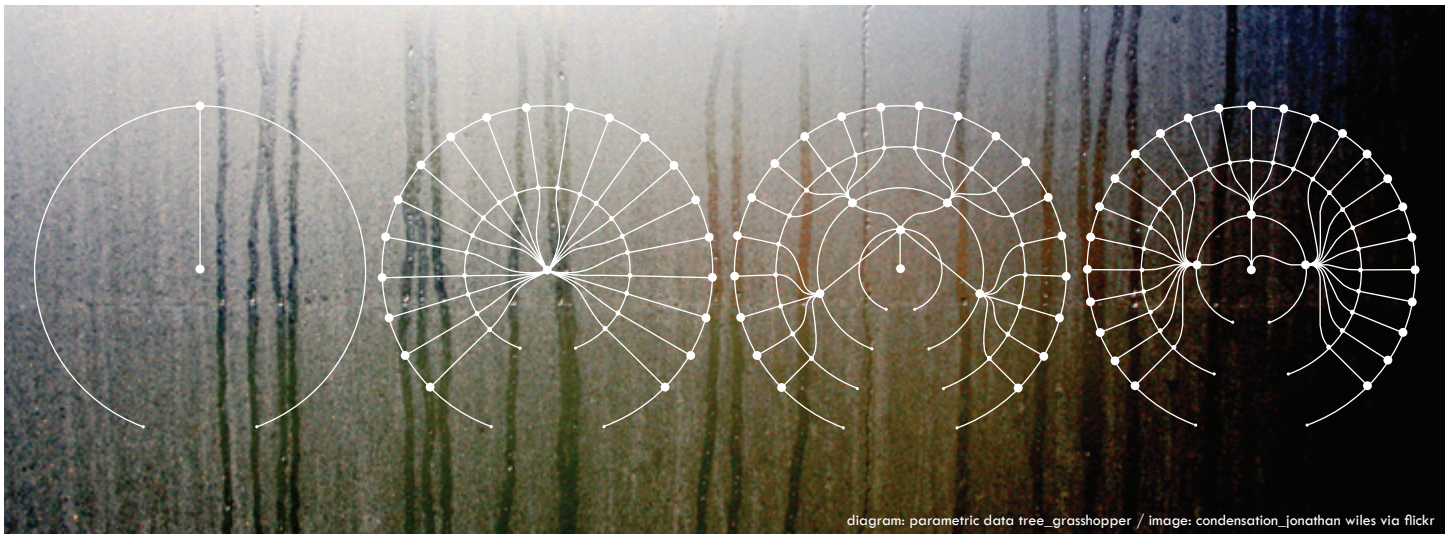
ARC 640
CONDITIONAL FORM

Spring 2010
Tuesday 10:00 – 12:40
302 Hayes Hall

Instructor: Nicholas Bruscia (nbruscia@buffalo.edu)
Eligibility: Graduate students that have passed ARC 611 or equivalent. Media Robotics I or Atmospheric Architectures and prior experience with Rhinoceros is preferred.
Requirements: Arduino USB board, personal laptop (PC or Windows capable Mac) is recommended.
Office Hours: Tuesdays and Thursdays by appointment.

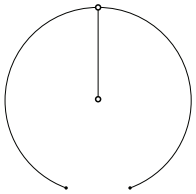


Goethe defined morphology as the science of form (Gestalt), formation (Bildung) and transformation (Umbildung) in organic bodies. He laid the foundations for a systematic method for observing the relation between the outward appearance of things and the intuited processes that made them come about. This recognized form as unstable and conditional; the product of transformations performed on more primordial forms. Based upon this supposition we may propose to first observe the immaterial and the phenomenal as a fluid formal condition, one that is never static. Harnessing non-static environmental conditions then, may become a method to develop responsive systems that are contingent to the processes of their making.

The research agenda within this seminar will be focused on the potential agency of environmental sensing (temperature, humidity, light, air pressure) to generate form and structure. How can immaterial atmospheric conditions be incorporated into a formal design process? What are the affordances and shortcomings of tying real world data to more abstract formal explorations? What are its potential material ramifications? As the research moves forward, we will experiment and develop a critical stance on the connection between physical and digital computing as an instigator of formal study.

Students will focus on a local atmospheric condition by situating various sensors within a specific context to document a change in the condition over time. Depending on the chosen condition, the duration within which the data is collected will vary and become an important design parameter in the development of an architectural response to the studied environmental condition. Topics of study (within the parametric modeling environment) include surfaces, solids, systems, data visualization, modeling / fabrication, and physical computing (data collecting)

Class time will be held in workshop format and split into two sessions, one of demonstration and the other of hands on exercises. The digital toolsets introduced are Rhinoceros 4.0 (surface modeling), Grasshopper 0.6 (parametric modeling), and Arduino (physical computing). All design research and prototypes will be documented on the course website which will be continuously updated throughout the semester.



