

ARC 320D INTERMEDIATE DESIGN STUDIO I: OPERATIONAL
MW 1-5:30pm

Fall 2018

INSTRUCTORS (Office hours by appointment)

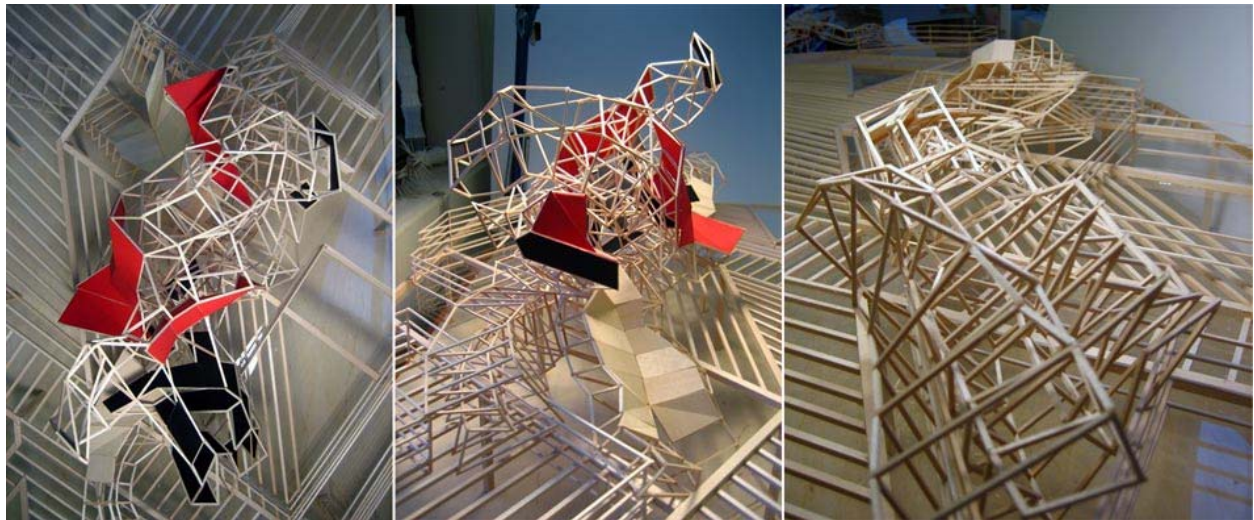
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Sequence and Sensibility: Intuitive Parametric Design Processes



"A system of differential repetition becomes a means of handling a variety of material within the same organization. Just as a single hair is not sufficient to make a hair-do, so too a single element in architecture will never reveal the rich organizational possibilities inherent when greater quantities come into play." (Reser + Umemoto, *Atlas of Novel Tectonics*, 46)

"Symmetry breaking is not a loss but an increase in organization within an open, flexible, and adaptive system. Symmetry is not a sign of underlying order but an indication of a lack of order due to an absence of interaction with larger external forces and environments." (Greg Lynn, *Folds, Bodies & Blobs*, 70)

"There are many ways to inhabit space, and so there are many ways to handle an airplane...what these extreme states and activities have in common is sudden precipitation and total blending of wild fluxes, in an organic computational ensemble that defies both predetermination and 'hard,' or rational, control...The cardinal rule for survival in aerial combat: Never become predictable. What better slogan for the creation of a truly modern – and wild – architecture." (Sanford Kwinter, *Flying the Bullet*, 78)

PREREQUISITES

ARC 310L and 311L with a grade of at least C in each. Registration for Architecture 221K or Architectural Interior Design 221K.

CURRICULUM FLAG

This course carries the Independent Inquiry flag. Independent Inquiry courses are designed to engage students in the process of inquiry over the course of a semester, providing a student with the opportunity for independent investigation of a question, problem, or project related to the student's major. At least one-third of the grade will be based on independent investigation and presentation of one's own work.

INTERMEDIATE DESIGN STUDIO

Students pursuing the Bachelor of Architecture must complete four Intermediate Design Studios during their second and third years. Building on the Foundation Design Studios taken during the first year, the goal of the Intermediate Studios is to prepare students for Advanced Design Studios in their fourth and fifth years.

