ISEL
ADEM
Área Departamental de Engenharia Mecânica

Curricular Unit Form (FUC)

Course:	**FIRST CYCLE IN MECHANICAL ENGINEERING**					
Curricular Unit (UC)	**Applied Mechanics**			Mandatory		
				Optional		
Scientific Area:	**Mechanical Project, Manufacturing and Industrial Maintenance**					
Year: **1**	Semester: **2**	ECTS: **5,5**		Total Hours: **4,5**		
Contact Hours:	T: **45,0**	TP:**22,5**	PL:	S:	OT:	TT:
Professor in charge		Academic Degree /Title		Position		
João Filipe de Almeida Milho		**PhD**		**Professor Adjunto**		

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)

Provide students with scientific concepts of mechanics of rigid bodies, which can be used to model, describe and forecast real phenomena. It is intended that students learn to apply these concepts as a tool in engineering systems analysis.

The fundamental objective of curricular unit is to enable the student to be able to, from real mechanical systems, create a free body model that accurately describes its mechanical behavior in static analysis.

Syllabus (max. 1000 characters)

Introduction to Mechanics.

Static equilibrium of rigid bodies: Vector of forces and couple; Resulting force and couple; Concept of rigid body; Equivalent force-couple system; Center of gravity, center of mass and centroids; Free-body diagram; Static equilibrium equations of rigid bodies in two (2D) and three (3D) dimensions.

Analysis of loads in structures and mechanical systems components: Loads in bars, beams and cables; Static analysis of trusses; Static equilibrium of components of structures and mechanical systems.

Analysis of mechanical systems components considering friction. Dry friction definition, friction forces and laws of dry friction.

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Demonstration of the syllabus coherence with curricular unit's objectives (max. 1000 characters)
The fundamental concepts of the syllabus are progressively introduced in class, and, whenever possible, based on real structural or mechanics systems, allowing students perceive either the qualitative or quantitative aspects. The sequence of the syllabus leads the student to understand the static behaviour of components of structures and mechanical systems. Understanding the interaction of multiple components and the perception of the importance of a balanced analysis of structures and mechanical systems, represent essential methodologies to the achievement of the fundamental objectives of the course.

Teaching methodologies (including evaluation) (max. 1000 characters)
Teaching will consist of lectures, and mixed theoretical-practical classes. Lectures will have brief talks over each theme, followed by practical examples, where it is intended that the students consolidate the concepts studied. In the theoretical-practical classes, the students will apply the acquired knowledge to the solution of exercises. The assessment is carried out through continuous assessment or final exam. The continuous assessment involves two written tests and the final grade is the result of the arithmetic average of the two tests. The final exam assessment is performed through a written exam.

Demonstration of the teaching methodologies coherence with the curricular unit's objectives (max. 3000 characters)
In teaching methodologies are used different methods that enable the objectives of the course. Depending on the characteristics of concepts to transmit are used theoretical or theoretical-practical classes, which is a harmoniously set that aims the students to understand the fundamental concepts associated with program content. In class lectures and practices are used the potential of new multimedia systems and made the use of computer programs, namely symbolic computation, for development of models for analyzing the static and dynamic behavior of structures and mechanical systems, considered as rigid bodies.

Main Bibliography (max. 1000 characters)
Engineering Mechanics: Statics (13th Edition), Russell C. Hibbeler, Prentice-Hall. Vector Mechanics for Engineers: Statics (10th Edition), Ferdinand Beer, E. Russell Johnston

Jr., David Mazurek, McGraw-Hill.

Engineering Mechanics: Statics (8th Edition), J. L. Meriam, L. G. Kraige, J. N. Bolton, Wiley.