Syllabus FS25 4.500/4.505

4.500/4.505 Introduction to Computation Syllabus

Syllabus

INSTRUCTORS

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OVERVIEW

This class introduces concepts of parametric/computational design in architecture and integrates them with digital fabrication techniques. The course will provide you with both the skills and foundational knowledge needed for using computational techniques

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designing efficient (structural) forms using form-finding techniques informed by fabrication constraints. Relevant digital fabrication methods for construction will be examined through computational pipelines for production using available CNC tools (e.g., 3D printing, laser cutting, etc.).

The content will be taught through a combination of lectures, workshops, and lab sessions throughout the fall semester. These sessions will introduce you to the modelling software

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		and, where appropriate, coding languages (e.g., Python and COMPAS). These skills will be directly applied in an integrated building design and manufacturing exercise/assignment carried out in groups of two students. During the first half of the semester students will use lab time to familiarize themselves with the introduced software and computational design principles through a series of individual assignments. In the second half of the semester, lab times will be dedicated to designing

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LEARNING OBJECTIVES

Upon completing the class, you should be able to:

- Translate architectural or structural geometry into an accurate and systematic (parametric/computational) model.
- Design multiple alternatives for a structure and identify the most suitable solution from an integrated and inter-disciplinary perspective.
- Effectively analyse and improve design problems and geometrical non-standard structures taking fabrication

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		structure using (available) digital fabrication methods such as 3D printing and laser cutting
STRUCTURE	The course is divided into two parts: **Part I: General introduction to computation and Fabrication** Part I will introduce you to modelling in Rhinoceros 3D, setting up parametric models in Grasshopper 3D and principles of fabrication using available machines. You will be introduced to principles of form-finding using	

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digitally and physically. A crucial component in this introduction will be establishing a relationship between digital design and the resulting physical prototype. In this part you will be given 7 individual assignments to help build your design and fabrication skills.

Part II: Design Assignment

Part II will focus on a single design assignment which will be carried out in groups of two students. The design assignment helps you apply the skills learned in Part I to a structure

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and assignment overview

	Content				Assignment	Due date
I	Sep 9	Introduction	Sep 10	Software setup	A1	Sep 15
	Sep 16	Modelling overview	Sep 17	Rhinoceros 3D basics	A2	Sep 22
	Sep 23	Introduction to Computation	Sep 24	GH BasicsI	A3	Sep 29
	Sep 30	Introduction to Data structures	Oct 1	GH basics II	A4	Oct 6
	Oct 7	Physical prototyping	Oct 8	Physical prototyping	A5	Oct 13
	Oct 14	Introduction to form-finding	Oct 15	Introduction to Kangaroo	A6	Oct 20
	Oct 21	Introduction to Digital Fabrication	Oct 22	3D parametric nodes	A7	Nov 3
II	Oct 28	Introduction/ training fabrication shops	Oct 29	Introduction/training fabrication shops		
	Nov 4	Introduction to design assignment	Nov 5	Conceptualisation of design	A8	Dec 10
	Nov 11	No class Veterans Day	Nov 12	Topology and patterns		
	Nov 18	Unrolling patterning	Nov 19	Physical prototyping	A8.1	Nov 18
	Nov 25	Design sessions	Nov 26	Design sessions (optional)	A8.2	Nov 25
	Dec 2	Design sessions	Dec 3	Design sessions	A8.3	Dec 2
	Dec 9	Field day- ice	Dec 10	Field day - ice		

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