POLITEHNICA University of Bucharest (**UPB**)
Faculty of Engineering and Management of Technological Systems (**IMST**)
Study Programme: Industrial Engineering (**IE**)
Form of study: Licence (Bachelor)

COURSE SPECIFICATION

Course title:	Integrated Production Systems	***Semester:***	7
Course code:	UPB.06.S.07.O.004	***Credits (ECTS):***	6

Course structure	Lecture	Seminar	Laboratory	Project	Total hours
Number of hours per week	2		2	2	6
Number of hours per semester	28		28	28	84

Lecturer	Lecture	Seminar / Laboratory / Project
Name, academic degree	Cicerone Laurentiu POPA, Lecturer Dr. Eng.	Cicerone Laurentiu POPA, Lecturer Dr. Eng.
Contact (email, location)	laur.popa79@gmail.com IMST faculty, CK110 room	laur.popa79@gmail.com IMST faculty, CK110 room

Course description:

Thefollowing topics are presented:

1. Concepts and terminology of integrated production systems.
2. Definition and characterization of manufacturing architecture structural elements.
3. Concentrated and diffused production systems.
4. Discrete material flow management.
5. Continuous material flow management. Hybrid material flow management.
6. Workpieces, tools, parts and products material flow in manufacturing systems.
7. Establishing trajectories for workpieces, tools and parts material flow.
8. Structural elements parameterization (work points, transfer and transport systems, storage systems).
9. Flexibility and automation in manufacturing systems.
10. Common and specific algorithms for diffused and concentrated systems.
11. Integrated production systems simulation and diagnosis.
12. The bottlenecks identification methods.
13. Material flow optimization method for integrated production systems.
14. Economic impact analysis methods.
15. Quantifying the productivity for a modelled manufacturing architecture.

Seminar / Laboratory / Project description:

During the lab sessions students will learn how to use Witness Horizon to obtain the 3D system components, to define the links between structural elements, to establish the material flow trajectories, to make the structural elements parameterization, to run a material flow simulation, to identify the bottlenecks, to create and to analyze reports in order to choose a flow optimization method (technological or functional). The project is focused on using Witness Horizon software for the modelling, the simulation and the optimization of integrated production systems.

Intended learning outcomes:
Students will gain knowledge and develop competences regarding the following: • The design of manufacturing systems integrated in flexible production architectures. • Establish material flow trajectories for work pieces, tools and parts. • Structural elements parameterization (work points, transfer and transport systems, storage systems). • Material flow simulation and identificationof bottlenecks. • Material flow optimization methods for integrated production systems. • Methods of quantifying productivity for a modelled manufacturing architecture.

Assessment method:	% of the final grade	Minimal requirements for award of credits
Written exam	40%	At least 12.5 points for the Project At least 10 points for the Laboratory At least 50 points out of a total of 100 points
Project	25%	
Homework	-	
Laboratory	20%	
Other	15%	

References:	
1. Cachon, Gerard, Christian Terwiesch, Matching Supply with Demand: An Introduction to Operations Management, 3rd edition, ISBN 978-0073525204, Irwin - McGraw Hill, 2012 2. Cotet, C.E.; Popa, C.L.; Enciu, G., Popescu, A. &Dobrescu T., Using CAD and flow simulation for educational platform design and optimization, International Journal of Simulation Modelling IJSIMM, vol. 15, no. 1, March 2016, p.5-15, ISSN 1726-4529. 3. Coteţ C.E., Popa C.L., Anghel F. (2009) – Manufacturing architecture design using discrete material flow management – International Journal of Simulation Modelling IJSIMM, no. 4, vol. 8, December 2009, p.206-214, ISSN 1726-4529. 4. Popa C.L., Cotet C. E., Ionita V. and Gavrila St. - Modelling processing cell architecture by material flow simulation, Procedia Engineering 100, pp 334 – 339, Published by Elsevier Ltd. doi:10.1016/j.proeng.2015.01.376, 2015 5. Manual Witness Horizon	
Prerequisites:	***Co-requisites*** ***(courses to be taken in parallel as a condition for enrolment):***
Computer Aided Design, Databases	
Additional relevant information:	
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Date: 06.07.2016
Professional degree, Surname, Name: Lecturer Dr. Eng. Cicerone Laurentiu POPA