Course Title: Operations Research	Course code: 731415
Course Level: 4	Course prerequisite (s) and/or co requisite (s): 731212+ 210231 + 210101
Lecture Time: 15:10 – 16:00	Credit hours: 3

Name	Rank	Office Number and Location	Office Hours	E-mail Address
Dr. Mohammad alzoubi	Assistant Prof.	IT 325	12:00-14:10 (Sun+Tues+Thurs) 11:00- 11:12 (Mon+Wed)	mzoubi@**philadelphia.edu.jo**

Course module description:

Operations Research or **Operational Research** (OR) is an interdisciplinary branch of mathematics which uses methods like mathematical modeling, statistics, and algorithms to arrive at optimal or good decisions in complex problems which are concerned with optimizing the maxima (profit, faster assembly line, greater crop yield, higher bandwidth, etc) or minima (cost loss, lowering of risk, etc) of some objective function. The eventual intention behind using Operations Research is to elicit a best possible solution to a problem mathematically, which improves or optimizes the performance of the system.

Course module objectives:

This module aims to introduce to the students the use of quantitative methods and techniques for effective decisions – making. Model formulation and applications that used in solving business decision problems. Topics include: linear programming, Transportation, Assignment, and CPM/ MSPT techniques. Analytic techniques and computer packages will be used to solve problems facing business managers in decision environments.

Course/ module components

Text book

- Title**:** *Introduction to Operations Research*
  Author(s)/Editor(s): Hiller Lieberman

Publisher: 8th edition, McGraw Hill, 2005.
- Title: *Operations Research An Introduction*
  Author(s)/Editor(s): Hamdy A. Taha
  Publisher: 9th edition, Prentice Hall, 2011.

Teaching methods:
Duration: 16 weeks, 48 hours in total,
Lectures: 32 hours, 1-2 hours per week (including two 1-hour midterm exams)
Tutorial: 8 hours, Laboratories: 4 hour.

Learning outcomes:
- Knowledge and understanding
  - Understand the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type.
  - Understand the concepts of Linear and Integer Programming.
  - Understand the concept of optimisation in project management.
- Cognitive skills (thinking and analysis).
  - Build and solve Transportation Models and Assignment Models.
- Communication skills (personal and academic).
  - Design new simple models, like: CPM, MSPT to improve decision –making and develop critical thinking and objective analysis of decision problems.
- Practical and subject specific skills (Transferable Skills).
  - Implement practical cases, by using TORA, WinQSB

Assessment instruments

Allocation of Marks	
Assessment Instruments	**Mark**
First examination	**20**
Second examination	**20**
Final examination: 50 marks	**40**
Reports, research projects, Quizzes, Home works, Projects	**20**
Total	**100**

Documentation and academic honesty

Submit your home work covered with a sheet containing your name, number, course title and number, and type and number of the home work (e.g. tutorial, assignment).

Any completed homework must be handed in to my office by 15:00 on the due date. After the deadline "zero" will be awarded. You must keep a duplicate copy of your work because it may be needed while the original is being marked.

For the research report, you are required to write a report similar to a research paper. It should include:
- **Abstract**: It describes the main synopsis of your paper.
- **Introduction**: It provides background information necessary to understand the research and getting readers interested in your subject. The

introduction is where you put your problem in context and is likely where the bulk of your sources will appear.

- o **Methods (Algorithms and Implementation)**: Describe your methods here. Summarize the algorithms generally, highlight features relevant to your project, and refer readers to your references for further details.
- o **Results and Discussion (Benchmarking and Analysis)**: This section is the most important part of your paper. It is here that you demonstrate the work you have accomplished on this project and explain its significance. The quality of your analysis will impact your final grade more than any other component on the paper. You should therefore plan to spend the bulk of your project time not just gathering data, but determining what it ultimately means and deciding how best to showcase these findings.
- o **Conclusion**: The conclusion should give your reader the points to "take home" from your paper. It should state clearly what your results demonstrate about the problem you were tackling in the paper. It should also generalize your findings, putting them into a useful context that can be built upon. All generalizations should be supported by your data, however; the discussion should prove these points, so that when the reader gets to the conclusion, the statements are logical and seem self-evident.
- o **Bibliography:** Refer to any reference that you used in your assignment. Citations in the body of the paper should refer to a bibliography at the end of the paper.