Each Intermediate Studio will be structured around one of four broad themes of inquiry (Operational, Environmental, Integration, and Speculation) and will offer a critical framework and vocabularies for design and development into key issues emphasized in the theme. Intermediate Studios will also serve as a platform to prepare students for the range of offerings of the Advanced Studios (e.g. Comprehensive, Urban Design, Landscape Architecture, etc.). Intermediate Studios will follow a similar structure, but each instructor will individually determine the scope and design problem for each studio.

THEME: OPERATIONAL

The Operational Studio emphasizes architecture as a formal exploration. Students will use new tools for the design and fabrication of formally complex projects while considering the possibilities of software to produce architecture. Projects will be designed using a step-by-step process that generates a cohesive whole from an assemblage of parts. Each part will exist within a parametric network that develops as the project grows. Each part will be linked to the others through a set of rules that guide the morphogenesis of the whole, such that a change to either part or whole will have a ripple effect throughout the project. The project will be in a constant state of flux as new issues find their way to the forefront. By building parametric relationships from the bottom-up, students will know the mechanics of their project, yet have the freedom to improvise within the bounds of a rule-based framework. Students will be tasked with balancing an intuitive approach to form-making with an operational design methodology.

The semester will be divided into 4 assignments. The first assignment will focus on the research and analysis of a precedent project, while the second will ask students to design a three-dimensional physical construct using their analysis as a set of instructions. The first two projects will be completed in groups of two. The third project will be a short transitional project, in which students will deploy their project on a site using both intuitive and rule-based design methodologies. The final project will be a building design using tactics developed during the warm-up assignments.

The studio will rely on digital technologies (software + hardware) for the execution of projects. Instruction will be given via desk-crits, tutorials, group pin-ups, and reviews.

COURSE DESCRIPTION

Parametric design is an approach that fuses computational tools with a design process in which the parameters of a building's parts are connected – the whole is a sum of the parts and a change to a part affects the form of the whole. A parametric design approach is one in which the designer instantiates parts; each part the product of a set of parameters that exist within a minimum and maximum range, and under a defined set of constraints. By thinking of a building as a system in which everything is related, as opposed to a discrete object, architects can layer complexity into a design without having to re-coordinate an entire set of drawings every time a change is made.

As digital fabrication technologies advance, we are no longer beholden to the limitations imposed by mass manufacturing. Parts can differentiate across a surface while adjusting to extremely local conditions imposed by context or the environment. Or, parts can be altogether unique from one to the next.

The intersection of a parametric theory and the advance of new technologies has changed the way many architects design. Rather than follow a top-down approach in which some overall vision is sketched on paper and then articulated through details, a parametric approach works from the bottom-up and the whole emerges from a series of executable steps.

Of course, architects have a unique sensibility that cannot be entirely translated to computational design processes. This studio will challenge students to find a balance between a parametric design process and a personal set of interests. Students will develop an operational logic through which these issues will be explored.

STUDIO STRUCTURE

Assignment #1: Research and Analysis (1.5 weeks)

10% of final grade

Students will work in pairs

Assignment #2: Operational Construct (2.5 weeks)

10% of final grade

Students will work in pairs

Assignment #3: Site Intervention (2.5 weeks);

20% of final grade

Students will work individually

Assignment #4: Main project, approx. 10,000 SF Building (7 weeks);

60% of final grade

Students will work individually

LEARNING OUTCOMES

Students will be exposed to a series of learning goals several times and from different angles over the four Intermediate Studio sequence. The goal is that similar issues are repeated from studio to studio but from different angles, allowing students to find, within the diversity of the topics, a “common thread” as they go through the sequence of the four studios. The level of expectation will grow as students go from being introduced to an issue, to becoming competent at it. Some issues would be only mentioned in passing in one studio but will be studied in more depth in another.

