COURSE OUTLINE

(1) GENERAL

SCHOOL	POLYTECHNIC		
ACADEMIC UNIT	ARCHITECTURE DEPARTMENT		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	ARC_E4806	SEMESTER	8, 10
COURSE TITLE	TOPICS IN DIGITAL DESIGN 4		

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 presentations	2	4
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*

By the end of the course, students will be able to:

- Understand the basic principles and types of Artificial Intelligence relevant to architectural design.
- Apply AI tools (e.g., diffusion models, text-to-image generation) to develop conceptual architectural ideas.
- Use image-based tools to generate and interpret 3D architectural forms from sketches or visual inputs.
- Integrate AI-assisted methods into early design workflows for ideation, visualization, and iteration.
- Employ visual and basic text-based scripting (e.g., Grasshopper, Python) to control AI design behavior.
- Analyze and evaluate AI-generated outputs critically with respect to architectural context, intention, and originality.
- Understand ethical implications and authorship issues related to AI in design.
- Collaborate in team settings to experiment with AI-driven design strategies.
- Communicate and present AI-assisted design concepts using visual, verbal, and written formats.

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*	*Project planning and management* *Respect for difference and multiculturalism* *Respect for the natural environment*
Decision-making *Working independently* *Team work* *Working in an international environment* *Working in an interdisciplinary environment* *Production of new research ideas*	*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.

This undergraduate course introduces students to the creative potential of Artificial Intelligence (AI) in the early stages of architectural design. Focusing on concept generation, it explores how emerging AI tools—such as diffusion models, text-to-image generation, and image-to-3D model translation—can be integrated into architectural workflows to spark innovation and support visual exploration.

Students will learn how to use accessible AI platforms to generate conceptual imagery from textual prompts, transform sketches or images into three-dimensional forms, and experiment with generative AI tools to expand their design language. In parallel, the course offers a foundation in AI-assisted scripting using visual and text-based tools (e.g., Grasshopper, Python), enabling students to begin customizing AI behavior within computational design environments.

Through a series of workshops, case studies, and short design projects, students will develop a critical and practical understanding of how AI can augment architectural creativity. No prior coding experience is required—this course is designed as an entry point for students eager to explore the future of design through AI.

(3) SYLLABUS

(1) TEACHING and LEARNING METHODS - EVALUATION

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 40% of the intermediate work and 60% of the final work.

(2) 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
- 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
- Space Reader: Heterogeneous Space in Architecture (AD Reader), Michael Hensel - Achim Menges - Christopher Hight, Wiley, 2009
- Carpo, M. The Second Digital Turn: Design Beyond Intelligence, The MIT Press, 2017
- Carpo, Mario. Twenty Years of Digital Design, The Digital Turn in Architecture, 1992 -2012, AD reader, Wiley, London, 2013
- Ecker, A.S. Bethge, M., A Neural Algorithm of Artistic Style, eprint 1508.06576, arXiv, 2015
- Huang, Weixin & Zheng, Hao. Architectural Drawings Recognition and Generation through Machine Learning. 10.52842/conf.acadia.2018.156, 2018
- Zheng, Hao & An, Keyao & Wei, Jingxuan & Ren, Yue. Apartment Floor Plans Generation via Generative Adversarial Networks. 10.52842/conf.caadria.2020.2.599, 2020
- Boden, Margaret. In Creativity and Artificial Intelligence, Artificial Intelligence 103, Elsevier London, p347-356, 1998
- del Campo, Mario, Carison, A., Manninger, S. 3D Graph Convolutional Neural Networks in Architecture Design, Acadia, 2020
- del Campo, Matias & Manninger, Sandra & Carlson, Alexandra. A Question of Style. Architectural Intelligence, Springer, 2020
- del Campo, Matias & Carlson, Alexandra & Manninger, Sandra. Imaginary Plans, The potential of 2D-to-2D Style transfer in planning processes, Ubiquity and Autonomy, Acadia, 2019
- del Campo, Matias & Manninger, Sandra & Wang, L. & Sanche, M. “Sensibilities of Artificial Intelligence: An Examination of Architecture in a Post-human Design Ecology.”, 2020
- del Campo, Matias & Carlson, Alexandra & Manninger, Sandra. Towards Hallucinating Machines - Designing with Computational Vision. International Journal of Architectural Computing. 19. 147807712096336. 10.1177/1478077120963366., 2020
- Bolojan, Daniel. & Vermisso, Emmanouil. Deep Learning as heuristic approach for architectural concept generation, Creativity and Artificial Intelligence. eCAADe/Sigradi, 2020
- Leach, N. & Yuan P. Introduction, Architectural Intelligence, Springer, 2022
- Leach, N. Do robots dream of digital buildings? Architectural Intelligence, Springer, 2022

- Related academic journals: