



Co-funded by the
Erasmus+ Programme
of the European Union



HEIn4.0

Deliverable of Erasmus+ project

***Boosting the role of HEIs in the industrial transformation towards the
Industry 4.0 paradigm in Georgia and Ukraine / HEIn4***

609939-EPP-1-2019-1-BE-EPPKA2-CBHE-JP

Produced under Activity 2.2.1

HEI: *Odessa I.I. Mechnikov National University*

SYLLABUS

"Business Management Industry 4.0"

European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein

Name of discipline	Integration of Industry 4.0 to Manufacturing Operations
Code and specialty name	073 Management
Name of educational program	Management
Higher education level	First (bachelor's)
Status of discipline	Selective discipline of the training cycle (professional) training
Scope of the discipline in ECTS	3 ECTS (90 academic hours)
Term of the discipline	2nd semester (VIII quarter)
Name of the department teaching the discipline	Department of Management and Innovations
Leading teacher (lecturer)	Iryna Nyenno, Professor, Doctor of Economics
Language of instruction	Ukrainian
Prerequisites for study	<p>The training is conducted in a specialized laboratory “Specialized classroom Virtual Learning Factory Industry 4.0”. The study should be preceded by the learning of disciplines:</p> <ul style="list-style-type: none"> - Management, Leadership, Business Planning, Innovation Economics.
Purpose	The discipline is aimed at acquisition of theoretical and applied knowledge on instrumental support of the management process at the micro and macro levels of the economy in the context of interaction with the technologies of the fourth industrial revolution and artificial intelligence.

Competences provided	<p>Students shall obtain:</p> <ul style="list-style-type: none"> - Competence to determine the level of digitalization of projects and enterprises using the software product SMEART; - Competence to build the architecture and modeling of management information systems. Be able to model and simulate industrial processes; - Competence to apply guidelines for the use of artificial intelligence, machine learning and robotics - the use of avatars and chatbots in the learning process for consultation, testing and design of individual learning routes for students; - Competence to manage the enterprise architectonics in Industry 4.0; - Competence to set performance targets for production systems and monitoring their performance in real time; - Competence to integrate production systems into supply chains and management on the principles of customer orientation.
-----------------------------	--

Learning outcomes	<p>As a result of study the students must know:</p> <ul style="list-style-type: none"> ✓ key trends and processes of Industry 4.0: Big Data Analytics; Autonomous works; Modeling; Horizontal and vertical integration; Industrial Internet of Things; Cybersecurity; Clouds; Additive production; Virtual reality; ✓ how independently integrate and interact with the main features of Industry 4.0: through the Internet of Things and Internet services, where cyberphysical systems are industrial equipment, robots, CNC machines and diagnostic modules combined with information systems, in which there is a modeling and control of technological processes. <p>be able to:</p> <ul style="list-style-type: none"> ✓ analyze the process of creating a flow of value added in innovative production: analysis, implementation design; ✓ identify opportunities to get rid of unnecessary costs (muda, waste); ✓ design, configure and adjust management systems in the context of "Industry 4.0" business performance; ✓ build a system of indicators in terms of using augmented reality and digitalization of management; ✓ use the main indicators of efficiency and effectiveness of management in the impact of Industry 4.0. apply modern experimental methods to assess quality of materials in lab and in industrial conditions; use knowledge and skills for operating, maintenance and production control; <p>The discipline ensures the achievement of the following learning outcomes:</p> <ul style="list-style-type: none"> ✓ Knowledge of the principles of design management systems for Industry 4.0; ✓ Ability to virtualization - integration of simulation and virtual information models with real technological processes, both at the stage of process design and during their implementation; ✓ Ability to perform and monitor business management system in Industry 4.0 based on the key performance indicators (KPI) with specialized software.
Course content	<p><i>Module 1.</i> Externalities of influence on the management system in Industry 4.0</p> <p>Topic 1. Theoretical principles and practical approaches to the management of the digital age.</p> <p>Topic 2. The main features of Industry 4.0</p> <p><i>Module 2.</i> Practical principles of forming a management system in Industry 4.0 technology parks</p> <p>Topic 3. Creating a flow of value in the management system.</p> <p>Topic 4. Criteria and indicators of the process of training management in the context of Industry 4.0</p> <p>Topic 5. Advanced technologies Industry 4.0 in the content and means of modern education</p>

Measurement	<p>Assessment of the Modules is based on the results of test which includes questionnaire and assignments.</p> <p>Each module is graded on a 100-point scale. The final grade of the discipline is defined as the arithmetic mean of 2 modular grades.</p>
Specific learning tools/equipment	<p>Use of a multimedia system, application software, Laboratory equipment: Monitor Dell U4320Q with cable HDMI 10m; Motorized Screen Lumi 150"; Multimedia projector XGIMI HALO 3D 4K with cable; Server Dell PowerEdge T40v14 64G; Specialized software for 3D visualization; Software license Business Studio 5 Enterprise + Business Studio Portal 5, etc.</p>

