teaching hours for those who need help.
- More quizzes to assess their ability for understanding the course.
- Encourage the teamwork for those students with other advanced ones to increase their participation and understanding.

7- Student assessment

Assessment method	Time	Grade weight (%)	week	ILOs
Course Work (Tutorial Exercise and Assignments)		10	Every week	a1, a2, a3, a4, b1, b2, b3, b4, c1, c2, d1, d4
Quiz 1		5	Week#4	a1, a2, a3, b1, b2, b3, c1, c2, d1, d2
Mid-Term exam		15	Week#7	a1, a2, a3, a4, b1, b2, b3, b4 c1, c2, d1, d2, d3, d4
Quiz 2		5	Week#11	a1, a2, a3, b1, b2, b3, c1, c2, d1, d2
Final written exam		60		a1, a2, a3, b1, b2, b3, c1, c2, d1, d2, d4

8- List of references

8.1. Student notebooks:

- Comprehensive instructor notes ("PowerPoint slides") are available on the course web page

  ") Google Classroom ("

8.2. Essential textbooks:

- Kapoor, V.K. and Kapoor, S. 2001. "Operations Research Techniques for Management". Sultan Chand and Sons, New Delhi.
- Churchman, C.W., Ackoff R. L. and Arnoff, E.L. 1957. "Introduction to Operations Research". John Wiley and Sons, New York.

8.3. Recommended textbooks:

- Taha, H.A. 2005. "Operations Research: An Introduction". Prentice Hall of India Private Limited, New Delhi.

8.4. Journals, Periodical and Reports ……..etc.

- https://www.bing.com/ck/a?!&&p=53dddd231dcd0a11e5917081610449ad99131b751ab85c8c560b2e56ed7d04ebJmltdHM9MTczMTcxNTIwMA&ptn=3&ver=2&hsh=4&fclid=23bc4517-0a77-6b22-063b-50120b2c6a4e&psq=journal+of+operations+research&u=a1aHR0cHM6Ly93d3cudGFuZGZvbmxpbmUuY29tL2pvdXJuYWxzL3Rqb3IyMA&ntb=1

8.5. Websites

- **https://www.bing.com/ck/a?!&&p=8aacbe0c109ac99dec87531e8328312e71f911bade99abef4ab58a363061543fJmltdHM9MTczMTcxNTIwMA&ptn=3&ver=2&hsh=4&fclid=23bc4517-0a77-6b22-063b-50120b2c6a4e&psq=website+of+operations+research&u=a1aHR0cHM6Ly9saW5rNnNwcmluZ2VyLmNvbS9qb3VybmFsLzEwNDc5&ntb=1**

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