



*PM10 Air Pollution, Urban Design and Childhood Development, Barcelona and Portland, with Marc Viader, Robotics and Artificial Intelligence, 2014*

## Parametric Places 2015: Data making + Public space

Course Number, Time and Location: ARCH 4/523, Winter 2015; T + TH, 12:00- 1:50pm, LA 279

Instructor: Philip Speranza, [speranza@uoregon.edu](mailto:speranza@uoregon.edu)

In association with the U|xD Urban Interactions Lab

### PURPOSE

How do we measure the city today? How do we connect to or 'attach' our design work to place in the year 2014?

OpenStreetMaps.com, Grasshopper, plugins HUMAN and ELK, Arduino, Formub and other media provide new methods to understand the social qualities of cities in ways that are: 1) democratically open; 2) systematic; & 3) custom formulated.

The research method taught in this class will investigate the off-site and on-site use of data using Rhino Grasshopper, plugins and custom scripts. These tools will be integrated with mobile app technology to measure on-site phenomena, codify this qualitative information and create a customized design tool. These tools will not be seen as singular design solutions but rather as design agents that combine human and non-human authorship (Manuel De Landa 2008) (Bruno Latour 2005). Unlike GIS software ESRI ArcGIS and ESRI City Engine, the use of custom Grasshopper scripts allow the simultaneous analysis and synthesis of new custom data for design simulation. Students will design urban interventions at the scale of public space in Portland or Barcelona.

**Part I** of the course will investigate work at the scale of parametric urbanism in Portland and Barcelona. Students will learn parametric urban design and the ability to create new data using in-situ observation optionally using Arduino microprocessors. Case studies will use parametric urban design projects and files by NBBJ's Andrew Heumann, Carlo Ratti's MIT SENSEable Cities Lab (UO 2015 lecturer and possible reviewer) and previous UO developed projects.

**Part II** of the course will allow students to develop an analytical approach using data collection in Portland or Eugene to measure social phenomena and other information that affects the health of our communities. Students will work in groups of two to measure in-situ data using Rhino Grasshopper with ELK, HUMAN and other plugins for simulation. Students are encouraged to use this media elective project as a research tool for studio, terminal studio and other course work.

Students projects from this course since 2010 have been published and presented at: *ACADIA LA 2014*; *EU City, Architecture and Information Sustainable Places 2014 Conference in Nice, France*; *SIM Sustainable Intelligent Manufacturing 2013 in Lisbon* and the forthcoming *Journal of Urban Design Special Issue on Pedagogy*.

Weeks 8 and 9 of this course will be administered offsite by the instructor with technical assistance by others in both Eugene and in collaboration with Marc Viader, robotics and artificial intelligence, laaC, Barcelona. The opportunity will exist to extend student projects during the **life | city | adaptation Barcelona Urban Design Summer Program 2015**.

**\*Basic knowledge of Rhino Grasshopper is required. Readings, media exercises and urban design methods will occur in lectures, workshops and online.** <http://www.lcabcn2014uo.wordpress.com>, <http://parametricplaces14.wordpress.com/>

## PARAMETRIC URBANISM

Program: Social Interaction Cohesion Tool

Location: Super Illa's in Barcelona and Portland

Scale: Architectural, Envelope, Public Landscape

## COURSE TEACHING METHOD

This course is organized as one lecture group and smaller lab setting in which students engage in independent project-based learning. The course time will be split between lectures, discussion and workshops using the analog and digital media in the lab environment. The work will be shared in class to foster peer-to-peer learning. Class meetings include a variety of communication formats including lectures, tutorials, desk-critiques, pin-ups, reviews, in-class discussions and reading assignments. \*Students are required to document their work to a digital archiving system.

*Office hours: Tuesday 2-3pm or by appointment, to be confirmed with student schedules.*

## CATALOG

Develop blog, ebook and printed catalog for presentation to City of Barcelona, Portland Planning and Sustainability, Portland Developers, Xavier Querol CSIC and or the Barcelona Agency of Urban Ecology with Salvador Rueda.