☐ Protection by Copyright

1. Coursework, reports, and essays submitted for assessment must be your own work, unless in the case of group projects a joint effort is expected and is indicated as such.

2. Use of quotations or data from the work of others is entirely acceptable, and is often very valuable provided that the source of the quotation or data is given. Failure to provide a source or put quotation marks around material that is taken from elsewhere gives the appearance that the comments are ostensibly your own. When quoting word-for-word from the work of another person quotation marks or indenting (setting the quotation in from the margin) must be used and the source of the quoted material must be acknowledged.

3. Sources of quotations used should be listed in full in a bibliography at the end of your piece of work.

☐ Avoiding Plagiarism.

1. Unacknowledged direct copying from the work of another person, or the close paraphrasing of somebody else's work, is called plagiarism and is a serious offence, equated with cheating in examinations. This applies to copying both from other students' work and from published sources such as books, reports or journal articles.

2. Paraphrasing, when the original statement is still identifiable and has no acknowledgement, is plagiarism. A close paraphrase of another person's work must have an acknowledgement to the source. It is not acceptable for you to put together unacknowledged passages from the same or from different sources linking these together with a few words or sentences of your own and changing a few words from the original text: this is regarded as over-dependence on other sources, which is a form of plagiarism.

3. Direct quotations from an earlier piece of your own work, if not attributed, suggest that your work is original, when in fact it is not. The direct copying of one's own writings qualifies as plagiarism if the fact that the work has been or is to be presented elsewhere is not acknowledged.

4. Plagiarism is a serious offence and will always result in imposition of a penalty. In deciding upon the penalty the Department will take into account factors such as

the year of study, the extent and proportion of the work that has been plagiarized, and the apparent intent of the student. The penalties that can be imposed range from a minimum of a zero mark for the work (without allowing resubmission) through caution to disciplinary measures (such as suspension or expulsion).

Course/module academic calendar

week	Basic and support material to be covered	Labs, Home works and others
(1)	Introduction to Operations Research (OR)	
(2)	Introduction to Operations Research (OR)	
(3)	Introduction to Linear Programming (LP)	
(4)	Formulation and Graphical Solution of Linear Programming (LP)	Assignment 1 Lab1:QMfor Windows
(5)	Solving Linear Programming Problems: the Simplex method	Tutorial 1
(6)	The Theory of the Simplex method 1st exam	
(7)	Integer Programming	Assignment 2 Lab 2: Excel Solver
(8)	Duality Theory and Sensitivity Analysis	Tutorial 2
(9)	Other Algorithms for Linear Programming	
(10)	The Transportation and Assignment Problems	
(11)	The Transportation and Assignment Problems 2nd exam.	Tutorial 3
(12)	Shortest Path Algorithm and application (Dijkstra)	
(13)	Shortest Path Algorithm and application (Dijkstra)	Tutorial 4
(14)	Traveling Sales Person Problem TSP	
(15)	Network Optimization Models	
(16)	Revision and Final Exam Final Exam	

Expected workload:

On average students need to spend 2 hours of study and preparation for each 50-minute lecture/tutorial.

Attendance policy:

Absence from lectures and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.

Module references

Books
1. Taha, Hamdy , Operations Research , 8th edition , Macmillian Publishing Company, 2007**.**

2.   Introduction to operations research,Frederick S. Hillier, Gerald J. Lieberman ,2006

Journals
Websites
http://people.hofstra.edu/Stefan_Waner/RealWorld/Summary4.html
http://people.hofstra.edu/Stefan_Waner/RealWorld/LPGrapher/lpg.html
http://www.isl.itu.edu.tr/ya/END332E.pdf
http://www.mhhe.com/hiller
http://www.mhhe.com/primis/online.