

Curricular Unit Form (FUC)

Course:	INDUSTRIAL ENGINEERING MANAGEMENT					
Curricular Unit (UC)	Operation and Processes Simulation				Mandatory	
					Optional	X
Scientific Area:	Engineering and industrial management					
Year: 1º	Semester: 1º	ECTS: 5		Total Hours: 3		
Contact Hours:	T:	TP:45	PL:	S:	OT:	TT:
Professor in charge		Academic Degree /Title		Position		
Vitor Manuel Rodrigues Anes		PhD		Assistant Professor		

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

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

It is intended that, at the end of this course, the students get competences and capacities that allow them to:

- Build a mathematical model and simulate processes using a simulation software;
- Develop a critical sense regarding the system performance obtained from the simulation results analysis and perform "what - if" analysis
- Identify opportunities for improvement in the system being studied.

Syllabus (max. 1000 characters)

- 1-Introduction to simulation- simulation concepts; types of simulation models; goals of the study; simulation clock.
- 2 - Fundamental simulation concepts - Queuing theory; Generation methods for probability distributions, activity cycle diagrams, development of simulation models based on events; Components of a simulation model; Manual simulation; Randomness in simulation output; Replication of system output, Comparison of alternatives.
- 3 - Phases of development of a simulation study
- 4- Modeling a system using the Arena
- 5 - Modeling basic operations
- 6 - Advanced modeling of operations
- 7 - Modeling the input of a simulation model
- 8 - Statistical analysis of output from Terminating simulations
- 9 - Statistical analysis of output from Steady-State simulations
- 10 - Statistical characteristics of simulation

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

The chapters of the syllabus correspond to the fundamental concepts referred in the objectives of the curricular unit.

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 ≥ 9.5

Have a project grade ≥ 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)

Law, A. M.; Kelton, W. D. Simulation Modeling and Analysis. Mcgraw-Hill International Edition (2015).

Kelton, W. D.; Sadowski, R.; Sturrock, D. T. Simulation with ARENA. 4th ed., Mcgraw-Hill International Edition (2008).

Pidd, M. Computer Simulation in Management Science. Singapore: John Wiley & Sons (2005).

ARENA 14.0 Standard Edition User's Guide. Rockwell Software