## APPROACH, READINGS AND SOFTWARE METHODS

Readings will include

- Bruno Latour & Alben Yaneva, *Give me a Gun and Ill Make All Buildings Move*
- Philip Speranza, "Using parametric methods to understand place in urban design courses"
- Philip Speranza "Attachment' As Agency In Off-Site and On-Site Indicators of Phenomena in Geospatial Urban Analysis Tools," *Design Agency, ACADIA 2014*
  
- 22@ Ten Years of Urban Renovation: models, MBM, Manel Bairo, others
- Manuel Sola-Morales: *10 lessons of Barcelona*, chapter "05: The Eixample"
- Vicente Gualart, "Towards a Self-Sufficient Habitat"
  
- Stan Allen, *Field Conditions* (Systems thinking)
- James Corner, *Not Unlike Life Itself* (Frameworks: open-ended but specific)
- Alejandro Zaera-Polo, *Between Ideas and Matter* (Abstract and real; Drawings and Diagrams)
- Jane Jacobs, *The Nature of Economies* (Positive and negative feedbacks)
- Manuel De Landa, *A Thousand Years of Non-Linear History*, (evolvable criteria + agglomeration)

## Course Outline

### Ia. Barcelona and 22@ Urban Design Background, Weeks 1

- Urban Design Reading and Writing Assignment, general and Barcelona context
- *Eixample* Study with unit block tiling exercises in 2D and 3D (hand media diagrams)

### Ib. Case Studies in Parametric Urban Design, Weeks 2-3

- Analog parametric design in Rhino 3D / Illustrator
- Digital parametric design in Grasshopper for individual relationships

## II. Student Projects, in parallel with weekly Grasshopper workshops, Weeks 4-10

- Background problem and project purpose
- Comparative statistics to Portland, Oregon
- Formulation of urban characteristics to include dataset gathering
- Analog parametric drawings, digital parametric drawings in Rhino Grasshopper
- Urban design strategy and drawings using analysis tool.

### *\*New for 2015:*

- New data gathering techniques
- More GH workshops (ELK, HUMAN, CSV, Post-production, etc)
- Shorter Case-Study Project

## TASKS, SCHEDULE, PRODUCTS

*\*revisions till be posted to the course weblog*

### Ia. Background and Methods, Week 1

Week 1: Tuesday, January 6<sup>th</sup> and Thursday, January 8<sup>th</sup>

#### **Data Making + Public Space** - Social Interaction Cohesion Tool, BCN to PDX

- **Lecture** on Parametric Urbanism and Barcelona (*Eixample*, 22@, Super Illa and Social Interaction Cohesion Tool)
- ACADIA Lecture: Off-site, On-site, Virtual [R: **ACADIA**, **Speranza**]
- **JUD**: Systematic abstraction, Inclusion of Experience, Open Formulation [R: **PS**]
- Content of Site (Barcelona and Portland): Google Earth, OpenStreetMap
- Measuring urban phenomena directly vs urban characteristics that support it
- *Supplemental Rhino/Grasshopper tutorial (point attractor and image sampler)*
  - *Discuss reading on Open, Systematic and Formulaic, Speranza*
  - Lecture on Barcelona *Eixample* Grid (+Portland) [R: **Sola-Morales** and **Gualart**]
  - Scales of development: Super Illa, Block and Parcel Address (ex. Gualart to UD&CL)
  - Start Exercise 01: 2D in class [**Exercise 01: Tiling 3D to 2D**] *Rhino only*
  - Grasshopper (GH) Workshop: "Off-Site Workflow" **HUMAN**, object attribute and color

## Ib. Case Study and Data Gathering, Weeks 2-3

Week 2: Tuesday, January 13<sup>th</sup> and Thursday, January 15<sup>th</sup>

Parametric Urbanism and Measuring Social Data In-Situ, Case Studies,  
Case Study / Urban Organization, Week 2

- *Review Exercise 01: Tiling 3D to 2D and Readings Morales and Guallart*
- Lecture on Social Interaction Cohesion Tool 2: Rueda, IcaBCN 2014, Vincent and Ryan
- Selected urban phenomena related to 3 readings, **[Writing Assignment 1]**
- **Case Study Phenomena mapping options:** By others, Parametric Places 2012, 2013 and 2014, IcaBCN 2013 and Milwaukie Alignment Studio (UC Berkeley Local Code by Nicholas DeMonchaux, abandoned space; **Zaha Schumacher**, form; Edible Infrastructure, agriculture; **City Farm**, water and agriculture; MIT SENSEable Cities Lab, recycling flow; Karen M'Closky, transformation; Sound Interaction, sound; Healthy Trees, social space and trees)
- GH Workshop: **Exiample, GH geometry vs Rhino geometry**
- GH Workshop: **Data Trees** (Graft, Flatten, Param Viewer)
- *Supplemental Grasshopper Workshop: ELK 1, basic tutorial*
- GH Workshop **ELK of Barcelona and Portland: Geographic data**
- Case Study: Pin-up / desk crits, paired groups
- In-Situ Workflow: Google Maps pins, KML to CSV conversion, GH CSV component

