

GENERATIVE DESIGN

Co-meeting courses

Arch 4509/6509 Special Topics in Visual Representation: Generative Design (3 credits); DESIGN 4197/6197 – Special Topics in Design II/III: Generative Design (3 credits)

SPRING 2021: Wednesdays 2:40 – 4:35pm ONLINE (OL)

Instructor: Jenny E. Sabin / jsabin@cornell.edu

Office Hours: By appointment

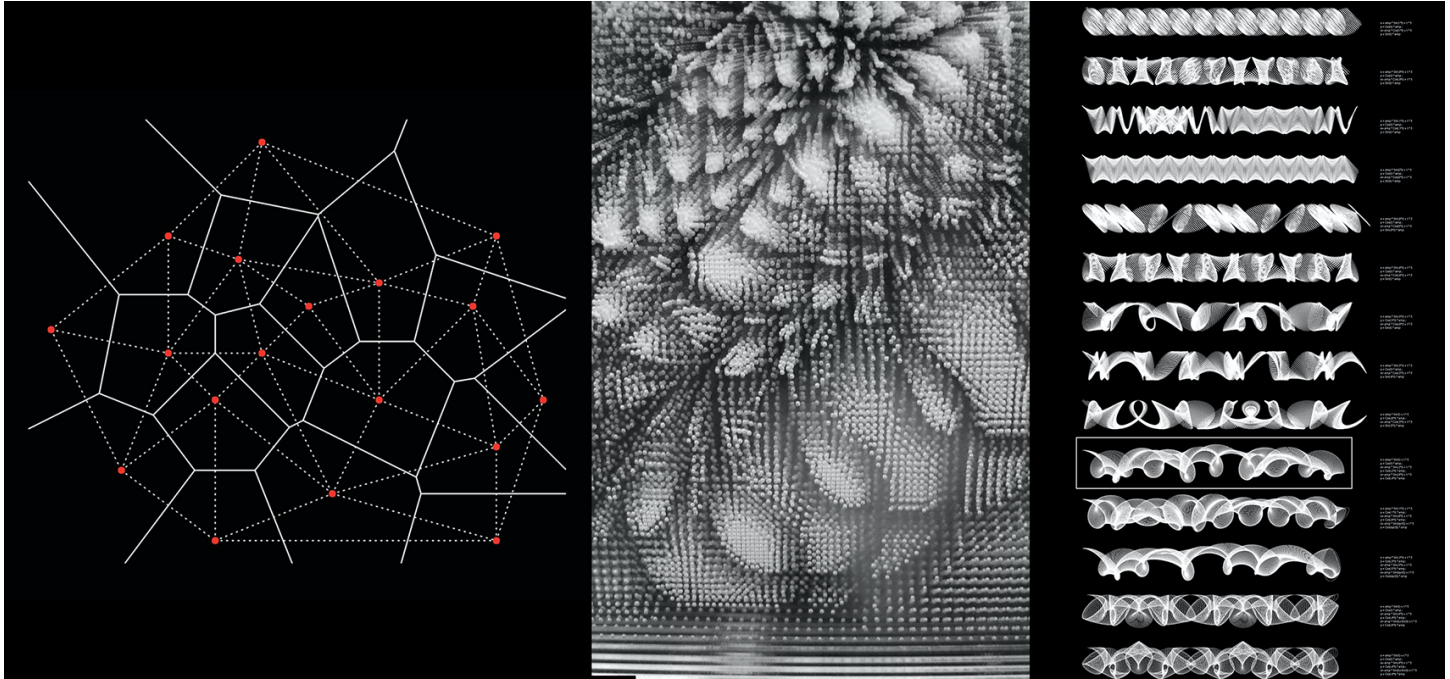


Figure 1: (left) – The now stylized and overused Voronoi algorithm and its geometric dual, Delaunay Tesselation; (middle) – generative field condition based on weighted particle simulations; (right) matrix drawing of iterations exploring mathematical parametric functions.

I. Rationale:

Architects and designers specializing in generative and parametric design strategies have adopted a bottom-up approach to the negotiation of constraints within the design process. The evolution of digital media has prompted new techniques of fabrication alongside new understandings in the organization of material through its properties and potential for assemblage. Recent advances in computation, visualization, material intelligence, and fabrication technologies have begun to alter fundamentally our theoretical understanding of general design principles as well as our practical approach towards architecture and research. This renewed interest in complexity has offered alternative methods for investigating the interrelationships of parts to their wholes, and emergent self-organized pattern systems at multiple scales and applications. This course will explore the history of generative design through scripted drawings with a specific focus on software techniques and algorithmic methods developed over the last 25 years.

Although a history of generative design in architecture has yet to be written, schools of thought where immanence, morphogenetic processes, generative design, and constructivist theories thrive have influenced and partially shaped the course of digital architecture, including Gilles Deleuze's infinite folds, Detlef Mertins's bioconstructivisms, Manuel DeLanda's meshworks, Bernard Cache's objectile, Cecil Balmond's informal, Greg Lynn's blob architecture, Patrik Schumacher's parametricism, Neri Oxman's material ecologies, Achim Menges's material computation, and Jenny Sabin's matrix architecture, amongst others. As Mario Carpo points out, the pioneering thinkers at the onset of digital architecture focused primarily upon variation as afforded through simple manipulations of parametric functions that gave rise to concepts such as mass-customization and the nonstandard. This has opened new opportunities for fabrication and construction as we grapple with the complexity of the physical world of making through direct correspondences with digital fabrication machines. This course will unpack the recent history of generative design through lectures and workshops to actively explore the techniques and methods that have been developed by key pioneers. We will read the history of generative design through algorithmic processes that have established the field to produce a catalogue of generative drawings. Students will learn generative and parametric design strategies through digital and scripted models (the writing of computer code to add design functionality to existing digital modeling environments) to unpack and understand through drawing the algorithms, methods, and processes that define generative design. Through this process, students will develop a critical discourse and approach to generative design and speculate upon its current and future trajectories.