TOOLING UP // AN INTRODUCTION TO NEW DIGITAL TERRITORIES

// COURSE DESCRIPTION

Contemporary digital design practice is in a state of rapid evolution. While architects have employed computer-aided drafting (CAD) systems for decades, only recently have two distinct and potent design sensibilities - parametric and algorithmic design - emerged. Nurtured by early architectural researchers and programmers operating in practice, these methodologies are now gaining widespread professional and academic acceptance. As a result we are witnessing a new landscape of parametric and algorithmic toolsets that in micro-scale enable generation of complex geometries and analysis of structural and environmental variables, and in macro-scale transforming the way we understand our cities. This course introduces students to computational design thinking and various scripting techniques.

// COURSE REQUIREMENTS

Each student will be required to complete weekly assigned tutorials and a final group project. Grading will be determined from the following distribution: Class Participation: 10%, Weekly tutorials: 10%, Group project: 80%

Group project: Students will work collaboratively (teams of 3-4) under a specified topic of investigation proposed in Operation 1 and developed in Operation 2.

Operation 1: Concept Sketching
Project groups are asked to sketch a design problem to study through various methodologies and toolsets.
Deliverable: Workflow Diagram
Due: 09/10/2012

Operation 2: Workflow Automation
The goal for the final assignment is to realize the full extent of the research workflow proposed in Operation 1 as a dynamic and interoperable system. Groups are expected to utilize interoperative methodologies discussed in class to formalize their research and generate data-driven geometry and/or systems.
Deliverables: Process video + Workflow Diagram + Matrix of possibilities + Rendered scenario
Due: 10/15/2012

// COURSE SCHEDULE

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<th>Date</th>
<th>Week</th>
<th>Topic</th>
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<tr>
<td>08/27/12</td>
<td>Week 1</td>
<td>Course overview + Introduction to Object-Oriented Programming</td>
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<td>Introduction to Processing</td>
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<td>09/10/12</td>
<td>Week 2</td>
<td>Interoperations: Linking Processing + Grasshopper</td>
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<td>Processing + Grasshopper input/output: .txt + .csv formats, Grasshopper plug-in: gHowl</td>
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<td>09/17/12</td>
<td>Week 3</td>
<td>Physics Engine:</td>
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<td>Processing libraries: Toxiclibs (Verlet Physics Engine), Traer Physics + Grasshopper plug-in: Kangaroo</td>
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<td>09/24/12</td>
<td>Week 4</td>
<td>Feedback Loops</td>
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<td>Rhino Python + Grasshopper Python</td>
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<td>10/01/12</td>
<td>Week 5</td>
<td>Environmental Analysis Toolsets</td>
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<td>Ecotect + Geco + Project Vasari</td>
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<td>10/08/12</td>
<td>Week 6</td>
<td>In class work session</td>
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<td>10/15/12</td>
<td>Week 7</td>
<td>Final Presentation</td>
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// BIBLIOGRAPHY

Casey Reas, Ben Fry, *Getting Started with Processing*, O’Reilly Media/Make, 2010  
Eric Bonabeau, Marco Dorigo, *Swarm Intelligence: From Natural to Artificial Systems*, Oxford: Oxford University Press, 1999  
Karen Hanna, *GIS for Landscape Architects*, ESRI Press, Redlands, California  
Lars Spuybroek, *NOX: Machining Architecture*, London: Thames and Hudson, 2004  
Michael Silver, *Programming Culture, AD*  
Neil Leach (ed.), *Digital Cities*, AD, 2009  
Neil Leach, Roland Snooks (eds.), *Swarm Intelligence: Architectures of Multi-Agent Systems*, Liaoning: LSTPH, 2011  
Paul Andersen, David Salomon, Sanford Kwinter, David Carson, *Architecture of Patterns*, W. W. Norton & Co, 2010  

// ATTENDANCE

This course adheres to the School of Architecture attendance policies. Because of the concentrated nature of foreign studies course offerings, consistent attendance is a critical aspect of the course. Absence from class can not easily be "made up" when the class experience involves unique exposure to resources not otherwise available to the students. As such absence from field study activities can have significant impact on the evaluation of student and may result in an unsatisfactory grade.

// STUDENTS WITH DISABILITIES

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

// ACADEMIC INTEGRITY

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one’s own academic work from misuse by others as well as to avoid using another’s work as one’s own. All students are expected to understand and abide by these principles. Scampus, the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A: http://www.usc.edu/dept/publications/SCAMPUS/gov/

Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: http://www.usc.edu/student-affairs/SJACS/

// ACCREDITATION STATEMENT

The USC School of Architecture’s Master of Architecture degree is an accredited professional architectural degree program. All students can access and review the NAAB Conditions of Accreditation (including the Student Performance Criteria) on the NAAB Website: http://www.naab.org/accreditation/2009_Conditions.aspx