*(Portland trip I) Selected phenomena, analog mapping, mobile sensors, data recording*

# class dinner

Week 3: Tuesday, January 20<sup>th</sup> and Thursday, January 22<sup>th</sup>

Case Study / Data Gathering, Urban Phenomenon

- Rebuild Case Studies: isolate and rebuild individual parametric relationships
- Case Study: Pin-up / desk crits, paired groups
- *Writing assignment Abstract and Outlines due*
- GH Workshop: **CSV component Portland data management**
- **Supplemental Workshop: Arduino 1**
- **Case-study Presentations** to group (share website documentation, identify, show GH, understand why, chart findings to Google Doc via assignment)

## II. Final Project, Weeks 4-9

Week 4: Tuesday, January 29<sup>th</sup> and Thursday, January 31<sup>th</sup>

- *Writing assignment Due*
- Formulation and Research, form partners
- Testing urban characteristics and their indicators: geographic, off-site and on-site
- [Reading: Carlo Ratti]
- ***Supplemental Workshop: Arduino 2***
  - discuss Ratti reading
  - GH Workshop: **Python CSV/OSM integration** (use only)
  - Desk crits

### Analog Parametric Operations

Week 5: Tuesday, February 2<sup>nd</sup> and Thursday, February 3<sup>rd</sup>

- Testing technique, abstract - unit parcel, block and Super IIIa
- GH Workshop: **"Post-production workflow" baking in layers, Illustrator vs Photoshop (ex. PM tool)**
- *Supplemental Workshop: Arduino 3*
  - **\*\*Presentation:** findings, urban characteristics, limits, questions

*Lecture and possible review: Carlo Ratti*

Week 6: Tuesday, February 9<sup>th</sup> and Thursday, February 11<sup>th</sup>

- Build system, 22@ unit/whole, Super IIIa,
- Begin: parametric intervention (arch, envelope, larch)
- ***Supplemental Workshop: Arduino 3***
  - Desk crits

*(Portland trip II) Phenomena, digital mapping, mobile sensors, data recording*

Week 7: Tuesday, February 16<sup>th</sup> and Thursday, February 18<sup>th</sup>

- Desk crits / technical assistance
- Grasshopper Workshop: Visualization 1, **z-lines, colors, thickness**

- **\*\*Presentation:** Final in-class pin-up

Week 8: Tuesday, February 23<sup>th</sup> and Thursday, February 25<sup>th</sup>

Final system, second pass, design communication

- Grasshopper Workshop: **Viz 2, baking HUMAN** (Stephen)
- Technical assistance (1 hour)
  
- Optional Grasshopper Workshop: **Python CSV/OSM integration** (Stephen)
- Technical assistance (1 hour)

Week 9: Tuesday, March 3<sup>rd</sup> and Thursday, March 5<sup>th</sup>

- **\*\*Pinup of Revisions, Weblog posts for comments**
- Grasshopper Workshop: **Viz 3, Graphic tools** (Vincent or Ryan)
  
- Technical assistance

Week 10: Tuesday, March 10<sup>rd</sup> and Thursday, March 12<sup>th</sup>

- no class, studio review

Final: Friday, March 20<sup>th</sup>, 2014

- Final Project Submission
- A&AA server upload (In-Design, JPG, blog post)

## **NON-TRADITIONAL LEARNING**

Weblog participation and related sketchbook work for diagramming ideas is required. The weblog posts will provide two mechanisms for learning: 1) the collection and organization of work in a single shared learning space and 2) the use of comments between students for peer-to-peer learning and to enhance writing ability. The sketchbook is a place for notes, in-situ drawing, and drawing to test ideas. You should draw systems diagrams, examples will be provided. A diagramming method of thinking, visualizing in the mind (including differentiation) and then concisely draw the idea in 30-60s will be presented.

