Week 5
Introduction to Parametric Design

CLASSROOM TIME:
This week we will be gaining our first understanding on parametric design and how it differs from non-parametric design. We also will look at what entails to be a parametric designer.
LINKS:

Podcast 1:
https://youtu.be/K_2H5I-enGM
https://v.youku.com/v_show/id_XNDc0Mjc1NTc5Mg==.html

Podcast 2:
https://youtu.be/C-04o4TtgAs
https://v.youku.com/v_show/id_XNDc0Mjc2MTUwNA==.html

Podcast 3:
https://youtu.be/xz0PUmj09Bc
https://v.youku.com/v_show/id_XNDc0Mjc3OTM0MA==.html

Quiz link:
https://www.surveymonkey.com/r/DF9FNPS
INTRODUCTION: Aims and objectives, LOs

CLASSROOM ACTIVITY 1: Group presentation and Q&A

CLASSROOM ACTIVITY 2: Online peer assessment

REFLECTION: Lesson summary, next week’s topic and feedback
Aims and objectives

- To introduce the concept of parametric design
- To infer parametric design thinking
- To provide illustration on how designers can use the concept in their practices
Learning outcomes

*Students will be able to...*

01 Summarise **what is** parametric design and **its key differences** with non-parametric design

02 To infer **main potentials** of parametric design

03 Critically **inform their design practice** with regards to parametric design
(module) Overarching skills

**Theory, history and current debate**
Understand historical background of this notion and relevant debates.

**Important concepts**
- Digital fabrication and construction
- Digital design cognition
- Digital craftsmanship
- Parametric design
- etc

**Software skills**
Rhino, Grasshopper, etc

**Research skills**
Designing through extensive research

**Personal interest**
Exploring a preferred scope of design to be developed further

**Design precedents**
Learning through analysis of completed project
What are your individual **takeaways** of parametric design?

https://miatedjosaputro.com/2020/03/24/week-5-discussion/
Previously in Week 4
What kind of understanding have we established?

With regards to digital architecture
The understanding

Think-draw-make

Changes on the way architects think-draw-make in computational design have presented benefits to design stakeholders (clients, collaborators and public) and improve quality of built environment. Architecture practices are also shifted.

New possibilities

Creativity is pushed further with the help of computational design tools, which addressed critiques that they hinder creativity. Strategies to address environmental issues are also in the main agenda of this emergent way of designing.

Digital design pedagogy


Digital design ecosystem

Design process is moving away from being linear and architects are at the centre of this ecosystem. Collaboration with specialists in industry, academia, local craftsman and end users provide more meaningful design.
Introduction to Parametric Design
What is parametric design?
What is parametric design?

- Parametric Design is a process based on algorithmic thinking.
- Enables the expression of parameters and rules that together; define, encode and clarify the relationship between design intent and design response.
- A parametric design system is defined by its: input, algorithm and output.
- Focus mainly on geometry and topology.

Activity 1:
GROUP PRESENTATION

GROUP 1- HISTORICAL ACCOUNT
GROUP 2- TYPES OF PARAMETERS
GROUP 3- SCRIPTING

2 minutes per group
Q&A session
Brief historical account
Architettura Parametrica, coined by Luigi Moretti

He did a research about the relationship between architectural design and parametric equations under the banner of ‘Architettura Parametrica’ between 1940-1942. Initially without computer.

Eventually in 1960 he was able to exhibit the models of parametrically designed stadia - Progetti di strutture per lo sport e lo spettacolo.

Types of parameters
Types of parameters


- **Mathematical** parameters: most basic type, such as numbers, logical values and strings of characters
- **Geometric** parameters: example includes points, lines, surfaces and solids
- **Topological** parameters: describe how two and more entities are related
- **Representational** parameters: describing and abstracting entities from outside themselves. For example, walls and windows
- **Material** parameters: built on the first four parameters by adding and connecting several physical attributes such as weight, tension, friction, etc
- **Environmental** parameters: time, wind, thermal variations are to name but a few
- **Human** parameters: most challenging class of parameters
Visual scripting
Direct modelling: On-the-fly design modification

VS

Parametric modelling: Associative relationship

RHINOCEROS 3D

PLUG-IN FOR RHINOCEROS 3D SUCH AS GRASSHOPPER
There are two working environments: Visual Editor (A) 3D Modelling Environment (B)

Visual scripting

3D Modelling Environment (B)

Visual Editor (A)
Activity 2:
ONLINE PEER ASSESSMENT

https://www.surveymonkey.com/r/GBDSWNB
Re-iterating aims and objectives

- To introduce the concept of parametric design
- To infer parametric design thinking
- To provide illustration on how designers can use the concept in their practices
REFLECTION

What are the main takeaways? How does your new understanding inform your design practice?
Week 6
Digital Fabrication

Next week we will be looking at principles, forms and broad techniques in digital fabrication.

Photo by Ricardo Gomez Angel on Unsplash
Leave your feedback about this flipped classroom approach here:

https://www.surveymonkey.com/r/GBDX669