Syllabus

Course Description

Course Title	Operational Satefy and LCA Evaluation
Course Code	42639
Course Title Additional	
Scientific-Disciplinary Sector	IIND-05/A
Language	Italian
Degree Course	Professional Bachelor in Wood Technology
Other Degree Courses (Loaned)	
Lecturers	Prof. Luca Gualtieri, Luca.Gualtieri@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/38728
Teaching Assistant	
Semester	First semester
Course Year/s	3
CP	4
Teaching Hours	40
Lab Hours	0
Individual Study Hours	60
Planned Office Hours	12
Contents Summary	Risk in the Workplace - Qualitative and quantitative risk assessment methodologies - Accident and injury databases - Case study discussions Safety of Machinery - The hybrid method for machine risk assessment - Guided exercises on safe machine design - Case study discussions Ergonomic Design of Production Systems - The Rapid Upper Limb Assessment (RULA) method for evaluating biomechanical overload

	- Other methodologies for assessing biomechanical overload - Guided exercises on physical ergonomics and human reliability - Case study discussions Digital Human Modeling and Virtual Ergonomics - Introduction to the "Tecnomatix Process Simulate" software, basic commands, and the "Human" module - Guided exercises using the software to support human-centered design and ergonomic analysis Life Cycle Assessment (LCA) - Environmental impact assessment of a product/process - Case study discussions.
Course Topics	
Keywords	
Recommended Prerequisites	None.
Propaedeutic Courses	
Teaching Format	Frontal lectures, exercises, case study discussions, individual or group work.
Mandatory Attendance	Recommended.
Specific Educational Objectives and Learning Outcomes	Considering the manufacturing context and the wood industry, the Safety and LCA Assessment course aims to provide students with both basic and advanced knowledge related to the evaluation and management of risks (both traditional and emerging) in the workplace, safe and compliant machine design, human-centered design of workstations and systems, human modeling, ergonomic analysis and reduction of biomechanical overload supported by simulation, psychosocial aspects, and human reliability. The course will also introduce the fundamentals of Life Cycle Assessment (LCA) and the sustainability of industrial systems. Theoretical content will be explored in depth through case study analyses and guided exercises. The Intended Learning Outcomes (ILOs) are listed below and are aligned with the Dublin Descriptors: Knowledge and Understanding The student knows the basic concepts related to occupational health and safety, safe machinery design, ergonomics,

	psychosocial aspects, and human-centered design of production/logistics systems and processes. The student is familiar with common approaches to assess and control health and safety risks in production processes, as well as methodologies for human-centered design of systems and processes. Applying Knowledge and Understanding The student has the opportunity to apply and understand theoretical content through exercises, case studies, and analytical activities. Theoretical content is illustrated through practical examples and, where applicable, through numerical or qualitative exercises. The student identifies, analyzes, and evaluates measures to reduce major health and safety risks in realistic scenarios. The student applies the fundamentals of safe and human-centered design in production and logistics systems. Making Judgements Based on specific practical situations, the student is able to evaluate the adoption of the most appropriate approaches for managing health and safety in the workplace, as well as for safe and human-centered design of production systems. The student is able to interpret, at a preliminary level, the results of a risk assessment concerning a specific production system or process. Communication Skills The student is able to engage in technical discussions on health and safety, ergonomics, human-centered design, and safety of machinery. They can prepare, present, and discuss content in a structured manner.

	Learning Skills The student learns through lectures (theoretical part), case study discussions, in-class exercises, and hands-on activities. The student is able to expand their knowledge through individual study and by consulting standards and technical materials.
Specific Educational Objectives and Learning Outcomes (additional info.)	
Assessment	Summative assessment: - Exercises and case studies addressed in class, during lectures; ILOs verified: 2,3,4,5,6,7,10. - Repetitions before lecture; length/duration: 5-10 minutes at the beginning of each lecture; ILOs verified: 1,2,3,4,5,6,7,8,9. - Results of the exercises (modeling, simulation, analysis, report) and the related discussion, during lectures (exercises); ILOs verified: 2,5,6,7. Summative assessment: - Results of the exercises (modeling, simulation, analysis, report) and the related discussion; modality PASS/NOT PASS; length: Individual or group work + 15-minute in-class discussion (10-minute presentation, 5-minute Q&A); ILOs verified: 2,5,6,7,8.
Evaluation Criteria	Final evaluation through a single grade. The final grade is determined by the results of the written exam (theory and exercises, as well as the assessment of practical skills). The laboratory activity is evaluated based on the results of the group work (modeling, simulation, analysis, report, presentation) and the related discussion. Criteria for the written exam evaluation: accuracy and completeness of the answers. Criteria for the laboratory activity evaluation: accuracy and completeness of results and analyses, as well as the quality of the discussion and completeness of the answers to specific questions.
Required Readings	Course notes and materials provided by the lecturer.

Supplementary Readings	Rausand, M. (2013). *Risk assessment: theory, methods, and applications* (Vol. 115). John Wiley & Sons. Bisio, C. (2019). *Gestione della sicurezza nei sistemi sociotecnici*. EPC Editore. Zikos, S., Albanis, G., & Tsourma, M. (2019*). Human-centred Factories from Theory to Industrial Practice. Lessons Learned and Recommendations*. ACE Factories Cluster Whitepaper.
Further Information	Software used: Siemens Tecnomatix Process Simulate.
Sustainable Development Goals (SDGs)	