

COURSE NAME AND CODE: LINEAR OPTIMIZATION (MATH 2430)

LEVEL: II

NUMBER OF CREDITS: 3

SEMESTER: II

PREREQUISITES: (MATH1141 & MATH1152) or (M10A & M10B)

RATIONALE:

In real life situations it is frequently necessary for everybody to optimize the situation under given constraints especially in industry, business and management. Hence, it very important to provide students with a theoretical knowledge of these situations and the methods of solving the constrained models that result. Industrial case studies motivate the students to analyze these models and interweave them with real physical situations.

COURSE DESCRIPTION:

The purpose of this course is to introduce students to the methods and techniques of some key areas of mathematical models in Operations Research. This course analyzes the mathematical modeling that can be applied in solving the problems in industry, business, science and technology, management, decision support and other areas and disciplines.

CONTENT KNOWLEDGE:

Linear Programming- Formulation, Simplex Method, Two Phase Method, Duality, Sensitivity Analysis; Transportation Models, Assignment Models

LEARNING OBJECTIVES:

At the end of this course, students will be able to:

- Solve linear programming problem by graphical method, simplex method.
- Explain and solve given LPP by Big M method and Two phase technique.
- State the duality of the given primal problem and solve the given problem

- Analyze the changes in the optimal solution by changing different parameters of the problem
- Solve given transportation problem
- Solve assignment problem

SYLLABUS:

Linear programming Introduction and formulation:

- Introduction, Phases of Operations Research

Graphical Method

- Solving linear programming by graphical method and examples

Simplex Method

- Algorithm and algebraic interpretation
- Examples general case and Special Cases

Big M Method

- Method and examples

Two Phase Method

- Method, Examples on different cases

Duality

- Dual form of given primal problem and examples
- Duality theorems, Primal Dual relations,
- Complementary Slackness Theorem Proof, Applications

Sensitivity Analysis

- Sensitivity analysis with Graphical Method
- Sensitivity analysis through simplex method

Transportation and assignment models

- Transportation Models introduction and modeling as a Linear programming Problem, initial solutions, Transportation simplex method
- Introduction, examples of Assignment models , Hungarian method of solution and examples

Tutorials

TEACHING METHODOLOGY

This course will be delivered by a combination of informative lectures, participative tutorials and practical laboratories. The total estimated 39 contact hours are broken down as follows: 29 hours of lectures and 10 hours of tutorials. The course material will be posted on the webpage <http://ourvle.mona.uwi.edu/>. Practice problems and assignments will also be available to students via this webpage, as well as the solutions to the assignment questions after the due date.

ASSESSMENT

The course assessment will be broken into two components; a coursework component worth 30% and a final exam worth 70%.

- Two course work exams (1 hour each) that should take place during weeks 5 and 9. Each of these exams will be worth 15% of the student's final grade.
- The Final theory exam will be two hours in length.

REFERENCE MATERIAL:

1. WINSTON, Wayne. *Operations Research, Applications & Algorithms, 4th edition*, Duxbury Press; July 25, 2003. ISBN-13: 978-0534380588 [prescribed]
2. TAHA, Hamdy. *Operations Research: An introduction 8th Edition*. Pearson Prentice Hall Publishers. 2006. ISBN-13: 978-0131889231 [recommended]
3. HILLER, Gerald & Frederick Lieberman. *Introduction to Operations Research 8th Edition*. McGraw-Hill International Edition. 2004. ISBN #: 0073017795, 9780073017792 [recommended]

Online Resources:

- <http://www2.lib.udel.edu/subj/opre/internet.htm>

This is an internet resource on operations research which helps the students with information about, conferences, materials and operations research societies etc.