POLITEHNICA University of Bucharest (**UPB**)
Faculty of Industrial Engineering and Robotics (**IIR**)
Study Programme: Industrial Engineering (**IE**)
Form of study: Master

COURSE SPECIFICATION

Course title:	**ADDITIVE MANUFACTURING - PROJECT**	***Semester:***	**2**
Course code:	**UPB.06.M2. O. 04**	***Credits (ECTS):***	**3**

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

Lecturer	Lecture	Seminar / Laboratory / Project
Name, academic degree	Prof.dr.ing.ec. DOICIN Cristian Sl.dr.ing.ec. ULMEANU Mihaela-Elena	
Contact (email, location)	cristian.doicin@cont-edu.pub.ro mihaela.lupeanu@yahoo.com	

Project description:
The project is comprised of 4 main chapters, which constitute the follow-up of the additive manufacturing process for a specific part. At the beginning of the project each student is given a part within an assembly. The development and manufacturing of each unique product constitutes the theme of the project. In order to complete the scheduled project tasks, students will need to cover the following topics, related to their own individual part: PART ANALYSIS: Working environment of the part – Assembly description, Part surface identification, Establishing the type of surface and manufacturing method, Part function definition and surface function identification, Surface stress in operation, Prescribed material characteristics; PART MODELLING: 2D Modelling, 3D Modelling; PART MANUFACTURING USING AM TECHNOLOGIES: Part manufacturing using 3DP, FTI and FDM. During the project sessions students will receive electronic and printed materials and bibliography. Work is undertaken on individual computers and 3D printers. Each student will be working with individual tool kits for post-processing operations.
Intended learning outcomes:

Amongst the intended learning outcomes are some of the following:

- Identifying the appropriate AM technology in relation to the end-use of a given part;
- Designing in accordance with specific AM technologies requirements;
- Designing, evaluating and selecting the optimum print layout for FTI®, FDM and 3DP® technologies;
- Acquiring knowledge regarding AM post-processing operations depending on the product end application;

- Correlating the general function of the product and the surface functions with geometrical requirements and AM capabilities;
- Designing the appropriate manufacturing process for a given part in relation to its' final use.

Assessment method:	% of the final grade	Minimal requirements for award of credits
Written exam	20 %	• 1 practical topic (20 points) • Knowledge for grade 5: minimum 10 p obtained • Knowledge for grade 10: 20 p obtained
Project	80 %	On-going examination during project sessions: • Knowledge for grade 5: minimum 40 points obtained • Knowledge for grade 10: 80 points obtained

References:

[1] Munir M. Hamad, AutoCAD 2010 - Essentials, Jones and Bartlett Publishers;
[2] Autocad 2011 for Dummies , Wiley-2010-Ed1;
[3] Wohlers, Wohlers Report 2014: Additive Manufacturing State of the Industry Annual Worldwide Progress Report, Wohlers Associates, Inc., Colorado, USA, 2014.
[4] Bopaya Bidanda, Paulo Bartolo (Editors), "Virtual Prototyping & Bio Manufacturing in Medical Applications", Springer; ISBN: 10: 0387334297, 2008.
[5] K. Ulrich, S. Eppinger, Product Design and Development, 4th Edition McGraw Hill Publishing Company Ltd., 2009.
[6] Taylor J.C. , Additive Manufacturing Centres of Excellence – An update to the Quality approach, Morris Technologies Inc., Rapid Quality Manufacturing, MBA, 2009.
[7] Ullman D, G., The Mechanical Design Process, Mc Graw-Hill, 4th edition, 2009.
[8] ***Solid Works, Dasault Systems

Prerequisites:	***Co-requisites*** ***(courses to be taken in parallel as a condition for enrolment):***

Computer Aided Design	Additive Manufacturing

Date: 13.06.2017

Professional degree, Surname, Name:

Prof.dr.ing.ec. DOICIN Cristian

Sl.dr.ing.ec. ULMEANU Mihaela-Elena