University of Trento

Doctoral School in Civil, Environmental and Mechanical Engineering

Ph.D. course in

MULTIPLE APPROACHES TO THE INVESTIGATION OF THE SEISMIC BEHAVIOUR OF TIMBER STRUCTURES

Trento (Italy), January 27th-30th, 2020

Course organized by

Dr. Daniele Casagrande

Institute for Bioeconomy, National Research Council of Italy

Course description:

The aim of the course is to illustrate the basic and advanced approaches to the investigation of the seismic behaviour of timber structures. Different methods for assessment of the capacity of timber buildings subjected to seismic lateral loads will be critically discussed. In particular, the strategies commonly adopted for the study of traditional and innovative structural systems in the research field will be presented and compared.

The key aspects related to the experimental characterisation of mechanical connections and the non-linear FEM procedure for the assessment of the seismic response of timber structural systems will be shown. Specific attention will be given to the use of analytical approaches as a viable alternative method for the prediction of the mechanical behaviour of timber systems.

The recent developments for the capacity design at connection and building level for light-frame and cross-laminated timber buildings will be presented. Finally, a critical comparison between the Italian and European Standard Documents for the seismic design of timber structures will be illustrated.

Duration:

16h (2 credits)

Venue:

The course will be held between January the 27th and 31st at the Room 2B and 2Q of the Department of Civil, Environmental and Mechanical Engineering building of the University of Trento (Via Mesiano 77, 38123, Trento) located in the city of Trento.

Participants

The course should be of interest to Ph.D. students, graduate students, academics and researchers in structural engineering and practicing structural engineers and architects with interests to specialize in timber structures. Recommended basis for the course is an academic degree in civil engineering or building technology. General knowledge about solid mechanics, structural engineering including basic knowledge about seismic engineering and design of timber structures is required.

Lecturer:

Dr. Daniele Casagrande
Researcher, Institute for Bioeconomy
National Research Council of Italy
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Short biography

Dr. Daniele Casagrande is a researcher at the Institute for BioEconomy (former Trees and Timber Institute - Ivalsa) of the National Research Council of Italy - CNR IBE. He holds a university postgraduate professional degree on the Seismic behaviour of structures at University of Trieste (Italy) in 2011 and a Ph.D. in Engineering of Civil and Mechanical Structural Systems at University of Trento (Italy) in 2014. He has been involved in a research project aimed at the development of innovative timber structures for post-emergency housing facilities (TRE3 –project) and has been working, within national and international collaboration, on the proposal of simplified analytical and numerical approaches for the seismic analysis of timber buildings. In his career, he actively participated in the design, execution and post-process analysis of full-scale laboratory tests on mechanical connections, wood-base shear walls and shake table tests of three 3-storey houses. As expert member of the Italian Committee for timber structures, Dr. Casagrande has been participating at the working group CEN/TC250/SC8/WG3 for the revision of section "timber structure" of Eurocode 8.

Guest Lecturer:

Dr. Igor Gavric
Researcher, InnoRenew CoE,
Livade 6, 6310 Izola, Slovenia / University of Primorska, Faculty of Mathematics, Natural Sciences and Information Technologies,
Muzejski trg 2, 6000 Koper, Slovenia
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Short biography

Dr. Igor Gavric is a researcher in the Sustainable Building with Renewable Materials research group at the InnoRenew CoE and an assistant at the Faculty of Mathematics, Natural Sciences and Information Technologies, University of Primorska. He graduated in Civil Engineering at the Faculty of Civil and Geodetic Engineering, University of Ljubljana in 2009. In 2013 he earned his PhD degree in Civil Engineering from the University of Trieste, Italy, in collaboration with the Trees and Timber Institute of Italian National Research Council (CNR IVALSA) in Trento. His PhD research focused on experimental testing and analytical modeling of seismic behaviour of cross-laminated timber buildings. During his doctorate programme he was a visiting researcher at FPInnovations, Vancouver, Canada, and at the University of Canterbury, New Zealand and actively participated in COST action FP1004. After completing his PhD, he worked on postdoctoral research projects with University of Sassari, Italy and as a researcher at FPInnovations in Vancouver, Canada. He also has 5 years of experience in structural design practice, construction of timber buildings, and in R&D national and EU projects that he gained at CBD d.o.o. and at the development center Intech-les. His main research interests are on advanced timber and hybrid structural systems, tall timber buildings, seismic behaviour and design methods of cross-laminated timber (CLT) buildings, and cyclic behaviour of timber building wall systems and connections. Dr. Gavric is a member of CEN/TC250/SC8/WG3 working group Eurocode 8: Earthquake resistance design of structures – Timber structures.

Schedule:

Day	#	Title	Hours	Lecturer	Room
27.01	00	Introduction to the Course	2.00-2.30 p.m.	DC	2B
27.01	01	Basic principles of seismic engineering applied to timber structures: the new Italian code - NTC 18	2.30-4.30 p.m.	DC	2B
27.01	02	Seismic analysis and modelling of timber buildings: Q&A	4.30-6.00 p.m.	DC	2B
28.01	03	Analytical methodologies for elastic analysis of LFT and CLT shear walls	2.00-4.00 p.m.	DC	2B
28.01	04	Analytical methodologies for plastic analysis of LFT and CLT shear walls	4.00-6.00 p.m.	DC	2B
29.01	05	Experimental investigation of CLT connections, assemblies and buildings	2.00-4.00 p.m.	IG	2Q
29.01	06	Analytical and numerical analyses for seismic design of CLT buildings based on experimental tests	4.00-6.00 p.m.	IG	2Q
30.01	07	The capacity design approach for LTF and CLT buildings	2.00-4.00 p.m.	DC	2Q
30.01	08	The revision process of timber chapter in Eurocode 8	4.00-6.00 p.m.	DC	2Q

Registration:

in order to access the course, please send an e-mail to: **dicamphd@unitn.it**