

### Curricular Unit Form (FUC)

Course:	<b>INDUSTRIAL ENGINEERING MANAGEMENT</b>					
Curricular Unit (UC)	<b>Decision Models</b>				Mandatory	<b>X</b>
					Optional	
Scientific Area:	Engineering and industrial management					
Year: 1º	Semester: 2º	ECTS: <b>6,5</b>		Total Hours: <b>4,5</b>		
Contact Hours:	T:	TP: <b>67,5</b>	PL:	S:	OT:	TT:
Professor in charge		Academic Degree /Title		Position		
<b>José Manuel Prista Cardoso Igreja</b>		<b>PhD</b>		<b>Associate Professor</b>		

T- Theoretical ; TP – Theory and practice ; PL – Laboratory ; S – Seminar ; OT –Tutorial ; TT – Total of contact hours

Entry into Force	Semester: <b>Winter</b>	Academic Year: <b>2016/2017</b>
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#### Objectives of the curricular unit and competences (max. 1000 characters)

This course aims to discuss several methods and tools for supporting process optimization and decision-making. At the end of this course, the students should get the knowledge and skills to:

- Select the most adequate optimization mathematical model to apply in each context.
- Develop competences to build mathematical models that characterize real situations .
- Design scenarios and evaluate alternatives
- Make an analysis of the processes under study and make a "right" and objective decision.

#### Syllabus (max. 1000 characters)

Deterministic models - Models based on linear programming. Sensitivity analysis. Output analysis (Analysis of small and large changes).

Non-probabilistic and probabilistic methods - Decision making under uncertainty. Value of information. Risk premium.

Decision criteria with risk. Decision trees. Theory of utility.

Decision making with multiple objectives (in the absence of uncertainty). Scoring models - Analytic Hierarchy Process (AHP). and TOPSIS.

Game theory in decision processes – concept of game, cooperation and conflict. Zero-sum and non-zero sum games.

Cooperation and mixed strategies. Dominance.

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### Demonstration of the syllabus coherence with curricular unit's objectives (max. 1000 characters)

The aims to be achieved by the students are directly related to the main syllabus topics, being achieved through attendance to classes, solve exercises and accomplish team work' projects related to topics discussed along the semester.

### Teaching methodologies (including evaluation) (max. 1000 characters)

Whenever appropriate the teaching methodology includes lectures with oral presentation, exhibition of real case studies, solving exercises, and use of software in the laboratory.

To develop competences and teamwork skills, students within a group have to perform 4 projects, their reports and its presentation.

In order to be approved, students must:

Have a written exam grade  $\geq 9.5$

Have a project grade  $\geq 9.5$

The final grade is given by the mean of the classifications above.

### Demonstration of the teaching methodologies coherence with the curricular unit's objectives (max. 3000 characters)

Taking into account the aims of this curricular unit, the teaching methodology used allows the students to have contact in class and in the laboratory with pedagogical resources that allow them to obtain theoretical and practical competences on the fundamental concepts of this course.

### Main Bibliography (max. 1000 characters)

Decisions with multiple objectives, R. Keeney, Cambridge Univ. Press

- Investigação operacional, L. V. Tavares et al., McGraw Hill
- Operations management, J. Heizer e B. Render, Prentice Hall
- Management Decision Making, George E. Monahan, Cambridge Univ. Press
- Multiple Criteria Decision Analysis, Belton, V. & T. Stewart, Kluwer Academic Publishers, Boston
- Operations Research: applications and algorithms, Wayne L. Winston, Duxbury Press
- An introduction to management science, D. Andersen, D. Sweeney e T. Williams, Thomson