POLITEHNICA University of Bucharest (**UPB**)
Faculty of Industrial Engineering and Robotics (**FIIR**)
Study Programme: Industrial Engineering (**IE**)
Form of study: Licence (Bachelor)

COURSE SPECIFICATION

Course title:	**TOLERANCES DESIGN**	***Semester:***	4
Course code:	UPB.06.D.04.O.001	***Credits (ECTS):***	4

Course structure	Lecture	Seminar	Laboratory	Project	Total hours
Number of hours per week	2	-	2	-	4
Number of hours per semester	28	-	28	-	56

Lecturer	Lecture	Seminar / Laboratory / Project
Name, academic degree	Prof. PhD. Eng. Nicolae IONESCU	Lecturer PhD. Eng. Daniel MANOLACHE
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Course description:

Given the overall context of product development, that tolerance is part of, the first chapter, „Basics of products and their characteristics", gives an overview of certain defining notions associated with product quality, the notion of „product", the main categories of products, and product characteristics, as well as the importance of tolerance in the case of products' characteristics, at the product development stage. In the second chapter „Deviation, tolerance and accuracy of product characteristics", the authors have attempted a more general definition of deviation, tolerance and precision of product characteristics. Basically, the authors' view is that the concept of precision prescription of product constructive characteristics or their tolerance relies heavily on identifying and solving three main issues. The first issue is related to the identification of the sizes that influence the prescribing precision of product characteristics. For example, in the case of the pieces and surfaces associated with them, the main characteristics analysed are: size, the macro-geometrical shape, the micro-geometrical shape, the relative position and the assembly precision. When considering these characteristics, the identification of the measurements that establish prescribed precision must take into consideration the following aspects: defining, symbolizing, calculus relations, and graphic design. Another important issue is setting the values of the dimensions that determine the prescribed precision of product characteristics. Finally, the third major issue to be considered when prescribing the precision of product characteristics is the way we inscribe the precision in drawings. Starting from the considerations mentioned above, and according to the main characteristics of the pieces, sub-assemblies and assemblies, chapters 3, 4, 5, 6, and 7 explain how one may solve the three issues related to the precision prescription of the five essential features of pieces and surfaces associated with them, namely size, the macro-geometrical shape, the micro-geometrical shape, the relative position and the assembly precision, respectively. In chapter 8, we present the theory of dealing with linear dimensional chains. In this chapter, the authors have taken an original approach, with a high degree of generalization. Chapters 9-14 present the precision prescription of certain characteristic surfaces and assemblages, such as: cone surfaces and cone assemblage, ball-bearing surfaces and ball-bearing assemblage, keys, slots and key assemblage, splines surfaces and splines assemblies, thread parts and thread assemblage and gears teeth and gearing.

Laboratory description:

In the works is pursuing theoretical and practical skills training so that the student
- Be able to analyze and interpret all aspects of precision (dimensions, micro and macro-geometric form, position etc.) existing in assembly and execution drawings;
- Be able to establish the values of sizes necessary in accuracy prescription, including the choice of appropriate standardized values;
- Be able toinscribe precision in the drawings based on individual and general tolerance, in design activity, in accordance with the provisions of the standards;
- Be able to use creative prescription prescribing in professional projects involving complex assembly drawings, including computer-aided design;
- Be able to take decisions on the tolerance of features, taking into account the functional role of parts and surfaces and to take responsibility for their consistency with the functional role and prescription rational tolerances on addiction cost -tolerance.

Intended learning outcomes:

- Learning of concepts and terminology used in prescription and measurement- evaluation of the precision of product characteristics
- Acquiringknowledge aboutprescribingprecision of dimensions, macro-geometric form, micro-geometric form and relative positions of the surfacesandassemblies;
- Acquiring knowledge about prescribing precision of dimensional chain solving;

- Acquiring knowledge about prescribing precision of surfaces and assemblies of cones, ball-bearings, key, channelling, threads and gears;
- Settingand deepeningknowledge regarding precision prescription of dimensions, macro-geometric form, micro-geometric form and relative positionof the surfacesandassemblies
- Settingand deepeningknowledge regarding dimensional chain solving;
- Settingand deepening practical knowledge regarding precision prescription of some surfaces and assemblies - cones, ball-bearings, key, channelling, threads and gears.

Assessment method:	% of the final grade	Minimal requirements for award of credits
Written exam	40	**Examination**, 3 written topics (3x 10 points) + 1 oral topic (10 p) Knowledge for mark 5: minimum 20 p obtained Knowledge for mark 10: 40 p obtained
Report / project	-	-
Homework	10	5 homework with 2 p each
Laboratory	20	Examination in sessions - Knowledge for mark 5: minimum 10 p obtained - Knowledge for mark 10: 20 p obtained
Other	30	1 point for attendance at each course Semester verification paper - 2 topics written x 8 points each

References:

[1] Henzold G., Geometrical Dimensioning and Tolerancing for Design, Manufacturing and Inspection, A Handbook for Geometrical Product Specification using ISO and ASME Standards, Published by Elsevier Ltd, 2006

[2] Ionescu, N., Vişan, A., Manolache, D., Nistor, C., *Tolerances Design,* Editura PRINTECH, Bucureşti, 2016.

[3] Ionescu, N., Manolache, D., *Tolerances Design,* e-learnig platform documents.

[4] ***, ISO 1101/2017

[5] ***, ASME Y14.5/2018

Prerequisites:	***Co-requisites*** ***(courses to be taken in parallel as a condition for enrolment):***
Technical Drawing, Mathematics	Probability and Statistics

Additional relevant information:

The course is based on the last ISO standards

Date:
Professional degree, Surname, Name:
Prof. PhD. Eng. Nicolae IONESCU
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