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Department of Architectural Technology

B. Tech. in Architectural Technology

ARCH 3690 Intermediate/Advanced Parametric Computation and Digital Fabrication

1 classroom hour, 4 lab/studio hours, 3 credits

Prerequisites: ARCH 1160 Visual Studies I and ARCH 1260 Visual Studies II, or CMCE XXXX

Course Description

This course, the second in the digital fabrication certificate sequence (following ARCH3290) focuses on the development of parametric tools and digital prototyping techniques and practice. Beginning from the study of precedents of modern architectural fabrication—both digital and non-digital-- the course will develop a comprehensive understanding of exemplary construction and tectonic systems, as well as allowing students to develop a proficiency in applying this knowledge in constructing associative/parametric digital models that utilize tools to generate alternative variations of these systems.

An integral part of the course involves the study of parametric modeling in Rhino 3D, Grasshopper, and Paneling Tools, and Bentley Generative Components, and scripting in Visual Basic (or equivalent), with dedicated workshops on geometry and linear algebra for 3D modeling. The output of the course will be a digitally modeled and fabricated panel, with paneling systems involving complex curvatures. Students will have come away from the course with digital and material models, and documentation of the structural characteristics of the materials and fabrication techniques used.

Required Text

Alayna Fraser, "Translations: de Young Museum and the Walker Art Center," *Praxis 9*, 2007
An Atlas of Fabrication, Barkow Leibinger, AA Publications, 2009
Digital Fabrication: Architectural and Material Techniques, Lisa Iwamoto, Princeton Architectural Press, 2009
Tooling, Pamphlet Architecture 27, Aranda/Lasch, Princeton Architectural Press, 2006

Recommended Texts

The Function of Ornament,, Farshid Moussavi and Michael Kubo, Actar, Barcelona, 2008
The Function of From, Farshid Moussavi, Actar, Barcelona, 2009
Atlas of Novel Tectonics, Reiser + Umemoto, Princeton Architectural Press, 2006
Studies in Tectonic Culture. Kenneth Frampton, Cambridge, MA: MIT Press, 1995.
The Nature and Art of Workmanship, David Pye, Herbert Press, London, 1995
The Nature and Aesthetics of Design, David Pye, Herbert Press, London, 1978
Architecture in the Digital Age: Design and Manufacturing, ed. Branko Kolarevic, Taylor & Francis, New York, 2003
Refabricating Architecture, Stephen Kieran + James Timberlake, McGraw-Hill, 2004
From Control to Design:Parametric/Algorithmic Architecture, Michael Meredith, Actar Publishing, New York, 2008

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Learning Objectives: Upon completion of the course, students should be able to

1. Demonstrate an advanced understanding of digital tools and how they can be applied to solve architectural digital fabrication problems.
2. Demonstrate intermediate / advanced knowledge of parametric software (Grasshopper, Solidworks), including solid modeling, polygons and mesh techniques, and a fundamental knowledge of coding
3. Demonstrate ease in carrying out iterative workflows across multiple software platforms including modeling, parametrics, and analysis
4. Demonstrate proficiency in detailing, assembly and digital tectonics
5. Illustrate proficient knowledge of mill set up, basic machine maintenance, and safety procedures
6. proficiency in best practices for 3D modeling for laser cutter operation through surface Setup a double sided mill form with jig
7. Illustrate an understanding of precedents of digital fabrication in other industries [ie. ship building, automotive industry, industrial design]
8. Carry out production/assembly of small-scale prototype(s)
9. Demonstrate flattening/building and contouring, and in operating laser cutters
10. Demonstrate knowledge for creating profiling, drilling, and surfaces modeling drawings for use with a CNC mill. Show applied understanding of mill software interfaces (RhinoCAM and MadCAM, etc.)