3IMGOX70 –
MSOR (Management Science - Operations Research)

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Department: LSO
Semester: 1

Course level: L3
Domain: Management
Teaching language: English
Number of in-class hours: 18
Number of course sessions: 12 + Exam
ECTS: 3

Course description and objectives

Many decisions are to be made at different levels of socio-economical organizations. This includes various types of decisions such as the optimal design of a production or distribution plan, inventory management policies, selection of a best candidate for a position, determining the best location for new facilities…. The main difficulties to be handled are the potentially huge number of possible solutions, uncertainty in their evaluation, and, in some cases, the presence of conflicting criteria to be taken into account. In order to support such decisions a formal approach is thus required.

The purpose of the course is to provide an introduction to the main concepts and techniques for modeling and solving decision problems arising in socio-economical organizations.

Prerequisites

No prior knowledge is required, but basic skills and interest in simple mathematical formalism and reasoning is necessary.

Learning outcomes

After attending this course, the student will be aware of the existence of approaches to support important decisions in organizations. He/she will be able to identify situations where such approaches should be used and discuss with specialists in this field. The most interested and motivated students might consider becoming themselves specialists, e.g. consultant, in MS/OR, after a specialization at the Master level.

Assignments and grading

Each session consists of a 1.5-hour lecture followed by a 1.5 hour tutorial class taking place every week during 12 weeks in the first semester.

Concepts are introduced in the first part. Case studies are discussed in the second part. Active participation of the students is expected.

Homework assignments are the case studies which are distributed in class at the beginning of the course. Assignments will be collected at the beginning of each class on the day they are due as indicated in the class schedule. Each student must return at least 3 homeworks. All problems and case studies will be discussed in class on the day they are due. Students may be asked to go to the board to explain their solution to selected problems. Every student must come to class prepared to discuss all homework assignments on the day they are due. Assignments are done individually.

TYPE	*%*
Midterm Exam (test)	30%
Final Exam:	50%
Homework (cases) and class participation	20%
Total	100%

The numerical grade distribution will dictate the final grade. The passing grade for a course is 10/20.

Class participation: Active class participation – this is what makes classes lively and instructive. Come on time and prepared. Class participation is based on quality of comments, not quantity.
Exam policy: In the exam, students will not be allowed to bring any document (except if allowed by the lecturer). Unexcused absences from exams or failure to submit cases will result in zero grades in the calculation of numerical averages. Exams are collected at the end of examination periods.

Course structure

Session	Topic	
1	**Introduction**	**1.1** Presentation of the course. Management Science - Decision Aiding. Modeling. Basic concepts in graph theory.
2	**Part 1.** Graph models	**1.2** The shortest path problem (graphs with circuit and without circuit).
3		**1.3** Network flows. Concepts of flows and cut. Presentation of various flow problems.
4		**1.4** The maximum flow problem: Ford-Fulkerson's theorem and algorithm. Determining the cut of minimal value.
5	**Part 2.** Linear Programming models	**2.1** Linear programming. Introduction. Modeling examples.
6		**2.2** Graphical method. Graphical sensitivity analysis.
7		**2.3** The solver optimization module on a spreadsheet. Sensitivity analysis and interpretation.
8		**2.4** Integer linear programming. Modeling. Use of 0-1 variables (logical conditions, fixed charge...).
9	**Part 3.** Decision under uncertainty - Decision with multiple objectives	**3.1** Elements of decision theory. Formulation of a problem, various decision situations (certain, uncertain, stochastic). Decision criteria under uncertainty and risk.
10		**3.2** Decision trees. Decision with additional information. A priori and a posteriori probabilities. Value of information.
11		**3.3** Introduction to multicriteria analysis. Concept of criterion, efficient solution.
12		**3.4** Weighted sum aggregation and its limits. Electre I method.
13	**Final Exam**	

Bibliography

- 1] F. S. Hillier and Lieberman G. J. *Introduction to Operations Research*. McGraw Hill, 10th edition, 2014.
- [2] Ph. Vallin and D. Vanderpooten. *Aide à la décision : une approche par les cas*. Ellipses, Paris, 2000. 3e édition, 2006.

Reference [1] is a standard textbook. Reference [2] (in French) has been especially designed for this course. It contains additional problems with solutions.

MyCourse

This course is on MyCourse: **No**

Academic integrity

Be aware of the rules in Université Paris Dauphine about plagiarism and cheating during exams. All work turned in for this course must be your own work, or that of your own group. Working as part of a group implies that you are an active participant and fully contributed to the output produced by that group.

Academic calendar

Dates (Monday/Sunday)		L3 Gestion
02/09/19	09/08/19	
09/09/19	15/09/19	1
16/09/19	22/09/19	2
23/09/19	29/09/19	3
30/09/19	06/10/19	4
07/10/19	13/10/19	5
14/10/19	20/10/19	6
21/10/19	27/10/19	7
28/10/19	03/11/19	8
04/11/19	10/11/19	9
11/11/19	17/11/19	10
18/11/19	24/11/19	11
25/11/19	01/12/19	12
02/12/19	08/12/19	Review w.
09/12/19	15/12/19	Exams
16/12/19	22/12/19	
23/12/19	29/12/19	Holidays