Course unit English denomination	Inspection, Risk and Resilience Analysis for Asset Management Purposes (IRRA)
SS	CEAR-07/A
Teacher in charge (if defined)	• Mariano Angelo Zanini • Lorenzo Hofer
Teaching Hours	24
Number of ECTS credits allocated	4
Course period	May-June
Course delivery method	☒ In presence ☐ Remotely ☐ Blended
Language of instruction	Italian/English is needed
Mandatory attendance	☒ Yes (80% minimum of presence) ☐ No
Course unit contents	Maintenance of existing transport infrastructure is a key issue for a proper asset management. Several hazards can affect structural safety of buildings and infrastructure components resulting in premature failures. Hence it is crucial to adopt suitable asset management systems able to collect field data together with advanced risk and resilience analysis frameworks to outline a priority ranking. This course aims to illustrate main concepts underlying these best practices, with special emphasis to applications on infrastructure components, like bridges. After an introduction on infrastructure management systems, the course will describe the state-of-the-art regarding inspection best practices, deterioration phenomena and pathologies usually detected, as well as condition state indicators and rating algorithms. The second part of the course will be devoted to the theoretical bases for a risk and resilience assessment, showing simplified and advanced methods for the characterization of hazard, vulnerability and consequence functions to be further used to compute risk and resilience indicators. Finally, some applicative examples will be illustrated considering different types of natural and man-made hazards.
Learning goals	At the end of the course the student will be able to understand the fundamental principles of the integrated asset management approach with particular reference to inspection techniques, risk analysis and intervention planning.
Teaching methods	Frontal lesson
Course on transversal,	☒ Yes

interdisciplinary, transdisciplinary skills	☐ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites	Master Degree in Engineering in at least one of the following course: • Civil • Environmental • Architectural • Safety
Examination methods	Individual project
Suggested readings	• Lectures notes • Hudson and Haas (1997) Infrastructure management: integrating design, construction, maintenance, rehabilitation and renovation. McGraw-Hill ISBN-13: 978-0070308954 • Balzer and Schorn (2015) Asset management for infrastructure systems. Springer, ISBN: 978-3-319-17879-0 • Gardoni (2018) Routledge Handbook of Sustainable and Resilient Infrastructure. Taylor & Francis, ISBN:9781351392778.
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