UNIVERSIDAD DE MURCIA

FACULTY OF MATHEMATICS

Location, distribution and transportation

Syllabus

Course code:	6376
Number of ECTS credits:	6
Semester:	2nd (February-June)
Recommended components:	Linear algebra (1569), Linear optimization (1582), Real functions of a single variable II (1573), Functions of several real variables I (1578), Graphs and discrete optimization (1592). Some standard knowledge of real analysis and linear algebra is required, as well as a background in linear optimization and graphs and discrete optimization.
Language of instruction:	Spanish (students are allowed to ask questions and write homeworks and exams in English)

Course description

The fundamentals of a variety of location, distribution, and transportation problems are presented in this course. The student will acquire abilities in problem modeling as well as knowledge of optimization techniques focused on the resolution of specific real world problems.

Learning outcomes and competences

The student will learn to:

1. Formulate problems under different criteria and situations.
2. Analyze solution properties in each case.
3. Solve mathematical models.
4. Analyze strategies in competitive situations.
5. Use standard software for model solving.

Course contents

I. THEORY

PART I: LOCATION

1. Ingredients of location problems
   Basic notions: Location space, distance measures, customers, attraction functions. Non competitive location models. Competitive location models.
2. Single facility location
   The median problem: Properties and solving methods. The center problem: Properties and solving methods. Applications.
3. Multi-facility location
   The p-median problem. The p-center problem. Exact and approximate solution methods. Covering models. Applications.
4. Competitive models
   Customer behavior. Attraction functions. Objectives. Models including quality or price. Applications.

PART II: DISTRIBUTION

1. Arc routing problems
   Eulerian cycles. The Chinese postman problem. The rural postman problem.
2. Vertex routing problems
   Hamiltonian cycles. The travelling salesman problem. The minimax travelling salesman problem.

PART III: TRANSPORTATION

1. The standard transportation problem
   The standard transportation problem. Initial feasible solution methods. Improving methods.
2. Variants and extensions of the transportation problem
   The transshipment problem. Sending several products. Capacity constraints. Assignment problem.

II. COMPUTER PRACTISES

1. The p-median and p-center problems.
2. Transportation problems.

References

Main texts

1. M.S. Bazaraa, J.J. Jarvis, H.D. Sherali, *Linear Programming and Network Flows (4th Edition)* ; John Wiley & Sons, 2010.
2. N. Christofides, *Graph theory*; Academic Press, 1975.
3. Z. Drezner (Editor), *Facility location: a survey of applications and methods*; Springer, 1995.
4. K. Mathur, D. Solow, *Investigación de operaciones*; Prentice hall, 1996.
5. P.B. Mirchandani, R.L. Francis (Editors), *Discrete location theory*; Wiley, 1990.
6. L. Pardo, A. Felipe, J.A. Pardo, *Programación Lienal Entera - Aplicaciones prácticas a la empresa*; Díaz de Santos, 1990.

Supplementary references

1. R. Alonso, A. Serrano, S. Alarcón, *La logística en la empresa agroalimentaria*; Ediciones Mundi-Prensa, 1999.

2. R. Fourer, D.M. Gay, B.W. Kernighan, *AMPL - a modeling language for mathematical programming, 2nd edition*, Duxbury, 2003.

3. I. Sored, *Logística comercial y empresarial, 4th edition*, ESIC, 2004.

4. H.A. Taha, *Investigación de Operaciones, 7th edition*; Pearson - Prentice Hall, 2004.