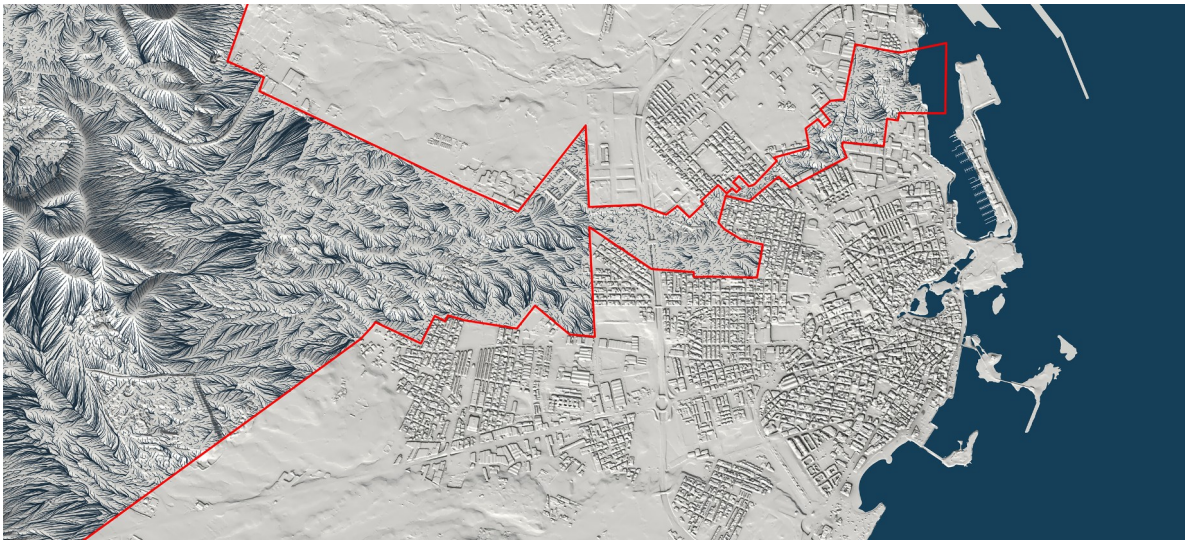
LA 439 Winter 2023

LANDFORM STUDIO: Caminos del Agua

CRN 22869 – Monday, Wednesday, Friday 1:00pm-4:50am in 310 LA Lawrence Hall

Instructor: **Ignacio López Busón**, ilopezbu@uoregon.edu (Office Lawrence 213)



Surface runoff analysis for Arrecife, Canary Islands
Ignacio Lopez Buson, MAPS

> *"Simply put, grading is design"*
>
> — *S.Strom, K.Nathan, J.Woland (Site Engineering for Landscape Architecture)*

COURSE DESCRIPTION:

The history of Lanzarote (Canary Islands, Spain) owes a great deal to the effort and ecological ingenuity of its inhabitants in their search for fresh water. The resulting hydrological structures in the form of water tanks, rainwater collectors at the bottom of ravines, ditches and pits dug in the soil are magnificent examples of how an arid territory has been adapted for human life and agriculture. However, this ancient infrastructure has been progressively lost since the 1960s due to urbanization and tourism economic pressure. Today, the island's capital, Arrecife, is an example of the consequences of a denaturalized approach to city planning, suffering from flooding events several times a year.

The aim of the project is to recover the old waterways and reconstruct lost sections of Arrecife's historic water infrastructure to design ecological corridors capable of filtering/storing rainwater and preventing flooding. These waterways will also perform as linear parks, equipped with gardens, and recreational areas, connecting different neighborhoods with Arrecife's agricultural hinterland and the coast.

Students will be introduced to a variety of digital tools, including 3D modeling, photogrammetry, and digital fabrication. We will collaborate with the local office Lab for Planning and Architecture (LPA) to develop the project Caminos del Agua, as part of their "Capital of the Biosphere Reserve" landscape urbanism framework for Arrecife.

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CONTEXT:

From LPA's project description:

"Arrecife: Capital of the Biosphere Reserve is a project coordinated by the Biosphere Reserve department of Lanzarote's Island Authority. It covers the town of Arrecife and its objective is to align the planning and design of the capital of the Island with the principles to which the island signed up in the designation of Lanzarote as a Biosphere Reserve (Unesco, 1993).

Arrecife is located in the centre of the south-easterly facing coast of the island, in the basin formed by the mountainous spine which runs between the north-eastern and south-western points of the island, where the land runs down to the sea. Historically, the inhabitants have taken advantage of rainwater and water channels. However, this ancient infrastructure has been progressively lost and this is shown in Arrecife's de-naturalized city planning. It currently suffers from flooding several times a year.

The aim of the project, inspired by design culture together with the idiosyncrasies of Lanzarote, is to recover old runoffs and reconstruct lost sections, using alternative routes. This has resulted in four pathways which cross the town from north to south and which we have named "Caminos del Agua" (water ways).

Caminos del Agua are ecological structures which filter and store rain water at its source. They act like sponges, preventing flooding and the costly processes of water channeling, purification and the discharge into the sea of conventional structures. These sustainable drainage solutions come in the form of four linear parks, equipped with gardens, recreational and pedestrian areas, which connect different neighbourhoods, until they reach the sea."

