Syllabus

Course Description

Course Title	Digital Transformation and Sustainability Management
Course Code	47553
Course Title Additional	
Scientific-Disciplinary Sector	IEGE-01/A
Language	English
Degree Course	Master in Industrial Mechanical Engineering
Other Degree Courses (Loaned)	
Lecturers	Dott. Margherita Molinaro, Margherita.Molinaro@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/43550
Teaching Assistant	
Semester	Second semester
Course Year/s	1
CP	5
Teaching Hours	28
Lab Hours	18
Individual Study Hours	79
Planned Office Hours	15
Contents Summary	The course provides insights into the developments in digital transformation and sustainability that are reshaping manufacturing and logistics systems. First, students will be introduced to a managerial perspective to understand how digital technologies enable process innovation, new business models and new approaches to value creation, while generating new organizational challenges and requirements. Methods for evaluating alternative digital technology investment decisions will also be discussed. Second, they will be introduced to key sustainability management concepts, including sustainability certifications, sustainable

	business models and practices, reporting frameworks and sustainability measurement approaches such as carbon footprint analysis and life cycle thinking. Overall, the acquired knowledge will enable industrial and mechanical engineers to analyze, evaluate and influence the technological, organizational and sustainability-related developments affecting modern manufacturing and logistics systems.
Course Topics	Digital Transformation: • Digital transformation concepts and enabling technologies • Digitalization of business processes • Digital transformation of business models • Organizational implications of digital transformation • Digital investments evaluation and decision-making Sustainability management: • Sustainability management principles • Sustainability certifications and standards • Circular and sustainable business models • Sustainability reporting and ESG performance measurement • Carbon footprint analysis and life cycle assessment
Keywords	Industry 4.0; digital business models; circular business models; sustainability measurement; sustainability reporting; life cycle thinking
Recommended Prerequisites	None.
Propaedeutic Courses	
Teaching Format	Frontal lectures and exercises.
Mandatory Attendance	Strongly recommended.
Specific Educational Objectives and Learning Outcomes	Students will be able to: Knowledge and understanding • Explain the concepts of digitization, digitalization and digital transformation • Describe the main digital technologies and their impact on business processes, business models and organizations • Explain sustainability management principles, sustainability certifications and sustainable business practices • Describe sustainability reporting frameworks, carbon footprint analysis and life cycle assessment approaches

	Applying knowledge and understanding • Analyze opportunities for digital transformation in manufacturing, supply chain and customer-related processes • Design sustainability KPI systems and performance dashboards • Apply carbon footprint and life cycle thinking to products and organizational contexts Making judgements • Critically evaluate the benefits, limitations and trade-offs associated with digital transformation initiatives • Evaluate alternative digital investment options using economic, operational and sustainability criteria • Use appropriate methods and tools to support sustainability and digital transformation decisions • Define appropriate system boundaries, assumptions and data requirements for sustainability assessments Communication skills • Present and discuss digital transformation and sustainability challenges using appropriate terminology • Communicate assessment results and recommendations to technical and managerial audiences • Support decisions through the use of quantitative and qualitative evidence Learning skills • Autonomously extend the knowledge and problem-solving skills acquired during the study course to complex organizational challenges
Specific Educational Objectives and Learning Outcomes (additional info.)	
Assessment	Written exam and case study assignments.
Evaluation Criteria	The mark is calculated from the results of the written exam and the case study assignments. The written exam counts 70% and the assignments count 30% of the final grade. The written exam is assessed considering:

	• correctness and completeness of the answers • ability to apply course concepts and methods to simple problems and exercises • ability to analyse and establish relationships among different topics • clarity and appropriate use of terminology The assignments are assessed considering: • consistency with the assignment requirements and quality of the analysis • appropriate application of course concepts and methods • ability to justify choices and effectively present the results
Required Readings	Lecture notes and documents for exercises will be available on the Microsoft Teams and/or the Open Learning Environment (OLE) pages of the course.
Supplementary Readings	**Digital Transformation** • Gupta, S. (2018). *Driving digital strategy: A guide to reimagining your business*. Harvard Business Press. • Hinterhuber, A., Vescovi, T., & Checchinato, F. (Eds.). (2021). *Managing digital transformation: Understanding the strategic process*. Routledge. • Rüßmann, M., Lorenz, M., Gerbert, P., Waldner, M., Justus, J., Engel, P., & Harnisch, M. (2015). Industry 4.0: The future of productivity and growth in manufacturing industries. *Boston consulting group*, 9 (1), 54-89. **Sustainability Management** • Lacy, P., Long, J., & Spindler, W. (2020). *The Circular Economy Handbook*. Palgrave Macmillan, London. • GRI Standard Ed. 2021 (https://www.globalreporting.org/) • https://ellenmacarthurfoundation.org/
Further Information	
Sustainable Development Goals (SDGs)	Decent work and economic growth, Climate action, Responsible consumption and production, Industry, innovation and infrastructure