- *Design Composition Skills*: Developed through three-dimensional architectural form and space, both exterior and interior; building envelope
- *Design Integration Skills*: Demonstrated through creative engagement with issues of materiality, structures, construction, and environmental system
- *Site Analysis and Design*: Developed through the creative engagement with relevant contextual; environmental and programmatic factors underlying the project
- *Critical Thinking*: Quality of conceptual and critical thought; learning from precedents; research skills
- *Graphic Skills*: Quality of presentation; clarity of communication; appropriateness of media strategy and level of skill displayed
- *Basic grasp of accessibility and egress*
- *Collaborative and Leadership Skills*: Demonstrated through the active engagement in all activities of the studio

STUDIO CULTURE

The School of Architecture believes in the value of the design studio model. Studio learning encourages dialogue, collaboration, risk-taking, innovation, and learning-by-doing. The studio offers an environment where students can come together to ask questions and make proposals, which are developed and discussed among classmates, faculty, visiting professionals, and the public-at-large. Studio learning offers intensive one-on-one instruction from faculty members, and provides the opportunity for each student to develop his/her critical thinking skills and spatial and material sensibilities. The design studio offers a synthetic form of education, where project-based learning becomes the foundation for developing an understanding of and commitment to the school's core values — broadmindedness, interconnectivity, professionalism, exploration and activism — all in service of architecture's fundamental mission: to improve the quality of the built and natural environments.

<https://soa.utexas.edu/programs/architecture/architecture-studio-culture>

DESIGN CONVERSATIONS: JESSEN LECTURES

The School of Architecture offers a wide range of opportunities for students to extend the design conversations taken place in studios (Lecture Series, Goldsmith Talks, Exhibitions, etc). Students are encouraged to participate and be engaged. Specifically, all B.Arch and BSAS students in studio are expected to attend all the Jessen Lectures (three per semester by lead practitioners from around the world). The lectures and the group discussions in studio that

follow are important for the holistic education of intellectually engaged students and participation will have an impact on students' grades (see below).

EVALUATION CRITERIA

While each project contains certain quantifiable elements for evaluation, a significant portion of each grade is derived from broader and more subjective criteria.

Student work will be evaluated according to its rigor and evolution over the semester. Grades are subject to deductions for late arrivals, absences, and late or incomplete work at the discretion of the instructor.

Grading for an assignment is broken into four components, each of which is given roughly equal weight:

Pursuit: the consistent and rigorous development and testing of ideas.

- The ability to formulate a query or thesis and pursue a self-determined concomitant method of inquiry
- The ability to identify and implement various processual mechanisms (software, sketch drawing and models, etc.) in the development of the design
- Initiative as demonstrated in work ethic – Does the student do what is asked; go beyond what is asked; direct their own efforts; eager to produce the next iteration of the design?

Grasp: the ideas and understanding of the project at hand and integration of knowledge introduced in companion courses.

- A strong and clearly stated design objective
- Spatial acuity as demonstrated in plan – including reasonable disposition of programmatic elements – and sectional development
- Synthetic and critical thinking; the ability to holistically organize a project as demonstrated through creative engagement with issues of materiality, structures and construction, structural and environmental system integration, building materials and assembly, sustainable practices, etc. in support of the design objective
- Structural competence and material sensitivity as demonstrated in wall thickness, floor plates, and assembly

Resolution: of the design objective; the demonstration of competence, completeness, and finesse in the final design presentation.

- Quality of presentation; clarity of communication; appropriateness of media strategy and level of skill displayed through the work presented at all stages of the design process; technical documentation

Engagement: the active participation in studio activities, leadership, collaboration, group discussions and reviews.

A student must earn a letter grade of C or better in order for the course to count towards a degree in the School of Architecture and to progress in to the next studio. A letter grade of C- will not satisfy degree requirements.

GRADE DESCRIPTIONS

A/A-	Excellent Project surpasses expectations in terms of inventiveness, appropriateness, visual language, conceptual rigor, craft, and personal development. Student pursues concepts and techniques above and beyond what is discussed in class. Project is complete on all levels.
B+/B/B-	Above Average Project is thorough, well presented, diligently pursued, and successfully completed. Student pursues ideas and suggestions presented in class and puts in effort to resolve required projects. Project is complete on all levels and demonstrates potential for excellence.
C+/C	Average Project meets the minimum requirements. Suggestions made in class and not pursued with dedication and rigor. Project is incomplete in one or more areas.
C-/D+/D/D-	Poor Project is incomplete. Basic grasp of skill is lacking, visual clarity or logic of presentation are not level-appropriate. Student does not demonstrate the required competence and knowledge base.
F	Fail Project is unresolved. Minimum objectives are not met. Performance is not acceptable. Note that this grade will be assigned when students have excessive unexcused absences.
X	Excused Incomplete Can be given only for legitimate reasons of illness or family emergency. Simply not completing work on time is not an adequate cause for assigning this evaluation. It may only be used after consultation with the Associate Deans' offices and with an agreement as to a new completion date. Work must be completed before the second week of the next semester in which the student is enrolling, according to the School of Architecture policy.

