COURSE OUTLINE

(1) GENERAL

SCHOOL	POLYTECHNIC		
ACADEMIC UNIT	ARCHITECTURE DEPARTMENT		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	ARC_095	SEMESTER	9
COURSE TITLE	**ADVANCED DESIGN STUDIO** Direction: Computational Design		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	WEEKLY TEACHING HOURS	CREDITS
Lectures, seminars and laboratory work	4	8
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Special background, skills development
PREREQUISITE COURSES:	-
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (in English)
COURSE WEBSITE (URL)	

(2) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

- Skills acquired by students upon successful completion of the course:
- Familiarity with the reverse engineering method in understanding architectural compositions.
- The correlation of analog design media (model, sketch) with digital media (Rhino environment, Grasshopper).
- Experimenting with design processes that produce abstract synthetic structures in three-dimensional space.
- The development of design skills of students in digital 3D design media (Rhino environment).
- Familiarity with basic principles of parametric design (Grasshopper environment).
- The connection of design / physical model / prototype through rapid prototyping / laser cutting techniques (Rhino environment, Grasshopper).
- The enrichment of the representational media (use of diagrams, three-dimensional representations).

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Working in an interdisciplinary environment
Production of new research ideas
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking
……
Others…
…….

- Search, analysis and synthesis of data and information, using the necessary technologies.
- Autonomous work.
- Teamwork.
- Work in an interdisciplinary environment.
- Production of new research ideas.
- Exercise criticism and self-criticism.
- Promoting free, creative and inductive thinking.

(3) SYLLABUS

The course is aimed at 4th / 5th year students, who / who wish to deepen their use of Rhino and, with the Grasshopper plugin, integrate programming processes into the design. It is an introduction to basic principles, techniques and tools of parametric design. It has a dual, technical and design character: The technical part concerns the deepening of the possibilities offered by the Rhino / Grasshopper environment. The design department explores the application of modern techniques to synthetic architectural problems and the strongest correlation between design and implementation.

Prerequisites for attending the course are the basic familiarity with the environment of Rhino and the possibility of abstract - diagrammatic analysis of synthetic problems. Familiarity with programming and algorithmic processes is desirable but not necessary.
The course is laboratory and is developed in two modules: technical and design.

In the first section of the course, which is characterized by technique, through lectures and tutorials begins the learning of the Grasshopper - Rhinoceros design environment. In this section, students are taught basic concepts of programming in a graphical environment and design processes through scripting, gradually deepening into more complex problems. The development of the technical unit is accompanied by individual short-term tasks, which are delivered via e-class.

In the second unit of the course, which is characterized as synthetic / design, the students prepare a synthetic topic utilizing the special knowledge and techniques developed in the first unit. The synthetic topic is prepared by student groups of 2 people and is delivered at the end of the semester, with intermediate development deliveries. It is located primarily in abstract space, with emphasis on the geometric properties of objects and the development of design sets. The work begins with the selection of an abstract concept attributed to a physical model (working model) and / or two-dimensional representations (sketch, collage, diagram). At the same time, the representation of the same concept in the three-dimensional space as a diagram (Rhino environment) and a design mechanism (Grasshopper environment) are attempted. The two interpretations complement each other and in the course of the semester are correlated into a single design argument that combines the free tactile perception of real space with the precision and control offered in digital space. In the last stage of the work, possible spatial applications are investigated, with the aim of solving conventional architectural problems.

At the end of the semester, a detailed issue with a description of the synthetic theme is delivered, as well as a natural model and / or animation with three-dimensional representations of the composition.
During the semester there will be lectures by the teachers to theoretically support the technical subject of the course.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	
STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	The evaluation is done in combination, based on the assignments assigned to the students during the semester, which are delivered remotely through the course website (e-class), and the final project (project) delivered on the day of the exam, during the examination period. The final grade is 30% of the intermediate work and 70% of the final work.

Activity	*Semester workload*
Lectures	10
Bibliography study	20
Study of reference projects	20
Special software suggestions	20
Introductory works	30
Studio project	100
Course total	**200**

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- AAD Algorithms-Aided Design: Parametric Strategies using Grasshopper, Arturo Tedeschi, Le penseur publisher, 2014, ISBN-10 : 8895315308
- Architectural Principles in the age of Cybernetics, Christopher Hight, Routledge, 2007
- Parametricism 2.0: Rethinking Architecture's Agenda for the 21st Century, Patrik Schumacher, Academy Press, 2016, ISBN-10 : 1118736168
- The Autopoiesis of Architecture, Volume II: A New Agenda for Architecture, Patrik Schumacher, Wiley, 2012, ISBN-10 : 0470666161
- The Autopoiesis of Architecture, Volume I: A New Framework for Architecture, Patrik Schumacher, Wiley, 2011, ISBN-10 : 0470772980
- Research & Design: The Architecture of Variation, by Lars Spuybroek, Thames & Hudson, 2009, ISBN-10 : 0500342571
- The Function of Form, by Farshid Moussavi, ACTAR, Harvard Graduate School of Design, 2009, ISBN-10 : 8496954730

- Algorithmic architecture, Kostas Terzidis, Amsterdam Architectural Press, 2006
- A thousand plateaus – capitalism and schizophrenia, Gilles Deleuze - Felix Guattari (μτφρ. Brian Massumi), Minneapolis University of Minnesota Press, 1987
- Atlas of novel tectonics, Reiser+Umemoto, Princeton Architectural Press, 2006
- Space Reader: Heterogeneous Space in Architecture (AD Reader), Michael Hensel - Achim Menges - Christopher Hight, Wiley, 2009

- Related academic journals: