

COURSE MODULE OUTLINE

General Information

SCHOOL	Social Sciences		
PROGRAM COURSE	Supply Chain Management		
LEVEL OF STUDY	Postgraduate		
COURSE UNIT CODE	SCM44	Year / Semester	Year 2 / 3 rd Semester
COURSE TITLE	Industry 4.0 Technologies in Supply Chain and Logistics		
INDEPENDENT TEACHING ACTIVITIES <i>in case credits are awarded for separate components/parts of the course, e.g. in lectures, laboratory exercises, etc. If credits are awarded for the entire course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	CREDITS
Weekly study workload: 21-22 hours x 13 weeks		21-22	10
<i>Add rows if necessary. The organization of teaching and the teaching methods used are described in detail under section 4</i>			
COURSE TYPE Compulsory, Optional, Optional mandatory	Optional		
PREREQUISITE COURSES:	n/a		
LANGUAGE OF INSTRUCTION AND EXAMS:	English		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	https://courses.eap.gr/course/view.php?id=394 Each course has its own space at the Hellenic Open University's digital education space (http://courses.eap.gr), with controlled access (use of credentials) for students and the teaching staff.		

(2) LEARNING OUTCOMES

Learning Outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate (certain) level, which students will acquire upon successful completion of the course, are described in detail. It is necessary to consult:

APPENDIX A

- Description of the level of learning outcomes for each level of study, in accordance with the European Higher Education Qualifications' Framework.
- Descriptive indicators for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and

APPENDIX B

Guidelines for writing Learning Outcomes

Upon successful completion of this module, the students will be able to:

- Explain the key concepts, technologies and principles of Industry 4.0 and articulate their relevance to modern supply chain and logistics systems, especially in globalized supply chain networks.
- Critically analyze how IoT, AI, robotics, blockchain and big data analytics are transforming supply chain operations management focusing on real-world applications and case studies.
- Design a digital transformation strategy for supply chain management, integrating relevant Industry 4.0 technologies to improve performance, visibility and responsiveness.
- Evaluate the potential benefits and limitations of adopting Industry 4.0 technologies, including their impact on efficiency, transparency, agility and sustainability.
- Apply data-driven decision-making techniques, using AI and big data analytics tools, to solve complex supply chain and logistics challenges.
- Assess the organizational, legal, ethical and security implications of implementing smart technologies in supply chain networks.

General Competences

Taking into consideration the general competences that students/graduates must acquire (as those are described in the Diploma Supplement and are mentioned below), at which of the following does the course attendance aim?

Search for, analysis and synthesis of data and information by the use of appropriate technologies,

Adapting to new situations

Decision-making

Individual/Independent work

Group/Team work

Working in an international environment

Working in an interdisciplinary environment (Other.....citizenship, spiritual freedom, social

Introduction of innovative research

Project planning and management

Respect for diversity and multiculturalism

Environmental awareness

Social, professional and ethical responsibility and sensitivity to gender issues

Critical thinking

Development of free, creative and inductive thinking

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awareness, altruism etc.)

- Search for, analysis and synthesis of data and information by the use of appropriate technologies
- Adapting to new situations
- Decision-making
- Individual/Independent work
- Group/Teamwork
- Critical thinking
- Development of free, creative and inductive thinking
- Working in an interdisciplinary environment
- Introduction of innovative research

(3) COURSE CONTENT

This module explores the transformative impact of Industry 4.0 technologies on supply chain and logistics operations. It provides students with a comprehensive understanding of digital innovations like the Internet of Things (IoT), Artificial Intelligence (AI), Robotics, Blockchain and Big Data Analytics and their applications in creating smart, efficient and responsive supply chains. In particular, the course includes the following topics:

1. Introduction to Industry 4.0 and Smart Supply Chains
 - Evolution of industrial revolutions and the emergence of Industry 4.0.
 - Key principles and technologies underpinning Industry 4.0.

