



Vertical Studio Proposal: DIGITAL TECTONICS AND PARAMETRICS Wassim Jabi, Ph.D.

Introduction

The vertical studio will concentrate on the use of 3D modeling and visualization tools to investigate the nature of digital construction and its relationship to its physical counterpart. The term *digital tectonics* refers to an idea regarding the digitally influenced qualities of a body of work by some contemporary architects. This work seems to be influenced by the use of digital tools that allow a deep investigation of architectural making through digital operations. We will investigate this hypothesis by testing structure, skin, assemblage, form and space making methodologies that are aided by digital tools.

The studio schedule will be broadly divided into two phases. The first phase will be more instructional in nature with an emphasis on skill building. The second phase will be more investigative in nature with an emphasis on using the learned skills to explore form, space and the relationship between the physical and the virtual. The second phase will include a conceptual design project that will be continuously investigated until the end of the studio.

Parametrics

A parametric system will be used for the construction of geometric entities that can be inter-linked through parameters. The definition of a parametric model creates, conceptually, a tree structure that dictates how parameters are inherited among entities. Parametrically-based processes have proven to be powerful design tools in professional architectural practice and will be investigated in this studio for their role in design.

Project Brief – Collective Installation

Each student will be asked to design and digitally fabricate a part of a collective installation. The challenge will be to create a large three-dimensional object through the assembly of planar components that are laser cut, notched, and joined in a rib-cage of sorts. In order to ensure a proper fit among all the parts, students will be given several geometric parameters and constraints that they need to adhere to. These standardized constraints will ensure that the end parts of each student's construction will fit to the other manufactured parts in the studio. Additionally, all parts will be manufactured using a single material that can be laser cut. Students will have the opportunity to work with and get experience in using the laser cutter in a supervised environment. In addition to the fabricated part, each student will be asked to produce a complete and professional set of drawings documenting the concept, process, and final product of their digitally fabricated part.

Points of Emphasis

- **Digital Graphics Skills:** Ability to effectively resort to representational digital media as a tool to develop and convey concepts relevant to the course objectives and assignments. Demonstrate confidence in the use of digital media for the timely completion of a design assignment.
- **Digital Design Skills:** Ability to use digital tools as design aids to study visual, organizational, spatial, structural and constructional principles in the development and completion of the course assignments.
- **Verbal, Reading and Writing Skills:** Ability to read, understand and intelligently discuss assigned readings. Ability to speak and write intelligibly. Effectively convey in verbal and written form ideas relevant to the course objectives and assignments.
- **Research Skills:** Ability to resort to a structured method for gathering information via multiple sources. Analyze and summarize compiled information in a consistent form.
- **Critical Thinking Skills:** Ability to make a comprehensive analysis and evaluation of the researched topic.

Programme

1. Parametric I + Introduction to Image Processing and Vector-based Illustration.
Introduction to Bentley's Generative Components and methods of building a parametric model.
Introduction to Photoshop and Adobe Illustrator for image processing and line-based illustration.
2. Parametric II + Introduction to 3D Modeling and Rendering Continue Introduction to Bentley's Generative Components.
Introduction to 3D Studio MAX.
3. Parametric III + Digital Fabrication Methods I Advanced parametric Design with Bentley's Generative Components. Digital Fabrication Techniques in GC and 3D Studio MAX.
4. Digital Fabrication Methods II. Laser Cutter Orientation

Suggested Books

- Digital Tectonics, edited by Neil Leach, David Turnbull and Chris Williams, Wiley-Academy.
- Contemporary Techniques in Architecture, Guest Edited by Ali Rahim, Wiley-Academy.
- Contemporary Processes in Architecture, Guest Edited by Ali Rahim, Wiley-Academy.
- Refabricating Architecture: How manufacturing methodologies are poised to transform building construction, by Stephen Kieran and James Timberlake, McGraw-Hill.
- Architecture in the Digital Age: Design and Manufacturing, by Branko Kolarevic, Taylor & Francis Group.
- Pamphlet Architecture 27: Tooling by Benjamin Aranda, Chris Lasch, Cecil Balmond, and Sanford Kwinter, Princeton Architectural Press.

More information about the background for this studio can be found by reading the attached paper titled:

Jabi, W. "Digital Tectonics: The intersection of the physical and the virtual", Proceedings of ACADIA 2004.