

Course/studio syllabi

1. Data on the study programme

1.1 Institution	Technical University of Cluj-Napoca
1.2 Faculty	of Architecture and Urban Planning
1.3 Department	Urban Planning and Technical Sciences
1.4 Domain	Architecture
1.5 University level	Licence and master's degree
1.6 Study programme/Qualification	Architecture
1.7 Form of studies	IF – on-site full-time studies
1.8 Course / studio code	49.10

2. Data on the course

2.1 Name of the course	PARAMETRIC DESIGN				
2.2 Course/ Studio Head	Lecturer Dr. Arch. Andrei Kiss				
2.3 Head of seminary/ laboratory/ studio	Lecturer Dr. Arch. Andrei Kiss				
2.4 Study year	4	2.5 Semester	1	2.6 Type of evaluation	Colloquy
2.7 Course /studio regime	Formative category: fundamental (DF)/ linked to the domain (DD)/ specific (DS)/ complementary (DC)				DD
	Compulsory (DI)/ Optional/ (DOp)/ Voluntary (DFac)				DOp

3. Total estimated time

3.1 Number of hours/week	2	out of which:	3.2 Course	2	3.3 Seminary	0	3.3 Laboratory	0	3.3 Project	0
3.4 Number of hours/semester	28	out of which:	3.5 Course	28	3.6 Seminary	0	3.6 Laboratory	0	3.6 Project	0
3.7 Distribution of time (hours)/ semester for:										
(a) Individual study supported by course textbook, course text, bibliography, and notes										6
(b) Supplementary study in the library, online, and on site										10
(c) Preparation for seminars/ laboratories/ assignments, reports, portfolios, and essays										5
(d) Tutoring										0
(e) Examination										1
(f) Other activities										-
3.8 Total hours of individual study (sum (3.7(a)... 3.7(f)))					22					
3.9 Total semestrial hours (3.4+3.8)					50					
3.10 Number of credits					2					

4. Preconditions (where applicable)

4.1 curriculum preconditions	There are no curriculum preconditions for this course.
4.2 competence preconditions	There are no competence preconditions for this course.

5. Conditions (where applicable)

5.1. for the course	On site, in the allocated classroom (according to the faculty schedule). Attendance is a condition for examination. See also „10. Assessment method“.
5.2. for the seminary	The activity during the course and laboratories will be carried out on personal laptops or existing graphic stations in the faculty laboratory.

6. Specific competencies

	<ul style="list-style-type: none">• Ability to engage imagination, think creatively, innovate and provide design leadership.• Ability to gather information, define problems, apply analyses and critical judgement, and formulate strategies for action.• Ability to think three-dimensionally in the exploration of design.• Ability to reconcile divergent factors, integrate knowledge and apply skills in the creation of a design solution.• Awareness of the links between architecture and other creative disciplines.• Ability to act with knowledge of the fine arts as an influence on the quality of architectural design.• Awareness of philosophy, politics, and ethics as these are related to architecture.• Ability to act with knowledge of natural systems and built environments.• Knowledge and experimentation of design theory and methods.• Ability to demonstrate the capacity to integrate disparate areas of knowledge through design• Understanding of design procedures and processes.• Ability to utilise manual, electronic, digital, graphic and model making capabilities to explore, develop, define and communicate a design proposal.• Understanding of systems of evaluation, that use manual and/or electronic means for performance assessments of built environments.• Understanding the implications of the UN Sustainable Development Goals for architecture education.
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7. Objectives of the discipline

7.1 General objective of the discipline	<ul style="list-style-type: none">• Ability to create architectural designs that satisfy both aesthetic and technical requirements.
2. Specific objectives	<ul style="list-style-type: none">• Ability to demonstrate a creative competence in building techniques, founded on a comprehensive understanding of the disciplines and construction methods related to architecture.• Knowledge of the fine arts as an influence on the quality of architectural design.• Understanding of research and pedagogical methodologies, including those of transdisciplinary knowledge action and knowledge transferability as inherent parts of architectural learning, for both students and teachers.

