

# FROM BAMBOO TO ENGINEERED GLUBAM STRUCTURES

Bio-Based Materials, Digital Manufacturing and  
Form Optimization of Spherical Shells and Domes



Seminar by Prof. Yan Xiao

Within the course "Gusci e membrane: ricerca e ottimizzazione di forma",  
coordinated by Stefano Gabriele and Prof. Valerio Varano

Friday, 29 May 2026 | 14:00-15:00

Room Ersoch

Department of Architecture | Roma Tre University

## SHORT BIO

Prof. Yan Xiao is a Qiushi Distinguished Chair Professor and doctoral supervisor at Zhejiang University, affiliated with the ZJU-UIUC Institute. His research interests include modern bamboo and timber structures, hybrid and composite structures, advanced green civil engineering materials, and experimental methods for structural engineering. He is also Program Director for Energy, Environment and Infrastructure Sciences at the ZJU-UIUC Institute. His work has made major contributions to engineered bamboo and Glubam structural systems, including bridges, trusses and spatial structures.

## MAIN TOPICS

- Bamboo and engineered bamboo for sustainable construction
- Glubam as a bio-based structural material
- Digital design and parametric modelling
- Form optimization of shells, membranes and spatial structures
- Spherical tessellation and dome systems
- Digital twin manufacturing and robotic fabrication
- Bolted joints and experimental testing of lightweight structures

## SEMINAR OVERVIEW

The seminar will introduce bamboo as a sustainable structural material and then focus on Glubam, an engineered glue-laminated bamboo system developed for structural applications. Starting from a general overview of bamboo-based construction, the lecture will connect material innovation with digital design, parametric modelling, digital twin manufacturing and robotic fabrication. The final part will address spherical shell and dome structures, where form optimization, tessellation, joint detailing and manufacturing precision become central to the design process.

## REFERENCE PAPER

Ke Ma, Ruijia Wu, Yan Xiao & Hongwei Wang (2024). *Spherical dome: design, digital twin manufacturing, and testing of a glubam structure*. *Architectural Engineering and Design Management*, 20(6), 1471-1488.