ISEL
ADEM
Área Departamental de Engenharia Mecânica

Curricular Unit Form (FUC)

Course:	**FIRST CYCLE IN MECHANICAL ENGINEERING**					
Curricular Unit (UC)	**Innovation and New Product Development**			Mandatory		
				Optional	**X**	
Scientific Area:	**Mechanical Project, Manufacturing and Industrial Maintenance**					
Year: 2º	Semester: **1º**	ECTS: **5,0**		Total Hours: **3,0**		
Contact Hours:	T:	TP:**45**	PL:	S:	OT:	TT:
Professor in charge		Academic Degree /Title		Position		
Ana Sofia Martins da Eira Dias		**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**

Objectives of the curricular unit and competences (max. 1000 characters)

This Curricular Unit aims to present the innovative methodological tools of new product development from the early stages of design and conception up to its launch production thus preparing students for a work environment where This Curricular Unit associates the activities of production and design of innovative products both in the consumer market (voice of customer) and suppliers (of components and modules) that can jointly participate of open innovation and co-innovation upstream and downstream in co-design networks. It is also intended to prepare students for the emerging labor market of new products launch, which is becoming more common in the Portuguese industrial sector in place of not innovative and not add value-adding industries.

Syllabus (max. 1000 characters)

1 - Introduction to the General Model of Innovation and DNP: concepts of product; new product and innovation.
2 - Systemic and Strategic Environment: Risk, uncertainty and trade-offs.
3 - Organizational Parameters: multidisciplinary operation; strategic partnerships; collaborative networks; open innovation and co-innovation; lean thinking.
4 - DNP process variables - Idea and design: project management: sequential, spiral, stage-gate and concurrent engineering.
5 – DNP Problems and Solutions – DNP Support Tools; TRIZ (40 inventive principles, matrix of contradictions and Sfield); creative design; axiomatic design; Pugh analysis; DOE DFX; Solutions with Involvement of Suppliers (SDI); QFD; Model of Kano; HOQ; BSC; DFMEA; DFSS and it's usable cycles.
6 – Robust, tolerance and modular design.
7 – Support tools for decision and ranking: portfolio tools; CBR; fuzzy and neural networks; AHP.
8 - Final Critical to the General Model of Innovation and DNP.

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Demonstration of the syllabus coherence with curricular unit's objectives (max. 1000 characters)
The topics covered in this Curricular Unit are associated with the concepts inherent in the various phases of engineering, product, product and process design as well as its connection with suppliers upstream and the market/customers downstream. This UC aims to consolidate multiple knowledge already acquired before. At the end of this UC, students should be able to make decisions in the field of engineering, on the use of innovative and development of new products tools based on the programmatic content and focusing on the interaction of academic, technical and professional aspects. The UC is organized in theoretical and practical classes and seminars. In class, the topics that integrate the program are shown and discussed and implementation problems are proposed to students.

Teaching methodologies (including evaluation) (max. 1000 characters)
Classes will be taught using slides and presentation of explanatory diagrams of processes to address. Exercises and case study application of the matters under consideration will be conducted. The evaluation method is continuous and is based on the resolution of an individual mandatory written exam on all subjects taught - (50% of the final grade) and on the implementation of a mandatory individual work with literature review similar approach to conference Article - (50% of the final grade).

Demonstration of the teaching methodologies coherence with the curricular unit's objectives (max. 3000 characters)
1 - Students can take the MAIDNP as a working process - Comprehensive and Integrated Model of Development of New products. 2 - Students should understand the NPD strategic summit. 3 - Students should understand the NPD organizational environment. 4 - Students should understand the NPD operational envelope. 5, 6 and 7 - Students should acquire skills in NPD support tools (both methodological and instrumental); 8 - Students should use the material taught in case study / required individual work.

Main Bibliography (max. 1000 characters)
Edição do Estado do Brasil, https://pt.wikipedia.org/wiki/Manual_de_Oslo . Ulrich, K. T. e Eppinger, S. D., 2012, Product, Design and Development, 5th Edition, Irwin McGraw-Hill, 2012. Yang, K. e El-Haik, S. B., 2009, Design for Six Sigma – A Roadmap for Product Development, Second Edition, McGrawHill. Tennant, G., 2002, Design for Six Sigma, Gower Publishing Ltd. Bullinger, H-J., Warschat, J. e Fischer, D., 2000, Rapid Product development — an overview, Computers in Industry, 42, pp. 99–108. Yang, C-C. e Chen, J., 2011, Accelerating preliminary eco-innovation design for products that integrates case-based reasoning and TRIZ method, Journal of Cleaner Production, 19, pp. 998–1006