8. Content/Syllabi

8.1 Course	No. of hours	Teaching methods	Notes
COURSE 1 <ul style="list-style-type: none"> • Introduction • Definitions: design, parameter, parametric design. • Definitions of parametric design: algorithmic design, computational design, generative design, interactive design, software architecture, digital architecture. • Algorithm and programming languages used in architecture. • Brief history in parametric design • The origins of parametric design • Representative figures precursors of parametric design • Contemporary examples in parametric design - techniques and technologies 	2	Lectures supported by projections, Discussions on the reader of the course and presentations.	Students are encouraged to engage in talks throughout the course and to present the stage of their individual study.
COURSE 2+3 <ul style="list-style-type: none"> • Theoretical framework • The theoretical framing of parametric design in the scientific field • Aesthetics & Style vs. Performance • Tectonic culture vs. Digital tectonic culture • Aesthetic perspective vs. The Structural Perspective • Roman perspective vs. Gothic perspective • Heideggerian technophobia vs. Digital technology • Typological vs. Population thinking • The concept of type and the concept of multiplicity • The New Materialism 	4		
COURSE 4+5 <ul style="list-style-type: none"> • Interactive Architecture • Definitions of interactivity • Areas specific to interactive architecture: computation and kinetics • Definitions of interactive architecture • History of Computation in Interactive Architecture • Digital computing and human-machine interaction • Kinetic Theory • Characteristics of kinetic architecture • Kinetic Theory in architecture • Examples • Conclusions 	4		

<p>COURSE 5+6</p> <ul style="list-style-type: none"> • The organic paradigm • Introduction • Organic vs. Analogy The mechanical analogy • The analogy of the classification of types • Anatomical analogy • The ecological analogy • The evolutionary analogy • Instruments as organs-extensions of the body • Development processes vs. Design processes • Organs as inventions - Bio-mimetics • Natural Processes vs Cybernetic Processes • Interactivity - Natural processes vs. Artificial processes • New trends • ConCluSIonS 	4		
<p>COURSE 7+8</p> <ul style="list-style-type: none"> • Philosophies in the genesis of form • Introduction • Typological thinking and the archetype • Topological thinking • Intensive thinking • Population thinking • Network thinking • Conclusions 	4		
<p>COURSE 9+10</p> <p>Digital morphogenesis Introduction Algorithmic thinking Algorithmic thinking in architecture Techniques and technologies in digital spaces Generative digital spaces Conclusions</p>	4		
<p>COURSE 11+12.</p> <p>Experiments in digital space Presentation of workshops</p>	4		
<p>COURSE 13+14</p> <p>Theory and practice today Contemporary examples Critical analysis of contemporary architectural practices in parametric design</p>	4		
<p>NOTE: the permanent actualization of the course matter might lead to minor changes in its structure</p>			

Bibliography :

Compulsory (Titles available in the TUCN library)

- Peters, B., De Kestelier X., 2013. Computation works : the building of algorithmic thought, John Wiley and Sons Ltd. Publication. Cota bibiloteca UTCN 541.251
- DeLanda, Manuel, 2002. Intensive science and virtual philosophy, London: Continuum International Publishing Group. Cota biblioteca UTCN 505.151

