

Assignment 1: Parametric Logic Case Study

Value: 20% of Final Grade

Format: Groups of 3 (Exception: Two groups of 2 will be assigned simpler precedents)

Deliverable: 6-Page 11×17" PDF (Landscape) + Grasshopper Definition (`.gh` + `.3dm`)

Overview

In this assignment, you will "**reverse engineer**" the logic of a contemporary architectural precedent. Your task is not to design something new, but to **analyze, decode, and reconstruct** the geometric logic of the assigned precedent using Grasshopper.

The goal is to move beyond viewing architecture as a static image and understand it as a result of a computational process.

The Task

1. **Assignment:** You will be randomly assigned one of 20 specific case study projects by the instructor.
Policy: If you strongly dislike or struggle significantly with your assigned precedent, you may select a project from the Backup List or propose a new one. However, this requires explicit instructor approval before proceeding
2. **Analyze & Decode:** First, attempt to decode the logic yourself. Sketch diagrams and hypothesize the component flow. Search other resources if necessary, using online tutorials, forums, or AI tools (ChatGPT/Gemini) to help you determine the specific algorithmic logic required to generate that form.
3. **Reconstruct:** Write a Grasshopper script to generate a simplified version of the form. It does not need to capture every construction detail, but it must capture the basic underlying generative logic.
4. **Mutate:** Demonstrate the flexibility of your script by generating a radically different form using the same underlying logic, just by adjusting the parameters.

Submission Requirements

- Pin up your work in progress on [Miro](https://miro.com/app/board/uXjVGQIPaxs=/?share_link_id=927583765761) by **January 29 at 11:59 pm**.
(link: https://miro.com/app/board/uXjVGQIPaxs=/?share_link_id=927583765761; Password: UBCSALA2026)
- Submit a single **6-Page PDF (11×17" Landscape)** on Canvas by **January 30 11:59pm**.
- All 3D views (Diagrams, Renders, Matrix) must be in **Isometric / Parallel Projection**. Do not use Perspective views.

The 6 pages should include:

Page 1: Project Introduction

A brief overview of the assigned case study.

- Content: Name, Architect, Year, Location.
- Visuals: High-quality photos or drawings collected from online resources (ArchDaily, Dezeen, etc.).
- Text: A short paragraph describing the geometric system.

Page 2: The Grasshopper Script

A high-resolution screenshot of your Grasshopper definition.

- Organization: The script must be Grouped and Labeled. Use the **Group** command (Ctrl+G) to bundle related components.
- Annotation: Use **Scribble** or **Panel** components to explain what each part of the script does (e.g., "Base Surface Construction," "Attractor Point Logic," "Paneling").
- If the script is unreadable, points will be deducted.

Page 3: Generative Process (Diagram)

A step-by-step visual explanation of how the code generates the form.

- Method: Enable **Preview** on specific components in your script sequence to isolate steps.
- Sequence: Show 3-5 distinct steps (e.g., Step 1: Base Curve → Step 2: Extrude & Twist → Step 3: Divide Surface → Step 4: Populate Components).
- Annotation: Add brief text or arrows to explain the operation happening in each step.

Page 4: Final Render

A rendered view of your final Grasshopper output.

- Goal: Best approximation of the original case study.
- Technique: Screenshot from Rhino (Arctic or Rendered mode).
- Fidelity: It does not need to be a perfect replica, but the geometric character and atmosphere should match the precedent.

Page 5: Generative Matrix

A matrix showing the parametric flexibility of your script.

- Content: Display at least 4 iterations of the form.
- Method: Change key input parameters (sliders) to produce variations (e.g., changing the twist angle, number of divisions, or aperture size).
- Highlight: Clearly label which parameters were changed for each iteration.

Page 6: New Design

A rendered view of a radical variation.

- Goal: Use the *same script* and logic, but adjust the parameters to create a form that looks significantly different from the original precedent. Show us the extreme potential of your code.
- Description: Add a one-sentence caption explaining what changed (e.g., "Changed the grid from square to triangular and inverted the attractor influence").

Grading Rubric (Total: 20 pts)

Criteria	Weight	Description
Algorithmic Logic	30% (6 pts)	Geometric Accuracy: The script successfully recreates the core geometric logic of the assigned building. The student demonstrates a clear understanding of the computational method (e.g., correctly using Data Trees for a facade vs. simple array for a grid).
Code Hygiene	20% (4 pts)	Script Readability: The Grasshopper definition is well-organized. Components are Grouped and color-coded. Text labels (<i>Scribble</i> / <i>Panel</i>) clearly explain the logic flow.
Representation & Diagrams	50% (10 pts)	Visual Clarity & Quality: The "Generative Process" diagram (Page 3) clearly breaks down the complex form into logical steps. The final render (Page 4) is aesthetic and closely approximates the precedent. The Generative Matrix (Page 5) is well-laid out and clearly labeled.