- Concept of smart supply chains and their characteristics.
- 2. Internet of Things (IoT) in Supply Chain Management
 - IoT architecture and components relevant to supply chains.
 - Applications of IoT for real-time tracking, monitoring, and inventory management.
 - Case studies on IoT-enabled supply chain visibility and efficiency.
- 3. Artificial Intelligence and Machine Learning Applications
 - Fundamentals of AI and machine learning in the context of supply chains.
 - Predictive analytics for demand forecasting and inventory optimization.
 - AI-driven decision support systems and their implementation.
- 4. Robotics and Automation in Logistics
 - Role of robotics in warehousing, material handling, and order fulfillment.
 - Autonomous vehicles and drones in transportation and delivery.
 - Impact of automation on labor dynamics and operational efficiency.
- 5. Blockchain Technology for Supply Chain Transparency
 - Understanding blockchain and its decentralized ledger system.
 - Applications in enhancing traceability, security, and trust in supply chains.
 - Challenges and considerations in implementing blockchain solutions.
- 6. Big Data Analytics and Decision Making
 - Techniques for collecting, processing, and analyzing large datasets.
 - Utilizing data analytics for performance measurement and improvement.
 - Case studies on data-driven supply chain strategies.
- 7. Integration Strategies and Change Management
 - Frameworks for adopting Industry 4.0 technologies in existing supply chains.
 - Managing organizational change and workforce adaptation.
- 8. Ethical, Legal, and Security Considerations
 - Addressing data privacy and cybersecurity challenges.
 - Ethical implications of automation and AI in the workforce.
 - Compliance with regulations and standards in digital supply chains.
 - Trustworthy AI

(4) TEACHING METHODS--ASSESSMENT

MODES OF DELIVERY <i>Face-to-face, in-class lecturing, distance teaching and distance learning etc.</i>	Distance learning mode in conjunction with three (3) Tutorial Meetings during the academic semester, all held at weekends.	
USE OF INFORMATION AND COMMUNICATION TECHNOLOGY <i>Use of ICT in teaching, Laboratory Education, Communication with students</i>	The focal point for this course is the Hellenic Open University's e-platform (https://courses.eap.gr). As such, the students must acquaint themselves with the platform environment. For the Tutorial Meetings, the following ICT tools are used: • remote meeting tools (Cisco Webex) • presentation software (PowerPoint) In addition, students use office automation tools for drafting their essays, web browsers, and e-readers (digital teaching material etc.).	
COURSE DESIGN <i>Description of teaching techniques, practices and methods: Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, Internship, Art Workshop, Interactive</i>	Activity/Method	Semester workload
	3 Tutorial Meetings (x 4 hours)	12
	Weekly Learning Activities (close-ended and open-answer exercises) (13 x 1 hour)	13

<i>teaching, Educational visits, projects, Essay writing, Artistic creativity, etc.</i> <i>The study hours for each learning activity as well as the hours of selfdirected study are given following the principles of the ECTS.</i>	Short Written Assignments (2 x 5 hours)	10
	Written Assignment (1 x 10 hours)	10
	Final Exam (1 x 2,5 hours)	2,5
	Weekly studying based on coursebook, texts, book excerpts, case studies, articles, etc.)	230-235
	Total	277,5 - 282,5
STUDENT PERFORMANCE EVALUATION/ASSESSMENT METHODS <i>Detailed description of the evaluation procedures:</i> <i>Language of evaluation, assessment methods, formative or summative (conclusive), multiple choice tests, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral exam, presentation, laboratory work, other.....etc.</i> <i>Specifically defined evaluation criteria are stated, as well as if and where they are accessible by the students.</i>	Students should carry out two (2) Short Written Assignments (SWA) and one (1) Written Assignment (WA), the aim of which is to facilitate further acquaintance with the syllabus. Each SWA carries a weight of 10%, whereas the WA carries a weight of 20%, respectively. Detailed feedback is provided to the students for the SWAs and the WA. In addition, students must take a Final Exam (FE). The Final Grade is calculated (on a scale of 1 to 10) based on the following formula: Final Grade = (SWA×0,1) + (SWA×0,1) + (WA×0,2) + (FE×0,6). Participation in the Final Exam will be allowed provided that a) the sum of the grades of the aforementioned assignments (SWAs and WA) is equal to or greater than 50% of the assigned grading scale, i.e., at least 20 points out of 100, based on the weights mentioned above and b) at least 2 of the 3 Assignments should be submitted.	

(5) SUGGESTED BIBLIOGRAPHY:

-Suggested bibliography

- Aamer, A.M., Yani, L.P.E., Priyatna, I.M.A., 2021. Data analytics in the supply chain management: Review of machine learning applications in demand forecasting. Operations and Supply Chain Management. <https://doi.org/10.31387/oscm0440281>
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- European Commission 2019, Ethics guidelines for trustworthy AI, Technical report available at <https://digital-strategy.ec.europa.eu/en/library/ethics-guidelines-trustworthy-ai>
- Jahani, H., Jain, R., Ivanov, D., 2023. Data science and big data analytics: a systematic review of methodologies used in the supply chain and logistics research. *Annals of Operations Research*. <https://doi.org/10.1007/s10479-023-05390-7>
- Kosasih, E.E., Papadakis, E., Baryannis, G., Brintrup, A., 2024. A review of explainable artificial intelligence in supply chain management using neurosymbolic approaches. *International Journal of Production Research*. <https://doi.org/10.1080/00207543.2023.2281663>
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