

## COURSE MODULE OUTLINE

### General information

<b>SCHOOL</b>	School of Applied Arts and Sustainable Design		
<b>PROGRAM COURSE</b>	Interaction Generative Design		
<b>LEVEL OF STUDY</b>	Postgraduate		
<b>COURSE UNIT CODE</b>	<b>IGD54</b>	<b>YEAR OF STUDY</b>	1 <sup>ST</sup>
<b>COURSE TITLE</b>	Digital Fabrication Techniques		
<b>INDEPENDENT TEACHING ACTIVITIES</b> <i>in case credits are awarded for separate components/parts of the course, e.g. in lectures, laboratory exercises, etc. If credits are awarded for the entire course, give the weekly teaching hours and the totalcredits</i>	<b>WEEKLY TEACHNG HOURS</b>		<b>CREDITS</b>
Weeklyteachinghours: 21-22 hours per weekX 13 weeks	280		10
<i>Add rows if necessary. The organization of teaching and the teaching methods used are described in detail under section 4</i>			
<b>COURSE TYPE</b> Compulsory, Optional, Optional mandatory	Compulsory		
<b>PREREQUISITE COURSES:</b>	Introduction to algorithmic design (IGD52)		
<b>LANGUAGE OF INSTRUCTION AND EXAMS:</b>	English		
<b>THE COURSE IS OFFERED TO ERASMUS STUDENTS</b>	NO		
<b>COURSE WEBSITE (URL)</b>	<a href="https://www.eap.gr/en/diadrastikos-algorithmikos-sxediasmos/diadrastikos-algorithmikos-sxediasmos-thematikes-enotites/#igd51">https://www.eap.gr/en/diadrastikos-algorithmikos-sxediasmos/diadrastikos-algorithmikos-sxediasmos-thematikes-enotites/#igd51</a>  Each unit has its own page in the EAP digital education space ( <a href="http://courses.eap.gr">http://courses.eap.gr</a> ), with controlled access (use of code) for students and teachers.		

### (2) LEARNING OUTCOMES

### **Learning Outcomes**

The course learning outcomes, specific knowledge, skills and competences of an appropriate (certain) level, which students will acquire upon successful completion of the course, are described in detail. It is necessary to consult:

#### **APPENDIX A**

- Description of the level of learning outcomes for each level of study, in accordance with the European Higher Education Qualifications' Framework.
- Descriptive indicators for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and

#### **APPENDIX B**

- Guidelines for writing Learning Outcomes

Students will be able to:

- Understand the link between the process of digital design and digital fabrication.
- Understand the capabilities of the subtractive and additive techniques of digital fabrication, as well as their differences.
- Use subtractive and additive digital prototyping machines to construct an object described by a digital model.
- Choose the appropriate digital fabrication method according to the geometrical characteristics of the model, the properties of the construction material and the digital prototyping machines.
- Adapt the digital model according to the capabilities and limitations of digital prototyping machines.

### **General Competences**

Taking into consideration the general competences that students/graduates must acquire (as those are described in the Diploma Supplement and are mentioned below), at which of the following does the course attendance aim?

<i>Search for, analysis and synthesis of data and information by the use of appropriate technologies,</i>	<i>Project planning and management</i>
<i>Adapting to new situations</i>	<i>Respect for diversity and multiculturalism</i>
<i>Decision-making</i>	<i>Environmental awareness</i>
<i>Individual/Independent work</i>	<i>Social, professional and ethical responsibility and sensitivity to gender issues</i>
<i>Group/Team work</i>	<i>Critical thinking</i>
<i>Working in an international environment</i>	<i>Development of free, creative and inductive thinking</i>
<i>Working in an interdisciplinary environment (Other.....citizenship, spiritual freedom, social</i>	<i>.....</i>
<i>Introduction of innovative research</i>	<i>awareness, altruism etc.) .....</i>

*Search for, analysis and synthesis of data and information by the use of appropriate technologies*  
*Decision-making*  
*Individual/Independent work*  
*Working in an interdisciplinary environment*  
*Development of free, creative and inductive thinking*  
*Individual/Independent work*

### **(3) COURSE CONTENT**

The aim of this thematic unit is to introduce students to the techniques of additive and subtractive digital manufacturing (milling with CNC routers, cutting with Laser cutting machines, and printing with 3D printers). The students understand the potential and limitations of these techniques,

depending on the form of the digital model and the materiality of its construction. Through theory and practical application, students understand the workflow between digital design and digital manufacturing, the properties, and limitations of construction materials (wood, acrylic, metal, plastic, etc.), the limitations of digital prototyping machines, and the data that ought to be extracted from the two-dimensional or three-dimensional model for its fabrication.

