

**COURSE RECORD**

Code	<b>ARCH 518</b>
Name	Computational Design Thinking in Architecture
Hour per week	3(3+0)
Credit	3
ECTS	7
Level/Year	Graduate
Semester	Fall/Spring
Type	Elective
Location	
Prerequisites	-
Special Conditions	-
Coordinator(s)	Özlem Atak Doğan, PhD
Webpage	
Content	The current transition from Computer Aided Design (CAD) to Computational Design in architecture represents a profound shift in design thinking and methods. This course aims to establish a foundation for computational design thinking and to focus its relations with mathematic, computer science, evolutionary biology, system science and philosophy. Rather than a merely technical approach, it will discuss essential concepts and topics that are fundamental not only for a discourse on computational design but also for its practice. (algorithmic and parametric design, generative systems, expert systems and case-based design, evolutionary systems, animation and performance-based design approaches, diagrams, computer aided manufacturing and etc)
Objectives	<ul style="list-style-type: none"> <li>- To give the theoretical background of the current computational design research and development.</li> <li>- To question the effects of changing architectural design tools and medium with computational design and novel technologies on design activities and processes.</li> <li>- To discuss the contemporary relationship between theory and praxis in computing.</li> <li>- To understand the interdisciplinary interaction related with the other fields</li> <li>- To research and analyze contemporary issues in the architectural design computing area and present the research using verbal and visual means</li> </ul>
Learning Outcomes	<p>LO1 To be able to develop and deepen knowledge of historical and contemporary computing theories in architectural design with original research</p> <p>LO2 To be able to execute critical analysis, synthesis, and evaluation of new architectural design approaches brought by computational methods.</p> <p>LO3 Grasping the inter-disciplinary nature of architectural design computing area; Interpreting and forming new types of knowledge by combining the knowledge from the architectural design computing area and various other disciplines</p> <p>LO4 To develop new ideas through the use of creative and critical thinking, problem solving and decision-making skills</p>
Requirements	Expected requirements of the course.
Reading List	<p>AD READER: Computational Design Thinking. Eds. Achim Menges, Sean Ahlquist, 2011.</p> <p>Mitchell, W.J., (1990), The Logic of Architecture, Design, Computation and Cognition, Massachusetts: The MIT Press.</p> <p>Hensel, M., Menges, A., (2007), Morpho-Ecologies, Towards Heterogeneous Space In Architecture Design, AA Publications.</p> <p>Terzidis, K., (2006), Algorithmic Architecture, MA: Architectural Press/Elsevier.</p>

- Kolarevic, B., Manufacturing Material Effects: Rethinking Design and Making in Architecture, London: Routledge, 2008.
- Bentley, P. J., 1999, Evolutionary Design by Computers, ISBN 1-55860-605-X, ed., Kaufmann M., The Bath Press, UK.
- Frazer, J. 1995, Evolutionary Architecture, Architectural Association, London.
- Stiny, George. Shape: Talking about seeing and doing. Cambridge, MA: The MIT Press, 2006.
- Novak M., 1992. Liquid Architectures in Cyberspace. In: Cyperspace: First Steps. Benedikt M., MIT Press, Cambridge, Massachusetts
- Dosya 29: Hesaplamalı Tasarım, Ankara Mimarlar Odası, 2012.  
<http://www.mimarlarodasiankara.org/dosya/dosya29.pdf>
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<http://www.mimarlarodasiankara.org/dosya/dosya35.pdf>
- Erdem, A., 2007. Sanal Mimarlık ve Hiperyüzeyler,  
[http://www.arkitera.com/gundem\\_57\\_sanal-mimarlik-ve-hiperyuzeyler.html?year=2007&aID=561](http://www.arkitera.com/gundem_57_sanal-mimarlik-ve-hiperyuzeyler.html?year=2007&aID=561). (Nisan, 2008)
- Menan, Z., 2005, Non Standard mimarlıklar: Bir Serginin Ardından. Mimarlık, pp.37-41.  
<http://www.mimarlikdergisi.com/index.cfm?sayfa=mimarlik&DergiSayi=409&ReclD=4185>
- Kozikoğlu, N. Akipek, F.Ö., 2004, Bilgisayar Tabanlı Tasarım Teknolojileri ve Mekanla İlgili Kavramlar Üzerine, Tasarım Dergisi, Haziran 2004, İstanbul v:142, pp: 138- 143

#### CONTRIBUTION TO PROGRAMME OUTCOMES\*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14
LO1	4	5	3	4	3	3	4	1	2	3	4	4		
LO2	4	5	5	5	3	4	4	0	2	3	4	4		
LO3	5	5	4	4	4	4	5	0	0	4	4	4		
LO4	5	5	4	4	0	0	4	0	2	4	5	4		

\* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

#### WEEKLY SCHEDULE

W	Topic	Outcomes
1	Computation, computational thinking and computational design	L01
2	Early Computational Period (1960-1980): anthropomorphizations of a computer	L01, L02, L03
3	1980S: computer as a tool Computer Aided Drafting, Computer Aided Architectural Design, Expert Systems	L01, L02, L03
4	1990s: Computer Aided Design	L01, L02
5	2000S: Computational Design Thinking: Focus is computational thinking not computer	L01, L02, L03
6	Algorithmic and parametric design in Architecture	L01, L02, L03

7	Generative System in Architectural Design	L01, L02, L03
8	Review and discussion of abstracts/paper proposals	L03, L04
9	Genetic Algorithms and Evolutionary Design in Architecture / Biomimesis	L01, L02, L03
10	Animation Based Design in Architecture Simulation Based Design in Architecture	L01, L02, L03
11	Material and Performance Based Design in Architecture	
12	Research Presentation	L01, L02, L03
13	Research Presentation	L03, L04
14	Research Presentation	L03, L04

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