COURSE OUTLINE

1. GENERAL

SCHOOL	ENGINEERING		
DEPARTMENT	PRODUCT AND SYSTEMS DESIGN ENGINEERING		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**4201**	**SEMESTER**	**7**
COURSE TITLE	**Computational Design and Biomimetics**		

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 and Lab exercises	**3**	**6**
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:	NONE
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK/ENGLISH
COURSE DELIVERED TO ERASMUS STUDENTS	YES
MODULE WEB PAGE (URL)	https://eclass.uowm.gr/

2. LEARNING OUTCOMES

Learning outcomes

The course explores the relationship between computational tools and product design, in an effort to attain a new insight into the relationship between design intent and built form. Students will have the opportunity to develop computational design skills and acquire hands on cutting-edge fabrication experiences, while cultivating analytical and creative thinking on the applications of computation in design. Furthermore, the course of computational design focuses to biomimetic design approach. Students face design problems according to nature approach.

On successful completion of this module the learner will be able to:

- acquire knowledge and expertise in computational design and digital fabrication in relation to product design.
- interpret and criticize specific design methodologies, current applications, and emerging advances in the field of computational design and digital fabrication.
- asses the effect of these methodologies and applications in the production of the built product environment based on nature principles.
- conduct research leading to new knowledge.
- propose original applications of analysis and research knowledge in the field of computational design and digital fabrication through product design projects.
- evaluate current methodologies and develop critiques of them, in relation to the question set and the outcome of the method.
- identify problems in design-to-fabrication workloads and develop solutions based on feedback loops between digital and material world.
- display high-level and sought-after skills in pursuing computational design research, including software skills, 3D-modelling, visual computer programming and text-based programming.
- display high-level skills in pursuing digital fabrication and material research, including material properties understanding and physical prototyping.
- formulate material fabrication techniques and physical prototyping as a medium for improving design communication and outcome.
- develop the capacity to creatively deal with complex problems either individually or as part of a group through research and design projects.
- acquire the ability to communicate research and design conclusions clearly to specialist and non-specialist audiences through design projects and presentations

General Skills

Upon successful completion of the program students will:

- have the theoretical and practical background on the field of computational design.
- utilize scientific knowledge to understand, analyze and solve problems based on nature approach.
- apply a wide range of scientific and technical knowledge concerning the design and development of products and systems.

3. COURSE CONTENTS

1. Theory of computational design.
2. Evolution of computational design.
3. Digital fabrication.
4. Computational design processes.
5. Programming languages.
6. Advanced CAD.
7. Modern production techniques.
8. Interactive design
9. Performance based Design
10. Research methodology in design and technology
11. Special topics in nature-based design.

4. TEACHING METHODS - ASSESSMENT

<table>
<tr><td>MODE OFDELIVERY</td><td>In class, face to face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</td><td>• Video and slide presentations via projector
• Support of teaching process via the electronic platform e-class
• Communication with students.</td></tr>
<tr><td>TEACHING METHODS</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>100</td></tr>
<tr><td>Non-directed study</td><td>25</td></tr>
<tr><td>Lab exercises</td><td>25</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Course total</td><td>150</td></tr>
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<tr><td>ASSESSMENT METHODS</td><td>Lab exercise which includes:
I. Homework exercises
II. Exercises in the class
III. Coursework for portfolio built

Final written exam which includes:
i. Short-answer questions
ii. Multiple choice questions
iii. Problem solving</td></tr>
</table>

5. ATTACHED

- Suggested bibliography:

1. Βιβλίο [102072449]: Σχεδιασμός Προϊόντων, Κυράτσης Παναγιώτης, Ευκολίδης Νικόλαος, Μηνάογλου Πρόδρομος, Μανάβης Αθανάσιος Λεπτομέρειες
2. Βιβλίο [102818653]: Geometric Principles in Generative Design, Κουρνιάτης Νικόλαος Λεπτομέρειες
3. Class notes