## **COURSE FOLDER**

A course folder: Arch 4\_523 SPERANZA is located in the AAAFILESERVER. Instructions for access to the studio folder are available on the AAA website. <http://aaauoregon.edu/computing/course-folder>  
The studio will use a weblog to communicate and post assignments.

## **GRADING AND EVALUATION**

20% PROJECT 1 /// Writing Assignment

30% PROJECT 2 /// Case Study

40% PROJECT 3 /// Final definition and application/test

10% Class Participation

Students will not receive a final grade until all work has been uploaded for digital submission.

## **ATTENDANCE**

Attendance is mandatory. Lateness will be counted 15 minutes after class has started. Absences will be counted 30 minutes after class has started. After 3 unexcused absences your grade will be lowered by a grade point for each additional absence if you do not have a written medical, school or religious excuse. All students are expected to participate in class discussions and to develop their projects beyond the minimum requirement.

## **SPECIAL ACCOMMODATIONS / STUDENTS WITH DISABILITIES**

The University of Oregon is committed to providing inclusive learning environments. Please notify your instructor if any aspects of this course result in barriers to your participation. You may also contact UO Disability Services in 164 Oregon Hall, 346-1155 or [disabsrv@uoregon.edu](mailto:disabsrv@uoregon.edu). If you have a documented disability and require accommodations in studio, please meet your instructor to show your notification letter.

## **ACADEMIC INTEGRITY**

Students should be familiar with University policies related to academic integrity and consequences for dishonest conduct. All work submitted should be your own and all sources should be cited.

Questions about how specific assignments should be handled with regard to collaborative work, citations, or any other issues can be raised in class. Principles of academic honesty and professional ethics also apply to any use of computers associated with the studio. This includes observing all software licensing requirements and respecting copyrights of intellectual property published on the Internet.

## **PROJECT OWNERSHIP, PUBLICATION, AND PUBLICITY**

Work created for credit and/or using the facilities of the School of Architecture and Allied Arts belongs

jointly to the school and the student. The AAA reserves the right to document and display all original work for the purpose of documenting student performance as mandated by the National Architecture Accrediting Board [NAAB]. Furthermore, the school reserves the non-exclusive right to use images or likenesses of the work for publicity and display in print and electronic media as well as to submit such work for competitively reviewed exhibitions or to various award programs, The School and its representatives [including faculty and teaching staff] have the non-exclusive right to use such work as illustrations in scholarly and/or technical publications and presentations.

## APPENDIXES

### Appendix 1.0, Social Interaction Cohesion Tool (Public and Private indicators)

- Social Indicators (22@)
  - Social Services
  - Social Space
  - Social Housing
  - Job Opportunities
- Demographics (Formhub?)
  - Cultural background
  - Age
  - Income
  - ...educational background
- Infrastructure
  - Transit
  - IT
  - ...Geographic (ex. slope, water, city metabolism)

### Appendix 2.0, Methodology

**DEFINE PROBLEM:** What is the question or problem to solve in Barcelona and Portland? *Social Interaction Tool*

**QUALITY:** What is the quality to attach to that responds to the problem of community design between works and residents in the 22@ neighborhood?

- Research: Comparative graphics to examples such as Portland, NYC or national averages.
- Visual Language: develop visual language for parametric variations

**CRITERIA:** Develop criteria that support the overall quality of the tool

- Criteria to Indicators: Identify indicators of this first criteria mapping (3-5 criteria to measure, existing data), 3 x3 block area, map
- Analyze: Analog to Digital
- Repeat in comparative location (Barcelona and Portland)

#### MODEL AS ANALYTICAL AND VISUALIZATION TOOL

- Identify and study parameters at unit parcel
- Abstract modeling at one block, unit parcel to unit block module
- Identify useful plugins and script as required to build Grasshopper "tool"
- Real-world case-study block in 22@, 3D Rhino model as necessary

#### MODEL AS SYNTHESIS TOOL, \*AGENCY

- Apply tool to 3 x 3 test areas around original real-world study block
- Develop and refine parametric relationship, use plugin such as Galapagos as required.
- Parametric Formula (Diagram)