Recomended

- Peters, B., Peters, T., 2018. Computing the Environment. Tools for Simulation and Visualisation of Sustainable Architecture, John Wiley and Sons Ltd. Publication.
- Menges, A., Ahlquist, S., 2011. Computational Design Thinking, John Wiley and Sons Ltd. Publication.
- Oxman, N., 2010. Material-based Design Computation. Massachusetts Institute of Technology.
- Terzidis, K., 2006. Algorithmic architecture, Oxford: Architectural Press.
- Delanda, M., 2007. Material Elegance. Architectural Design, 77(1), pp.18–23.
- Frazer, J., 1995. An evolutionary architecture, London: Architectural Association.
- Garcia, M. ed., 2009. The Patterns of Architecture: Architectural Design. Architectural Design, 79(6), p.144.
- Hensel, M. & Menges, A., 2006. Morpho-Ecologies M. Hensel & A. Menges, eds., London: Architectural Association Publications.
- Hensel, M. & Menges, A., 2008. Versatility and Vicissitude: An Introduction to Performance in Morpho-Ecological Design. În Architectural Design, 78(2), pp.6–11.
- Hensel, M., Menges, A. & Weinstock, M. eds., 2006a. Techniques and technologies in morphogenetic design. În Architectural Design, 76(2) London: Wiley-Academy.
- Hensel, M., Menges, A. & Weinstock, M., 2006b. Towards Self-Organisational and Multiple-Performance Capacity in Architecture. Architectural Design, 76(2), pp.5–11.
- Johnson, S., 2002. Emergence: the connected lives of ants, brains, cities, and software, Simon & Schuster.
- Kolarevic, B., 2009. 2 Digital Morphogenesis. În Architectural Design, 79(1), pp.11–28. Kolarevic, B., 2005. Architecture in the digital age: design and manufacturing, Taylor & Francis.
- Leach, N., 2009. Digital Morphogenesis. Architectural Design, 79(1), pp.32–37.
- Leach, N., 2003. Digital morphogenesis. Architecture in the Digital Age: Designing and Manufacturing, Taylor and Francis, Oxon, UK, 79(1), pp.12–28.
- Leach, N., Turnbull, D. & Williams, C., 2004. Digital Tectonics, London: John Wiley & Sons.
- Leach, N. & Wei-Guo, X. eds., 2008. New Materialism. In (Im)material Processes: New Digital Techniques for Architecture – Students. Beijing: China Architecture and Building Press, pp. 6–15.
- Menges, A., 2006. Instrumental geometry. Architectural Design, 76(2), pp.42–53.
- Schumacher, Patrick, 2009. Parametricism: A New Global Style for Architecture and Urban Design. În Architectural Design, 79(4), pp.14–23.
- Weinstock, M., 2006a. Self-organisation and material constructions. În Architectural Design, 76(2), pp.34–41.
- McNeal Roberts and Associates, Rhino 3D, www.rhino3d.com/learn
- McNeal Roberts and Associates, Grasshopper, <http://www.grasshopper3d.com>

A selection of texts can be found in the annex of the course, on the course TEAMS channel.


8.2 Seminary / laboratory / project	No. of hours	Teaching methods	Notes
-	-	-	-
Bibliography			

9. Harmonizing the content of the discipline with the expectations of the epistemic community, the professional associations, and representative employers

The competencies achieved across the course contribute to the consolidation of the professional culture necessary for the profession and to the integrated use of theory and practice.

10. Assessment

Type of activity	10.1 Evaluation criteria	10.2 Assessment method	10.3 Calculation of final grade
10.4 Course	-	-	1 point by default
	Relevance and quality of individual study	The 3 briefs of the individual and group assignments will be announced in the first course along with the dates and digital delivery format.	max. 7 points
	Envolvement during the course	Oral assessment. Oral critical discussions of individual studies carried out based on the presented briefs. The feedback enables the improvement of individual study.	max. 1 points
	Relevance and quality of answers	Presentation of the topics addressed in the individual study.	max. 1 points
	<p>Calculus of the final grade: as a sum of the points obtained through the evaluation methods described above.</p> <p>According to the ECTS/UTCN Regulations, art. 6.4, the Faculty Council has decided that attending courses is compulsory in a percentage of at least 50%. The situation of attendance will be updated weekly on the Teams channel dedicated to the course.</p> <p>Students who have not attended 50% of the courses will not be able to participate in the final exam and will need to recontract the course.</p>		
10.5 Seminary/ Laboratory	-	-	-
10.6 Minimal standard for passing			
• a grade of minimum 5			

Date :	Head of course	Title, Name, Surname	Signature
28.02.2024	Course	Lecturer. Dr. Arch. Andrei KISS	
	Seminary/Lab	Lecturer. Dr. Arch. Andrei KISS	

Date of validation by the Department Council:

Chief of Department
Associate professor Dr. Arch. Vlad RUSU

Data of approval in the Faculty Council:

Dean
Associate professor. Dr. Arch. Dragoş Şerban
Ion ȚIGĂNAȘ