ATTENDANCE

Attendance is mandatory. Participation is expected. With three (3) unexcused absences, the student's final grade for the course will be lowered by a full letter grade. The final grade will be lowered by a full letter grade for each unexcused absence thereafter. Aside from religious

observances, absences are only excused with written documentation of a medical issue or family emergency. The student is responsible for completing work missed due to excused absences and initiating communication with the instructor to determine due dates.

If a student is late (5 minutes after the start of class) three (3) times, it will be counted as one (1) unexcused absence. Students should notify the instructor prior to class if lateness or absence is known in advance. Students must notify instructors directly regarding lateness or absences; Asking a classmate to inform the instructor is not acceptable.

RELIGIOUS OBSERVANCES

A student shall be excused from attending classes of other required activities, including examinations, for the observance of a religious holy day, including travel for the purpose. A student whose absence is excused under this subsection may not be penalized for that absence and shall be allowed to take an examination or complete an assignment from which the student is excused within a reasonable time after the absence. University policy requires students to notify each of their instructors as far in advance of the absence as possible so that arrangements can be made.

ACADEMIC INTEGRITY

Students who violate University policy on academic integrity are subject to disciplinary penalties, including the possibility of failure in the course and/or dismissal from the University. Since such dishonesty harms the individual, all students, and the integrity of the University, policies on academic integrity will be strictly enforced. Refer to the Student Conduct and Academic Integrity website for official University policies and procedures on academic integrity: <http://deanofstudents.utexas.edu/conduct/academicintegrity.php>. University Code of Conduct: <http://catalog.utexas.edu/general-information/the-university/#universitycodeofconduct>

CARE PROGRAM

Counselors in Academic Residence (CARE) Program places licensed mental health professionals within the colleges or schools they serve in order to provide better access to mental health support for students who are struggling emotionally and/or academically.

Abby Simpson is the CARE counselor for the School of Architecture. Faculty and staff may refer students to the CARE counselor or students may directly reach out to her.

Abby Simpson | BTL 114B | (512) 471-3115
https://cmhc.utexas.edu/CARE_simpson.html

STUDENTS WITH DISABILITIES

Students with disabilities who require special accommodations need to obtain a letter that documents the disability from the Services for Students with Disabilities area of the Office of the Dean of Students (471-6259 voice or 471-4641 TTY for users who are deaf or hard of hearing). This letter should be presented to the instructor in each course at the beginning of the semester and accommodations needed should be discussed at that time.

<http://diversity.utexas.edu/disability/>

SECURITY, SAFETY, AND THE STUDIO

The studio is an exceptional learning environment. Since it is a place for all, it necessitates the careful attention to the needs of everyone. All spraying of fixative, spray paint, or any other substance should be done in the shop. Security is a necessary component for a studio that is accessible to you and your colleagues 24 hours a day, 7 days a week. Do not leave your studio without your studio key and do not leave your studio unlocked. Hold yourself and your studiomates accountable for the security of your shared space.

COURSE REQUIREMENTS

Students are required to have a laptop computer that is capable of running high performance 2d and 3d software applications, including Adobe Illustrator, Adobe Photoshop, Rhino, Grasshopper, and Autodesk 3ds Max. All programs should be 2015 versions or later.

Weekly progress and participation in class pin-ups, desk crits and reviews is required, including completion of assigned readings and participation in discussions. Students are expected to have new work for each class that is printed on min. 8.5" x 11" for desk-crits and larger plots for pin-ups and reviews.

