

FACULTY OF **ENGINEERING**

DEGREE COURSE: **CIVIL AND ENVIRONMENTAL ENGINEERING**

MASTER DEGREE: **CIVIL ENGINEERING**

SUBJECT: STRUCTURAL REHABILITATION

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OBJECTIVES

1. To provide the basic tools for reliability assessment of existing masonry, reinforced concrete and wood structures.
2. To provide the basic criteria for the design of structural strengthening interventions with traditional and innovative techniques.

CONTENTS

1. Review of structural assessment criteria for existing structures; the limit state method.
2. The use of composite materials for the structural strengthening: organic and inorganic matrices.
3. Bonds between composite materials and concrete and masonry supports.
4. Strengthening of reinforced concrete structures: flexural and shear strengthening of beams, increase of ductility, confinement of reinforced concrete columns.
5. Strengthening of masonry structures: increase of the load collapse multiplier via modification of the collapse mechanism.
6. Flexural and shear strengthening of masonry structural elements.
7. Flexural strengthening of timber beams.

LEARNING OUTCOMES

1. Reliability assessment of existing masonry, reinforced concrete and wood structures.
2. Analytical tools for the design of strengthening interventions on existing reinforced concrete, masonry and wood structures.

ASSESSMENT

Written exam: multiple choice and open questions.

RECOMMENDED TEXTBOOKS

J. G. Teng, J. F. Chen, S. T. Smith, L. Lam, J-F. Chen, FRP Strengthened RC Structures. Como, M. Statics of masonry constructions. Springer, 2013.
Heyman, J. Elements of the theory of structures. Cambridge University Press, 1996.
J. G. Teng, J. F. Chen, S. T. Smith, L. Lam, J-F. Chen, FRP Strengthened RC Structures. Eurocode 2: Design of concrete structures.

Eurocode 8: Seismic Design of Buildings.

Eurocode 6: Design of masonry structures.

CNR DT200-2004. Guide for the design and construction of externally bonded FRP systems for strengthening existing structures.