

### **ARC 594: Structural Forms**

**Joseph Dahmen Visiting Assistant Professor**

Time: Thursday 10:00am-12:40pm

Location: Diefendorf 207

Material Sponsor: Boston Valley Terra Cotta



### **Course Description**

This graduate-level seminar will research traditional and contemporary design tools in order to apply them to design of structurally efficient thin-shell masonry vaults. Catalan mason Raphael Guastavino arrived in New York in 1881 with a novel method of structural analysis called graphic statics. This method enabled him to construct unreinforced masonry vaults without formwork, earning him twenty four patents and commissions for hundreds of buildings in the United States. Swiss bridge engineer Robert Maillart designed Salginatobel Bridge in Switzerland in 1930 using the same method, enabling him to specify thirty percent less concrete than his contemporaries by locating material where stresses in the bridge were highest. Thirty years later, Eladio Dieste used graphic statics to design five inch thick compressive brick vaults that spanned fifty five feet at Atlantida Church in Uruguay. Together, these projects establish an architectural vocabulary of sustainable design as structural efficiency. This course will use graphic statics and other methods to innovative efficient architectural forms. The course will integrate research into design method with experimentation at full-scale with compressive thin-shell architectural forms.

### **Methodology**

- » Research, adapt, and apply design methods and tools to design thin-shell compressive structures in accordance with the flow of forces and lower bound theory.
- » Explore the limits of these forms through iterative design.
- » Construct one full scale version of most effective design.
- » Test to destruction to evaluate structural performance.