Università di Padova, Tuesday 11 June 2019

Seminar held in the framework of the ERASMUS + - KA1 HIGHER EDUCATION ACADEMIC YEAR 2018/2019

between

SCE – Shamoon College of Engineering, Beer Sheva, Israel - Civil Engineering Department and the

University of Padova - Department of Civil, Architectural and Environmental Engineering

Lecturers:

Rami Eid is a Senior Lecturer at the Civil Engineering Department at SCE – Shamoon College of Engineering. He is a member of several technical and experts committees at the Standards Institute of Israel, and at ACI - American Concrete Institute (ACI 440 and ACI-ASCE Committee 441). His research interests include development of analytical models of reinforced-concrete elements subjected to static and seismic loadings, as well as assessment and retrofitting of structures for earthquake resistance. His recent studies focused on the structural behavior of high-strength concrete elements and strengthening of RC columns using composite materials.

Edward Leibovich is a Senior Lecturer at the Civil Engineering Department at SCE – Shamoon College of Engineering. He is a civil engineer and director of Dr. Leibovich – Consulting Engineers, in Netanya Israel since 1994. His research interests include wind loads on buildings, mast and towers performance to wind loads, steel structures, and earthquake design and assessment of existing residential buildings.

Aula L – Dipartimento ICEA, Via Marzolo 9, h 10:30-14:30

Rami Eid **h. 10:30-12:30**	**Structural Behavior of High-Performance Concrete Columns** In high-rise buildings, high-strength concrete (HSC) can reduce the dimensions of the lower stories columns, which makes it a better cost-effective choice for constructors than the normal-strength concrete (NSC). However, a significant amount of transverse reinforcement is necessary to achieve toughness and ductility similar to normal-strength concrete. Inclusion of short discrete fibres into the concrete mixture can increase the compressive strength and ductility of NSC and HSC column specimens under compressive loading as has been shown by several studies. Moreover, the fibres can prevent the premature spalling of the concrete cover which is a phenomena observed in HSC columns while reducing the demand for transverse reinforcement. By adding discrete fibres to the concrete mixture, the core-cover interface can sustain the high tensile strains developed due to the action of the lateral reinforcement and thus, instead of early spalling due to buckling, the cover can reach the unconfined concrete strength. This paper presents experimental results for the structural behaviour of large-scale nonfibrous and fibre-reinforced normal- and high-strength concrete square and circular columns under concentric compression loading and under cyclic flexure and

	constant axial load simulating earthquake loading as well as an analytical model capable of predicting the experimental results.
Edward Leibovich h. 12:30-14:30	**Seismic assessment of RC buildings according to EN-1998-3** **Part 1 – Introduction** In this study, an overview of the requirements for earthquake assessment of existing buildings according to EN-1998-3 was carried out. EN-1998-3 standard relates to two general approaches for analyzing of an existing structure: The first approach is the force-based approach, and the second is known as Performance/Displacement based approach. These two approaches are presented and discussed. Design requirements according to the Force-based and Performance/Displacement based will includes several computational examples for the use of the formulas specified in EN-1998-3. A prototype six-story RC apartment building, with beam-column frames on the perimeter and flat slab frames in the interior, was assessed for the design earthquake specified by the code for low, medium and high seismicity zones, with peak ground acceleration of 0.09g, 0.18g and 0.26g. The assessment is a benchmark application of EN 1998-3:2005.

Aula P100 – Complesso Paolotti, Via G.B. Belzoni 7, h 14:30-18:30

Edward Leibovich h. 14:30-16:30	**Seismic assessment of RC buildings according to EN-1998-3** **Part 2 – Case Studies**
Rami Eid h. 16:30-18:30	**Some aspects on the assessment and retrofitting of existing Structural Unreinforced low performance Concrete Walls and RC columns** Strengthening of existing buildings in Israel is crucial, especially those designed several decades ago using old earthquake-resistance standards. Such buildings, constructed around the years 1930~1970, include interior partitions and exterior walls (as part of the vertical gravity structural system) made with large aggregates bound by unreinforced low-performance concrete (LPC). Detailed mechanical properties of these walls have never been investigated and thus, their load carrying capacity and possible effects on the capacity of the entire building is not well understood. Moreover, in buildings that contain LPC walls, they are considered the sole structural elements that carry vertical/gravity loads and supporting the reinforced concrete slabs. These LPC walls were not designed to resist horizontal loading. Moreover, existing RC columns constructed using old standards are also in need to be retrofitted. The evolution of earthquake-resistance standards has led to introduction of new design equations for the amount of transverse steel reinforcement (TSR) to ensure ductile behavior of reinforced-concrete columns. In order to comply with the new codes' TSR requirements there is a need to strengthen existing columns. One of the methods to strengthen reinforced-concrete columns is by using fibre-reinforced polymer (FRP) composites as confinement reinforcement. The presentation will focus on experimental derivation of the mechanical properties of LPC walls and on experimental as well as analytical modeling of FRP-confined RC columns.