**Topics:**

- Introduction to digital manufacturing - CAD/CAM workflow
- Subtractive techniques of digital manufacturing (milling with CNC routers, cutting with Laser cutting machines)
- Additive techniques of digital manufacturing (printing with 3D printers)
- Machine Protocols
- Introduction of material properties into the computational model
- File preparation and data export for fabrication (projection, nesting, labelling, datasheets)

**(4) TEACHING METHODS--ASSESSMENT**

<b>MODES OF DELIVERY</b> <i>Face-to-face, in-class lecturing, distance teaching and distance learning etc.</i>	Distance teaching and distance learning	
<b>USE OF INFORMATION AND COMMUNICATION TECHNOLOGY</b> <i>Use of ICT in teaching, Laboratory Education, Communication with students</i>	<ul style="list-style-type: none"> <li>• Using programs to present complex geometric shapes.</li> <li>• Multimedia material (Videos, Slides, Exercises).</li> <li>• PowerPoint presentations with a wide variety of dynamic interactive files.</li> <li>• Presentations through the respective g code production software, for the direct supervision of the production of the fabrication file, according to the construction decisions and the material to be processed</li> </ul>	
<b>COURSE DESIGN</b> <i>Description of teaching techniques, practices and methods: Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, Internship, Art Workshop, Interactive teaching, Educational visits, projects, Essay writing, Artistic creativity, etc.</i>  <i>The study hours for each learning activity as well as the hours of</i>	<b>Activity/Method</b>	<b>Semester workload</b>
	3 OSS (* 4 hours)	12
	Self-assessment exercises	34
	Module activities	17
	Preparation of Assignments (3 assignments * 10 hours)	30
	Examination	3
	Individual study	184

<i>selfdirected study are given following the principles of the ECTS.</i>	<b>Totalmoduleworkload (hours)</b>	280
<p align="center"><b>STUDENT PERFORMANCE EVALUATION/ASSESSMENT METHODS</b></p> <p><i>Detailed description of the evaluation procedures:</i></p> <p><i>Language of evaluation, assessment methods, formative or summative (conclusive), multiple choice tests, short- answer questions, open-ended questions, problem solving, written work, essay/report, oral exam, presentation, laboratory work, other.....etc.</i></p> <p><i>Specifically defined evaluation criteria are stated, as well as if and where they are accessible by the students.</i></p>	<p>Elaboration of three (3) written assignments during the semester. To participate in the final exam, it is mandatory to submit at least two of the three assignments and the total grade in the assignments must be at least 20 out of 100.</p> <p>Final written exam.</p> <p>These criteria are derived from the EAP Study Regulations (<a href="https://www.eap.gr/wp-content/uploads/2022/03/kanonismos-spoudwn-isxys-apo-to-didaktiko-etos-2022-2023.pdf">https://www.eap.gr/wp-content/uploads/2022/03/kanonismos-spoudwn-isxys-apo-to-didaktiko-etos-2022-2023.pdf</a>) and are posted, both on the website of the Foundation (<a href="https://www.eap.gr/education/odigos-spoudwn-eap/">https://www.eap.gr/education/odigos-spoudwn-eap/</a>), and on the Digital Education Page (courses) of the unit.</p>	

#### **(5) SUGGESTED BIBLIOGRAPHY:**

<p>- <i>Suggested bibliography</i></p> <ol style="list-style-type: none"> <li>1. Menges, Achim. <i>Material Computation: Higher Integration in Morphogenetic Design</i> 82, 2 (2012).</li> <li>2. Iwamoto, Lisa. <i>Digital Fabrications: Architectural and Material Techniques</i>. New York: Princeton Architectural Press, 2009.</li> <li>3. Dunn, Nick. <i>Digital Fabrication in Architecture</i>. London UK: Laurence King Publishing, 2012.</li> <li>4. Corser, Robert. <i>Fabricating Architecture : Selected Readings in Digital Design and Manufacturing</i>, Princeton Architectural Press, 2010.</li> <li>5. Youssef, Helmi A., et al. <i>Manufacturing Technology : Materials, Processes, and Equipment</i>, Taylor &amp; Francis Group, 2011.</li> </ol> <p>- <i>Related scientific Journals:</i></p>
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