University: *Fayoum University*
Faculty: *Computers and Information*
Department: *Computer Science*

Course Specification

1- Basic Information		
Code: GEN 231	**Course Title:** Operations Research	**Year/Level:** Second year – Second term
Programme: B.Sc degree in Computer Science	**Number of units:** **Lecture:** 3 hrs/ week **Tutorial:** 2 hrs/ week **Practical:** 0 hrs/ week	

2- Aims of Course:	This course will introduce the student to deterministic models in operations research. You will learn to formulate, analyze, and solve mathematical models that represent real-world problems. During the course, deterministic models in which no uncertainty exist, will be discussed. This topic will cover linear programming and the simplex algorithm, as well as related analytical topics. It will also introduce other types of mathematical models, including transportation, network, integer, and non-linear models

3- Intended Learning Outcomes	
A- Knowledge and Understanding:	**A10. Identify and explain the fundamental concepts, principles, and techniques needed for the analysis, development, validation, verification, deployment, and operations of computer-based and information systems.** **A13. Define the mapping of real-world problems to algorithmic solutions.** a1) The fundamental concepts of operations research theory and application. a2) Practical techniques for formulating and solving common optimization problems
B- Intellectual Skills:	**B1. Analyze real problems, and appropriate problem solving methods that satisfy commercial or industrial constraints and analyze results.** **B4. Apply solutions to a computer science problem, follow-up on solution to verify it, and if necessary restrict the solution methodologies upon the results.** **B10. Generate innovative designs to solve a problem containing a range of commercial and industrial constraints.** **B11. Evaluate a range of innovative design patterns and solutions to solve a computer science problem containing a**

	range of commercial and industrial constraints. **B.14 Identify the substituted solutions for the commercial, time, and industrial problems that faces information systems applications.** b1) Visual processing from both ``bottom-up'' (data oriented) and ``top-down'' (goals oriented) perspectives. b2) Understand the theoretical workings of the simplex method for linear programming and perform iterations of it by hand b3) Understand the relationship between a linear program and its dual, including strong duality and complementary slackness. b4) Perform sensitivity analysis to determine the direction and magnitude of change of a model's optimal solution as the data change. b5) Solve specialized linear programming problems like the transportation and assignment problems. b6) Solve network models like the shortest path, minimum spanning tree, and maximum °ow problems b7) Understand the applications of, basic methods for, and challenges in integer programming b8) Solve single- and multiple-variable unconstrained and constrained non-linear optimization problems
C- Professional and Practical Skills:	**C1. Analyze and improve organizational processes from an ICT perspective.** **C8.Deploy appropriate tools for the construction and documentation of computer-based systems that are used to solve practical problems.** **C9.Deploy different modeling techniques to model and analyze real life computing problems.** **C11.Develop a range of fundamental research skills that enable the graduate to continuously increase his knowledge, advance his career and pursue graduate studies.** c1) Use appropriate programming languages for operation research models c2) Evaluate systems in terms of general quality attributes and possible tradeoffs presented within the given problem. c3) Implement practical cases by using Win QSB, TORA, and spreadsheets software
D- General and transferable Skills	**D2. Use effective information-retrieval skills (including the use of browsers, search engines and catalogues) and general IT facilities.** **D3. Work as a member of a development team, recognizing the different roles within a team and different ways of organizing teams.** **D4. Demonstrate independent critical thinking and problem solving skills.**

	D5. Communicate effectively through oral, written, and visual means. **D7. Prepare technical reports to a professional standard** d1) Discuss and work in a group in order to design and write the specification of a new case d2) Oral Communication Skills. d3) Description, formulation and analysis of OR Problems

4-Course Content:	1. Linear Programming: Formulations and graphical solution. 2. Algebraic solution: the simplex method, 3. Duel- Simplex method. 4. Sensitivity Analysis, Transporting and Assignment problems. 5. Integer programming : Cutting-plan algorithms , 6. Branch and bound method. 7. Dynamic programming :Models and computations, 8. Solution of Linear programs by Dynamic programs. 9. Project scheduling by PERT-CPM.

5- Teaching and Learning Methods:	1. Lectures 2. Tutorials 3. Class discussions 4. Internet searches

6- Teaching and Learning Methods for handicapped students :	-

7- Student Assessment	
A- Assessment Methods:	1. Assignments and Quizzes 2. Midterm written exam 3. Oral exam 4. Final written exam
B- Assessment schedule:	Midterm examination: Week 7 Oral examination: Week 14 Final examination: Week 15
C- Weighting of assessments:	Assignments and Quizzes: 0 % Mid-Term Examination: 15% Oral Examination: 10% Final-term Examination: 75%

8- Books and References	
A- Notes:	-
B- Essential Books (Text Books):	▪ Introduction to operations research, By Frederick S.; Lieberman, Gerald J. Hillier 10th edition (2015)
C- Recommended Books:	-

D- Periodicals, Web sites, … etc	-

Course Professor: Dr.Ehab Mohamed Department Head: Dr.Amira Edres

Course Content Intended Learning Outcomes Matrix

Course Title: Operations Research
Course Code: GEN 231

Course Content	Week	Knowledge & Understanding		Intellectual Skills								Professional & Practical Skills			General & Transferable Skills		
		a1	a2	b1	b2	b3	b4	b5	b6	b7	b8	c1	c2	c3	d1	d2	d3
1. Linear programming :Formulations and graphical solution.	1:2	x										x			x	x	x
2. Algebraic solution: the simplex method,	3		x	x	x									x	x	x	x
3. duel- simplex method .	4		x	x		x								x	x	x	x
4. Sensitivity analysis . Transporting and assignment problems.	5		x				x	x	x			x	x	x	x	x	x
5. Integer programming : cutting-plan algorithms ,	6		x							x				x	x	x	x
6. branch and bound method .	7		x	x						x				x	x	x	x
7. Dynamic programming :Models and computations,	8		x								x			x	x	x	x
8. solution of Linear programs by dynamic programs.	9		x					x						x	x	x	x
9. Project scheduling by PERT-CPM.	10:11		x	x					x		x	x			x	x	

Course coordinator: s Dr. Ehab Mohamed

Head of Department:Dr.Amira Edress