The submission of high quality final renders (jpeg format), progress renders, 3d digital models, final boards, full documentation of project and design process and high quality photographs of your models on a flash drive is mandatory. Failure to submit flash drive on the final day of class will result in a minimum full letter grade drop in your final grade for the course.

COURSE SCHEDULE

WK 1	W.	8/29	Studio Lottery Handout Precedent List Handout Assignment 01 Precedent Research + Analysis
WK 2	M. W.	9/3 9/5	NO CLASS /// Labor Day
WK 3	M. W.	9/10 9/12	DUE Assignment 01 Precedent Research + Analysis Pin-up Sutton 4 th Floor Hallway Handout Assignment 02 Operational Construct
WK 4	M. W.	9/17 9/19	
WK 5	M. W. Th.	9/24 9/26 9/27	<i>Vis Comm Module 1 DUE</i>

WK 6	M.	10/1	DUE Assignment 02 Operational Construct Pin-up Sutton 4 th Floor Hallway Handout Assignment 03 Site Visit
	W.	10/3	
WK 7	M.	10/8	
	W.	10/10	
WK 8	M.	10/15	
	W.	10/17	
	Th.	10/18	<i>Vis Comm Module 2 DUE</i>
WK 9	M.	10/22	
	W.	10/24	
WK 10	M.	10/29	
	W.	10/31	
WK 11	M.	11/5	
	W.	11/7	
WK 12	M.	11/12	
	W.	11/14	
WK 13	M.	11/19	
	Tu.	11/20	<i>Vis Comm Module 3 DUE</i>
	W.	11/21	NO CLASS /// Thanksgiving
WK 14	M.	11/26	
	W.	11/28	
WK 15	M.	12/3	
	W.	12/5	FINAL REVIEW

WEB RESOURCES

www.cgarchitect.com (forum help for 3ds Max and rendering) www.scriptspot.com (free 3ds Max scripts)

www.vray-materials.de (free V-Ray materials)

www.shapeways.com (cheap 3d printing, expect 1 month lead time) www.lynda.com (good tutorials, all programs)

www.archive3d.net (free 3d models)
<http://www.grasshopper3d.com/> (great forum, GH plug-ins, tutorials)
<http://www.food4rhino.com/> (GH plug-ins)
<http://lynda.com> (good tutorials, all programs, free with UT email address)

READING LIST

Branko Kolarevic. *Architecture in the Digital Age: Design and Manufacturing* (Routledge Publishers, 2003).

Christopher Beorkrem. *Material Strategies in Digital Fabrication* (Routledge, 2013).

Fabio Gramazio, & Matthias Kohler. *Digital Materiality in Architecture* (Lars Müller Publishers, 2008).

Gail Borden. *Process: Material and Representation in Architecture* (Routledge Press, 2012).

Greg Lynn. *Folds. Bodies & Blobs: Collected Essays* (Books-by-Architects, 1998).

Helmut Pottmann, Andreas Asperl, Michael Hofer, Axel Kilian. *Architectural Geometry* (Bentley Institute Press, 2007).

Jane Burry + Mark Burry. *The New Mathematics of Architecture* (Thames & Hudson, 2010).

Lisa Iwamoto. *Digital Fabrications: Architectural and Material Techniques* (Princeton Architectural Press, 2009).

Marc Taylor. *The Moment of Complexity: Emerging Network Culture* (The University of Chicago Press, 2001).

Neil Gershenfeld. *FAB- The coming revolution on your desktop-from personal computers to personal fabrication* (Basic Books, 2005).

Nick Dunn. *Digital Fabrication in Architecture* (Laurence King Publishing, 2012).

Peter Cook. *Drawing: the Emotive Force of Architecture, The Drawing Redefined* (John Wiley & Sons Ltd., 2008) pp. 195-202.

Robin Evans, *Translations from Drawing to Building* (MIT Press, 1997) pp. 153-194.

Reiser + Umemoto, *Atlas of Novel Tectonics* (Princeton Architectural Press, 2006).

Rudolf Arnheim. *The Dynamics of Architectural Form* (University of California Press, 2009)

Wassim Jabi. *Parametric Design for Architecture* (Laurence King Publishing, 2013).