University POLITEHNICA of Bucharest

Faculty of Industrial Engineering & Robotics

Study programme: Industrial Engineering

Form of study: Bachelor

COURSE SPECIFICATION

Course title	Integrated Production Systems	Semester	7
Course code	UPB.06.S.07.O.005	ECTS	7

Course structure	Lecture	Seminar	Laboratory	Project	Total hours
No. of hours/ week	3		2	2	7
No. of hours/ semester	42		28	28	98

Lecturer	Lecture	Seminar	Laboratory	Project
Name, academic degree	Cicerone Laurentiu POPA, Assoc.Prof.Dr.Eng.		Cicerone Laurentiu POPA, Assoc.Prof.Dr.Eng.	Florina CHISCOP, Lecturer.Dr.Eng.
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Course description:

- **Concepts and terminology of integrated production systems.**
- **Definition and characterization of manufacturing architecture structural elements.**
- **Concentrated and diffused production systems.**
- **Discrete material flow management. Continuous material flow management. Hybrid material flow management.**
- **Workpieces, tools, parts and products material flow in production systems.**
- **Structural elements parameterization (work points, transfer and transport systems, storage systems).**
- **Material flow digital twinning in the Industry 4.0 paradigm**
- **Flexibility and automation in production systems.**
- **Common and specific algorithms for diffused and concentrated systems.**
- **Integrated production systems simulation and diagnosis.**
- **Material flow optimization method for integrated production systems.**
- **Economic impact analysis methods. Quantifying the productivity for a modelled manufacturing architecture.**

Laboratory description:

- **Witness Horizon general presentation.**
- **Case studies made in Witness Horizon.**

- **Using Witness Horizon for structural elements modelling and production systems modelling.**
- **Defining the links between structural elements and establishing the material flow trajectories using Witness Horizon.**
- **Structural elements parameterization using Witness Horizon.**
- **Material flow simulation and bottlenecks identification using Witness Horizon.**
- **Report analysis in order to choose a flow optimization method (technological or functional) using Witness Horizon.**
- **Material flow simulation in order to validate the identified optimization solutions using Witness Horizon.**
- **Economic impact analysis.**

Project decsription:

- **Generic case study – System modelling, simulation and optimization.**
- **Concentrated system modelling, simulation and optimization.**
- **Diffused system modelling, simulation and optimization.**
- **Modelling, simulation and optimization of integrated production systems**

Assessment methods	Percentage of the final grade	Minimal requirements for award of credits
Written exam	40	• Laboratory and project attendance is mandatory • At least 7.5 points for the Laboratory • At least 12.5 points for the Project • At least 50 points out of a total of 100 points
Written paper	20	
Laboratory	15	
Project	25	

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. **C.E. Cotet, C.L. Popa, G. Enciu, A. Popescu and C.E. Stoica - Material flow digital twinning in the Industry 4.0 paradigm, Proceedings of the 14th International Conference on Management and Innovative Technologies - MIT 2016, pg. 43-49, ISBN 978-961-6980-17-3, 2016.**
5. **C.E. Cotet, C. Doicin, G. Jiga, C.L. Popa, Groundhog Day versus the Butterfly Effect in Industrial Engineering, Proceedings of the 13th International Conference on**

Management and Innovative Technologies (MIT 2014), ISBN 978-961-6536-76-9, pag. 1-5, Fiesa, Slovenia, 2014.
6. Manual Witness Horizon

Prerequisites (recommended)	Co-requisites (courses to be taken in parallel as a condition for enrolment)
Computer Aided Design 1&2; System and Project Management; Production and Operation Management.	

Additional relevant information:
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Date: **24.05.2022**