

AR-327

Introduction to computational architecture

Settimi Andrea, Vestartas Petras

Cursus	Sem.	Type
Architecture	BA6	Obl.

Contact language	English
Credits	3
Withdrawal Session	Unauthorized Summer
Semester	Spring
Exam	During the semester
Workload	90h
Weeks	12
Hours	2 weekly
Lecture	2 weekly
Number of positions	30

Summary

This course reviews the basics of 3D modeling to establish the foundations of parametric architectural modeling via different methods. The main objective of the course is to develop a computational mindset to maximize the use of efficient digital tools in architectural projects.

Content

This course is composed of 3 modules:

1. 3D modeling (CAD) where the fundamentals of geometry are reviewed and advanced techniques of 3D modeling are covered (2 weeks).
2. Parametric modeling (visual scripting, Grasshopper) where the parameterization of basic and advanced geometric elements is studied (5 weeks).
3. Computational modeling (scripting) where an introduction to coding is given (5 weeks).

This configuration in 3 modules allows to gradually increase the level of complexity and to initiate architecture students to computational thinking.

Classes will be given in English but a fluent French speaker will be present at each class if needed.

Keywords

architecture, 3D modeling, computational thinking, parametric design, coding

Learning Prerequisites**Recommended courses**

- AR-114 : Modélisation numérique
- AR-219 : Introduction aux outils CAO en architecture

Learning Outcomes

By the end of the course, the student must be able to:

- Identify the different modeling techniques
- Classify these techniques by their degree of efficiency
- Develop simple parametric models with Grasshopper
- Develop and execute low-level Python scripts for 3D modeling

- Propose an appropriate method to build a model

Transversal skills

- Use a work methodology appropriate to the task.
- Plan and carry out activities in a way which makes optimal use of available time and other resources.
- Use both general and domain specific IT resources and tools
- Demonstrate the capacity for critical thinking

Teaching methods

- Lectures (1/3 to 1/2 of each session)
- In-class tutorials (1/2 to 2/3 of each session)

Expected student activities

- Participation during the course
- Pro-active attitude for class exercises
- Independent realization of exercises after each week

Assessment methods

An evaluation is done at the end of each 2,3 weeks with an exercise to be handed in for the following week on the theme studied. Each test has the same coefficient in order to obtain a continuous control throughout the course.

Supervision

Office hours	No
Assistants	Yes
Forum	Yes

Resources

Virtual desktop infrastructure (VDI)

Yes

Bibliography

- Aiello, Carlo. *eVolo 6: Digital and Parametric Architecture*. Los Angeles, eVolo, 2014.
- Arturo Tedeschi. *AAD, Algorithms-aided Design: Parametric Strategies Using Grasshopper*, Le Penseur Publisher, 2014.
- Helmut Pottmann, Andreas Asperl, Michael Hofer, Axel Kilian. *Architectural Geometry*. Bentley Institute Press, 2007

Moodle Link

- <https://go.epfl.ch/AR-327>

Videos

- <https://vimeo.com/571616142>