SCHEDULE . subject to change of course

conditional research

week 1

Jan. 12 ..... intro . modeling in rhino
research_ condition of study

week 2

Jan. 19 ..... modeling in rhino cont. (or) intro to grasshopper
pin-up_ diagramming of condition of study

fields

conditional sensing ...

week 3

Jan. 26 ..... grasshopper | patterns and fields
exercise 1

surfaces

week 4

Feb. 2 ..... grasshopper | surfaces
exercise 2

solids

week 5

Feb. 9 ..... grasshopper | solids
exercise 3

systems

week 6

Feb. 16 ..... grasshopper | systems
exercise 4

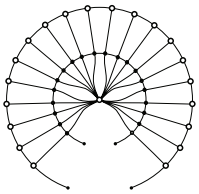
data

week 7

Feb. 23 ..... grasshopper | data visualization
exercise 5 | pin-up_ conditional data, form development

week 8

Mar. 2 ..... review | material, scale, response discussion



SCHEDULE CONT.

week 9

spring recess . no class ..... Mar. 9

sensors | parameter

week 10

grasshopper | sensors, parameter ..... Mar. 16

exercise 6

week 11

grasshopper | sensors, parameter ..... Mar. 23

pin-up_ sensed data to gh

modeling, fabrication

week 12

grasshopper | fabrication ..... Mar. 30

exercise 7

project development

week 13

special topics ..... Apr. 6

work session

week 14

special topics ..... Apr. 13

work session | pin-up_ project development

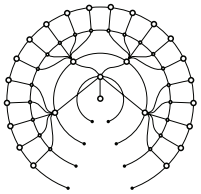
week 15

special topics ..... Apr. 20

work session

final review _ TBD

final deliverables due _ TBD



TECHNICAL METHODS

Technical methods introduced in the course are 3D modelling in Rinoceros, parametric modelling in Grasshopper (plug-in for Rhino), and environmental sensing with Arduino (physical computing platform). Additional tools introduced may be VBscripting for Grasshopper, storing of historical data gathered via sensors, and the reading of historical data (within Grasshopper) from text files and Excel spreadsheets. Preparing a parametric system to aid in the process of physical modelling will also be introduced.

COURSE FORMAT

The course will be conducted in a workshop setting. The first half of each class (1 hour, 20 min.) will consist of tutorials / demos. For the second half, students will work on basic exercises utilizing the material introduced in each class.

GRADING

• in-class exercises / projects	50%
• documentation / communications	35%
• attendance / participation	15%

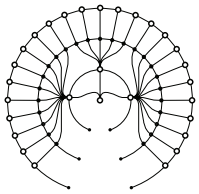
SUGGESTED REFERENCES

web:

http://www.grasshopper3d.com
http://www.liftarchitects.com/downloads (Grasshopper Primer_2nd Edition)
http://web.mac.com/rhino3dtv/GH/GH.html
http://blog.rhino3d.com/search/label/grasshopper tutorials
http://www.liftarchitects.com
http://modelab.nu
http://www.designalyze.com
http://designreform.net
http://www.tedngai.net
http://www.livearchitecture.net

books:

Boundary Layer Climates - T.R. Oke
Performatice Architecture: Beyond Instrumentality - Branko Kolarevic
Morpho-Ecologies: Towards Heterogeneous Space In Architecture Design - Hensel, Menges
On Growth and Form - D'Arcy Wentworth Thomson
Architectural Geometry - Pottman, Asperl, Hofer, Kilian
Frei Otto: IL various volumes
From Control to Design: Parametric/Algorithmic Architecture - Meredith, Aranda-Lasch, Sasaki
Innovative Surface Structures: Technologies and Applications - Martin Bechthold
Digital Fabrications: Architectural and Material Techniques - Lisa Iwamoto
AD | Energies: New Material Boundaries Also by AD - Versitility and Vicissitude, Programming Cultures
Pamphlet Architecture 27: Tooling - Aranda-Lasch



COURSE OBJECTIVES and EXPECTATIONS

The objectives of the course are: develop technical skills with digital and physical computing as well as the ability to construct parametric systems for use in architectural design. Additional objectives are to expose students to architectural research specific to a method and toolset while developing a unique position on the content and results.

Students will be expected to be highly proactive in absorbing the material presented in class, as well as producing unique content derived from available resources. Grasshopper definitions of your own will be included within the deliverables to be submitted.

ATTENDANCE:

Students are required to attend all class sections and to be on time to class. There is no such thing as an "allowable" unexcused absence. As your participation in class excerises amounts to 15% of your grade for this course, any missed class will result in a lowering of your grade. Arriving more than 15 minutes late for two 2 classes is considered one 1 absence. Missing more than 3 classes without an accpetable excuse will result in a failing grade. Acceptable excuses include documented sickness, accidents, severe weather, family crisis and other contingencies.

Incompletes are only granted in the case of legitimate, documented emergencies, and only to students in good standing in the course.

ACADEMIC INTEGRITY

Students are reminded of University Policy regarding Academic Integrity, as stated in the University at Buffalo Undergraduate Catalog 2001-2002:

"The University has a responsibility to promote academic honesty and integrity and to develop procedures to deal effectively with instances of academic dishonesty. Students are responsible for the honest completion and representation of their work, for the appropriate citation of sources, and for respect for others' academic endeavors. By placing their name on academic work, students certify originality of all work not otherwise identified by appropriate acknowledgments."

This policy includes, but is not limited to, the following:

1. Students should not cheat on exams.
2. Students should not submit previously completed work as original work.
3. Students should not submit work done for one class to fulfill the requirements of another course without the permission of the instructor.

SPECIFIC NEEDS

Students with specific needs that require attention should inform the instructor at the beginning of the semester. If you have a disability (physical, learning, or psychological) which may make it difficult for you to carry out the course work as outlined, and/or requires accommodations such as recruiting note takers, readers, or extended time on exams and assignments, please contact the Office of Disability Services, 25 Capen Hall, 645-2608. The office will provide you with information and review appropriate arrangements for reasonable accommodations.