RECOMMENDED SOFTWARE:

Although the studio's first design phase is related to physical modeling, the use of digital design tools will be a critical part of this course. Students will be introduced Agisoft Metashape will be used to digitize the physical models and export them to a 3D modeling software. McNeel Rhinoceros and Grasshopper are the recommended 3D programs for the further editing, analysis and visualization of the proposal. Prior knowledge of Grasshopper is not required and it will be introduced as part of the course. The Adobe Suite will be used for additional diagrams, collages and layouts for the presentations and final boards.

Please, have the following software ready to use before the start of the course:

- **Rhino 6.0 or 7.0**
  Free 90-day trial. Download at https://www.rhino3d.com/
- **Agisoft Metashape Standard Edition**
  Free 30-day trial. **Please, wait until the beginning of the term to install it.**
  Download at https://www.agisoft.com/downloads/installer/
- **Adobe Suite**
  Photoshop, Illustrator, InDesign. Subscription model.
  Download at: https://www.adobe.com/creativecloud/buy/students.html

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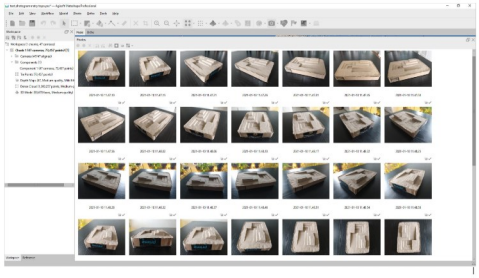
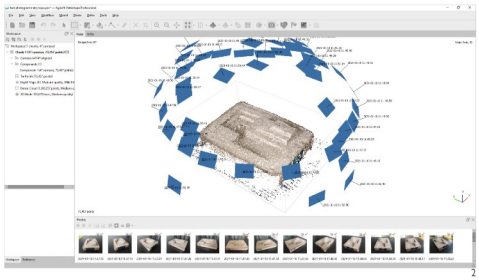
METHODS AND LEARNING OBJECTIVES:

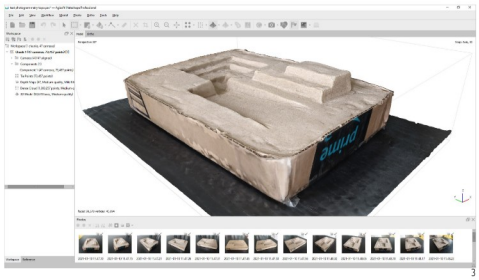
This studio introduces a methodology that combines physical and digital model-making techniques for landscape design. This proposal provides the students with a toolkit to: build quick initial physical models of their projects, use their phones to photo-scan those models and automatically generate 3d "digital twins" in their laptops, use design software to measure and analyze them, and overall create an efficient design back-and-forth between the physical and the digital, thus facilitating creative exploration and experimentation.

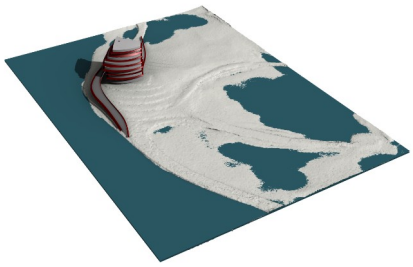
The possibilities of this methodology are multi-fold. As teachers, reviewing physical/digital models instead of isolated images gives us a broader perspective of the project's progress. From a student's point of view, they will be exposed to a workflow that covers topics critical to understanding the AEC industry's present and future (3d scanning, BIM, parametric design, environmental simulations), but without missing the creative potential of more intuitive design approaches. Physical and 3d modeling shouldn't cancel each other; they are both means to a common end: meaningful landscape architecture.

The images below illustrate the proposed analog-digital workflow, from scanning the kinetic sand model to the analysis and visualization of the digital 3D model.









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MATERIAL REQUISITES:

To experiment with a more hands-on approach to the design of landforms, this studio will rely on the use of physical models at the beginning of the design process, with an emphasis on kinetic sand for the development of topographic forms. These models will eventually digitized using photogrammetry and further edited and analyzed in the computer using 3D modeling software (Rhino 6 or 7).

There is a minimum course fee of USD 10 to purchase specific infrastructure related to photogrammetry that will be available in the studio space to all students.

In addition, students should anticipate to cover the cost of all the materials needed to build their physical models **(around USD 40)**. The main costs will be related to the purchase of:

- around 15 lbs of Kinetic Sand
- cardboard for topographic models
- some balsa wood or foam sheets to recreate the urban context around the site
- physical model figurines of different scales

Please, contact the instructor if you have any questions related to this.

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SUGGESTED READING:

Benedict, M. A., McMahon, E. T., & A., T. C. Green Infrastructure: Linking Landscapes and Communities. Washington: Island Press. 2012

Brown, R. D., & Gillespie, T. J. Microclimatic landscape design: Creating thermal comfort and energy efficiency. New York: Wiley. 1995

Cantrell, Bradley. Modeling the Environment: Techniques and Tools for the 3D Illustration of Dynamic Landscapes. 2012.

Petschek, P., Grading for Landscape Architects. 2008

Strom, S., Nathan, K., Woland, J. Site Engineering for Landscape Architects. 2009

Waldheim, C. (2006). The landscape urbanism reader. New York: Princeton Architectural Press.

Walliss, Jillian, and Heike Rahmann. Landscape Architecture and Digital Technologies: Re-Conceptualising Design and Making. Routledge, 2016.

Wilson, W. (2017). Stormwater: A resource for scientists, engineers, and policy makers. Chicago: The University of Chicago Press.

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