Recommended literature	<p><u>Ukrainian</u></p> <ol style="list-style-type: none"> 1. Higher education towards the fourth industrial revolution: cases from European and Ukrainian experience. Monograph. Dnipro. "Printing Accident Firm", 2021. - 68 p. Editorial Board: P. Avila, G. De Lepeleer, V. Kordas, M. Melnichuk, I. Nenno, R. Pedroza, A. Petrenko, F. Saei, J.F. Silva, V. Trumpet, I. Shvets. https://hein4.net/ckeditor_files/files/1/case-study_UA_HEIn4.pdf 2. Nyenno I.M., Hrinchenko Yu.L. Innovative forms of integration in high-tech sectors of the economy ; edited by L.O. Voloshchuk, Ye.I. Maslennikov. – Kherson : OLDI-PLIuS, 2019. – Book 4. – 524 s. - s. 483 – 504. 3. Nyenno I. M. Methodology of mastery of management personnel preparation // Economics: the realities of time. Scientific journal. - 2020. - № 2 (48). - P. 59-65. - Journal access mode: https://economics.opu.ua/files/archive/2020/No2/59.pdf. DOI: 10.15276 / ETR.02.2020.8. DOI: 10.5281 / zenodo.3976889. 4. Kuznietsov E.A. Concepts of integral quality of professional management system. Odesa: Fenyks, 2020. – 114p. https://hein4.net/ckeditor_files/E_Kuznetsov_mc_1602503308.pdf <p><u>English:</u></p> <ol style="list-style-type: none"> 5. ERASMUS+ «Boosting the role of HEIs in the industrial transformation towards the Industry 4.0 paradigm in Georgia and Ukraine (HEIn4). http://www.hein4.net 6. Nyenno, I., Truba, V., Lomachynska, I., Mazur, O. Digital public goods as a means to support affordable and clean energy. <i>Polityka Energetyczna – Energy Policy Journal</i>, 2021. 24 (4). C. 139-152. https://doi.org/10.33223/epj/144907 (Scopus) 7. Abele, Eberhard, Joachim Metternich, Michael Tisch, George Chrysosouris, Wilfried Sihn, Hoda ElMaraghy, Vera Hummel, and Fabian Ranz. 2015. “Learning Factories for Research, Education, and Training.” <i>Procedia CIRP</i> 32 (C1f): 1–6. https://doi.org/10.1016/j.procir.2015.02.187. 8. Carlsberg, Carolin Moeller; Jan Smit; Stephan Kreutzer; alin. 2016. “Industry 4.0 Analytical Study.” European Parliament. https://doi.org/10.1017/CBO9781107415324.004. 9. Cotteleer, Mark, and Brenna Sniderman. 2017. “Forces of Change: Industry 4.0.” <i>Deloitte Insights</i>, 1–20. https://doi.org/10.1007/s11947-009-0181-3. 10. Deloitte Development. 2018. “The Fourth Industrial Revolution Is Here—Are You Ready?” <i>Deloitte Insights</i>, no. January 22. 11. Hagel, J., J. S. Brown, R. Mathew, M. Wooll, and W. Tsu. 2015. “The Lifetime Learner,” 1–19. http://www.theatlantic.com/sponsored/deloitte-shifts/the-lifetime-learner/256/. 12. Mourtzis, D., E. Vlachou, G. Dimitrakopoulos, and V. Zogopoulos. 2018. “Cyber- Physical Systems and Education 4.0 -The Teaching Factory 4.0 Concept.” <i>Procedia Manufacturing</i> 23 (2017): 129–34. https://doi.org/10.1016/j.promfg.2018.04.005. 13. Rojko, Andreja. 2017. “Industry 4.0 Concept: Background and Overview.” <i>International Journal of Interactive Mobile Technologies</i>
-------------------------------	---

	11 (5): 77–90. https://doi.org/10.3991/ijim.v11i5.7072 .
	14. Business Studio Manual. https://www.businessstudio.ru/wiki/docs/current/doku.php/ru/manual/manual
	15. VRinSight Best Practice Showcase. 25 best practice examples of VR applications and software suitable for Higher Business Management education. https://www.vrinsight.org/downloads/

Workload

	Total
Total hours according to the curriculum	90
including: Classroom	
of which:	26
- lectures	
- laboratory work	10
- practical classes	4
- seminars	0
Independent work	50
including:	10
- preparation for classroom classes	
- preparation for modular control activities	0
- implementation of course projects (works)	0
- implementation of individual tasks	30
- elaboration of sections of the program that are not taught in lectures	20
Semester control	Exam

Approved at the meeting of the quality assurance group of the educational program "Management" (Protocol № 5 of 20.12.2021).

Guarantor of the educational program, Prof. I. Nyenno