Course unit title:	**DIGITAL TOOLS V**		
Course unit code:	**APXE13**		
Type of course unit:	**Elective**		
Level of course unit:	**Diploma Degree of Architect - Engineer**		
Year of study:	**4**		
Semester when the unit is delivered:	**From 7 semester**		
Number of ECTS credits allocated:	**3**		
Name of lecturer(s):	**Charis Solomou**		
Learning outcomes of the course unit:	1. The main learning outcome of the course is the understanding of the involvement of geometric principles and algorithmic processes in design. 2. The ability to use different parametric and numeric methods in design and to anticipate their implications. 3. Strategic knowledge about the manipulation of changing data that refer to internal or external parameters in design such as sun movement, changing programmes, and structural constraints. 4. Comprehension of theories on generative algorithms and diagrammatic thinking in design.		
Mode of delivery:	Face-to-face		
Prerequisites:	APX311	Co-requisites:	None
Recommended optional program components:	None		
Course contents:	**Presentation of Parametric Design Tools and Techniques** Design process is approached as a continuous effort to generate, investigate, clarify, and describe a built form in accordance to varied factors that quite often change through out the design process. This may lead to continuous modifications of the form. Parametric tools offer the ability to define the structure of the built form in a way that changing data do not entail the complete re-assembly and the re-design of it. There are certain disciplines that need to be addressed in order to attain a parametric design. These refer to a. strategic thinking, b. experimentation, c. simulation, and d. logic description of the structure. a. Strategic thinking has to do with the separation of the design elements into those that are affected by the parameters in hand and the anticipation of the a final outcome that takes into account a range of changing data. This leads to a kind of associative logic and a hierarchical structure that is used as the basis of design. b. Experimentation has to do with the setting up of small comparative structures that explore the importance and the value of certain parameters. Refers to the finding of the physical and geometrical characteristics that correspond to the effects of the parameters. Experimentation leads to diagrams that represent the relations between the parameters. c. Simulation refers to the digital dynamic representation of the diagrams so that the continuity and the validity of the structure are addressed. Through simulations the importance of different elements of the structure is attained and the values of geometric properties are given.		

	d. The logic description of the structure is the final outcome of design in which a form is expressed through an association of logic relations. This usually has the form of an algorithm that takes into account the results of the previous steps. It is manifested in written form in certain digital design tools that allow a connection between non-spatial parameters and geometric forms. **Design Examples with the Use of Parametric Digital Tools** The application of the methodologies and techniques above is approached with the design of realistic projects, using a specific parametric system. The system used is Rhinoceros in combination with Grasshopper and Kangaroo. AutoCAD and Photoshop are also used for final presentations. The projects are developed in all four stages presented above.
Recommended and/or required reading:	• Benjamin Aranda & Chris Lasch, *Tooling – Pamphlet Architecture 27*, Princeton Architectural Press, New York 2006. • Arturo Tedeschi, *AAD: Algorithms Aided Desig),* Le Penseur Publisher, Brienza 2014. • Mark Burry, *Scripting Cultures: Architectural Design and Programming*, Wiley, West Sussex 2011.
Textbooks:	• Lectures' Notebook • Rhinoceros (NURBS Modelling) User Guide and Tutorials. • Grasshopper User Guide and Tutorials.
References:	• AAD Algorithms-Aided Design. Parametric strategies using Grasshopper, Arturo Tedeschi, 2014 • Digital Fabrication in Architecture, Nick Dunn, 2012 • Jesse Reiser, Nanako Umemoto, Atlas of Novel Tectonics, Princeton Architectural Press, New York 2006. • Kostas Terzidis, Algorithmic Architecture, Elsevier, Oxford 2006.
Planned learning activities and teaching methods:	The taught part of the course is delivered to the students by means of lectures and computer-aided presentations. The students carry out examples of experiments, descriptions and modelling techniques. Lecture notes aare available through the web for students to use in combination with the relevant textbooks. Tools are exemplified with design projects work worked out on an individual basis. Students are requested to design small structures and to produce diagrams, logic definitions, scripts, 3D models and presentations. The tutor makes comments and discusses the students' proposals and progress, at every stage of the process.
Assessment methods and criteria:	• Participation 20% • Midterm Presentation 30% • Final Coursework 50%
Language of instruction:	Greek English offered for Erasmus Students
Work placement(s):	