Academic Integrity & AI Policy

- You are encouraged to use all available resources to solve the geometric puzzle.
 - **Research:** Googling "Project Name + Grasshopper" to see how others approached the logic is allowed, but try to analyze the geometry yourself first.
 - **AI as Visual Consultant:** You are encouraged to upload precedent images or your own hand sketches to AI tools (ChatGPT, Gemini) to ask for logic explanations, inspiration, or potential workflows. All problem-solving techniques are valid.
- While you can seek inspiration and logic from external sources, **you must construct the script yourself**. Downloading a pre-made *.gh* file from a forum or using an AI agent to generate the *entire* script for you is prohibited.

Additional Notes

- Grading will be judged on the accuracy and logic of the system, not the complexity of the script.
- Take a look at all the provided case studies first to understand the diversity of parametric logic across the list.

- We are not able to cover all components in class. You will likely need to use new components or even new plug-ins to generate the required patterns. Do not be afraid to explore the tab groups to check icons or directly search for Rhino command names within the Grasshopper search bar.
- Not all tutorials found online are the best options or capture the features of the project well. Be critical when watching tutorials; you may need to adjust the logic yourself to match the project intent.
- After this assignment, we will review and post all Grasshopper scripts for everyone to access and learn from.

Project List

Groups will be randomly assigned a project from the Primary List. The Backup List is reserved for groups who face significant difficulties or successfully petition for a change.

1. AU Office and Exhibition Space, Silk Wall (Archi-Union) - Facade
2. Winery Gantenbein (Gramazio & Kohler) - Facade
3. Signal Box (Herzog & de Meuron) - Facade
4. Al Bahar Towers (Aedas) - Facade
5. One Ocean Thematic Pavilion (SOMA) - Facade
6. SDU Campus Kolding (Henning Larsen) - Facade
7. The Broad Museum (Diller Scofidio + Renfro) - Facade
8. Crystal Bridges Museum (Safdie Architects) - Facade / Roof
9. Købmagergade Shopping Street (Karres en Brands + WERK) - Paving
10. Roche Pocket Park (Bryum) - Paving (Group of 2)
11. Keio University Roof Garden (Michel Desvigne) - Paving / Vegetation (Group of 2)
12. MAX IV Laboratory (Snøhetta) - Landscape
13. Berlin Memorial to the Murdered Jews of Europe (Peter Eisenman) - Overall Form
14. Aqua Tower (Studio Gang) - Overall Form
15. Hangzhou Wangchao Center (SOM) - Overall Form
16. Little Island (Heatherwick Studio) - Overall Form
17. Serpentine Pavilion 2016 (BIG) - Overall Form
18. EKKO Pavilion (Thilo Frank) - Overall Form
19. Waterloo International Terminal (Grimshaw Architects) - Structure
20. Water Cube (National Aquatics Center) (PTW + Arup) - Overall Form

Backup List

- Smithsonian Institution Courtyard (Foster + Partners) - Structure
- Mulberry House (SHoP Architects) - Facade
- Centre Pompidou Metz (Shigeru Ban) - Structure
- Metropol Parasol (J. Mayer H.) - Structure
- KAPSARC (Zaha Hadid Architects) - Overall Form
- Fulton Sky Reflector Net (Grimshaw) - Structure
- Museo Soumaya (FR-EE) - Facade
- Yas Hotel Abu Dhabi (Asymptote) - Facade
- Louvre Abu Dhabi (Jean Nouvel) - Facade / Roof
- Allianz Arena (Herzog & de Meuron) - Facade
- Department of Islamic Arts, Louvre (Mario Bellini) - Roof
- de Young Museum (Herzog & de Meuron) - Facade

Groups:

(find the project with the same number)

1. Sissi Liang, Alina Jansen, Rose Chan
2. Aiden McVea, Felix Lo, Carmen Lonsbrough
3. Katherine Liu, Nathanisha Snitwongse N Ayudhaya, Isabelle Tilbury
4. Bernardo Baca Alvarez, Zoe Zimmer, Paytra Christou
5. Rose Faida, Junfeng Yue, Quynh Phuong Doan
6. Shona Flett, Mehran Rahman, Jinny Lee
7. Julia Deng, Stephen Antonios, Grayson Collins
8. Rainier Sathanielle, Chloe Lu, Ava Houghton
9. Sofia Barragan, Jael Okoti, Elaine Zhuo
10. Raya Krastev, Brenden Knox
11. Aromie Jung, Spencer Sun
12. Jenny Wu, Kiana Ahmadi, Christina Chiu
13. Kristina Remiz, Bushra Samad, Zoe Aguilar
14. Cindy Chiu, Parmida Khoei, Sophie Wang
15. Reyhaneh Soltan, Sophie Chu, Juna Ibrahim
16. Jae-kyung Oh, Maya Pinhasov, Naomi Lightbound

17. Danica Caratao, Joaquin Lozano de Yta, Jadon Chang
18. Serafina Lee, Sienna Sheehan, Oliver Knapp
19. Aisha Lee Izawa, Damian Kan, Kai Earn
20. Shadda Al-Rammahy, Rylee Dai, Sophie Xiao