

DIGITAL MANUFACTURE. FABLAB MADRID CEU

Language of Instruction: English

NUMBER OF CREDITS: 3 credits. Contact Hours 45 hours

COURSE DESCRIPTION

This course is designed to show students how to manage advanced technologies for digital manufacture. It combines classes, lectures and visits, but it is basically a hands-on course. The program includes learning computer aided design, computer controlled cutting, parametric design and computer controlled machining. Additionally, the course includes lectures by experts in digital fabrication for Architecture and Design and visits to different places in Madrid relevant to the content of the class. The course will be held at FabLab Madrid CEU, the digital fabrication laboratory at CEU San Pablo University's Institute of Technology (EPS).

COURSE PREREQUISITES

Students with majors in Architecture, Engineering and Design could make the most of this summer course.

COURSE OBJECTIVES

The global objective of this course is to provide students with the necessary knowledge and tools to design and fabricate design prototypes, architectural models or engineering devices through a variety of digital fabrication practices, building skills in a short period of time.

Thus, upon completion of the course students should:

1. Understand the benefits of digital fabrication in Architecture, Engineering and Design.
2. Learn how to use computer aided design tools for 3D modeling ideas and projects.
3. Learn how to use a computer-controlled laser cutter, for press-fit assembly of 3D structures from 2D parts.
4. Learn the benefits of the use of parametric design tools for digital fabrication.
5. Learn how to use parametric design software to design a prototype that will be made by students in hands-on workshop.
6. Learn how to use a large numerically-controlled milling machine, for making furniture and larger prototypes.
7. Understand how the basic principles of digital fabrication are applied in diverse fields through conferences and visits to different spaces in the city of Madrid.

REQUIRED MATERIALS

Students work on the assignment using the materials provided by the FabLab and the equipment and machines available in the laboratory.

Although all the materials are included in the tuition fees, a laptop is strongly recommended to make the most of this summer course.

METHODOLOGY

Classes will be a mix of lecture (theory), tutorials, hands-on workshops (practice) and visits. The program takes place in five weeks. Every week the instructors of the FabLab hold a main lecture on a different topic (computer aided design, computer controlled cutting, parametric design, computer controlled machining and applications & implications of digital fabrication). Instructors will provide as well hands-on activities on the topic, and will offer their practical knowledge to help students develop a week's assignment related to this specific technology or topic. Students will work on the assignment using lab materials, equipment and machines, immediately applying all the concepts covered in the main lecture. Finally, students will document their progress to create a personal portfolio that will be presented in an exhibition that will be held at the end of the summer course.

GRADING

Work Load: Students will be required at the end of the summer course to document their assignments creating a personal portfolio that will be presented in an exhibition.

Grade Distribution: 5% class participation, 5% attendance to the conferences and workshops, 80% completion of assignments (20% each assignment); 10% presentation of portfolio.

Absence: in the event of unexcused absences the grade shall be lowered. Attendance and oral participation form an integral part of understanding the concepts and materials presented in class and in digital fabrication learning.

Participation: In terms of general classroom participation, you are expected to be an active member, you should be prepared to lead and participate on assigned activities.

Grading Percentages: The following table of conversion of percentages to letter grades shall be used by instructors:

93-100%=A,

90-92%=A-,

87-89%=B+,

83-86%=B,

80-82%=B-,

77-79%=C+,

73-76%=C

70-72%=C-,

67-69%=D=N,

63-66%=D=N,

60-62%=D-=N,

59% or lower =F

Grading Standards:

A achievement that is outstanding relative to the level necessary to meet course requirements

B achievement that is significantly above the level necessary to meet course requirements

C achievement that meets the course requirements in every respect

D achievement that is worthy of credit even though it fails to a C- or better.

F or **N** represents failure or no credit

I Incomplete

Academic Dishonesty: Academic dishonesty in any portion of the academic work of a course shall be grounds for awarding a grade of F or N for the entire course.

TENTATIVE/SAMPLE CLASS SCHEDULE**Week 1:** Computer aided design

Acquire understanding and knowledge on how to use computer aided design tools for 3D modeling ideas and projects for Architecture and Design using graphic strategies. Learn how to create a portfolio of drawings to illustrate their progress during the summer course.

Week 2: Laser cutting

Learn how to use a computer-controlled laser cutter, for press-fit assembly of 3D structures from 2D parts. Students will make a press-fit model that allows designing the structure before cutting the parts using a laser cutter to finally learn how to manufacture and assemble a prototype or architectural model.

Week 3: Parametric Design

Being Maths the base of the parametric world, the course focuses on design with equations, mathematical games, tessellations, genetic algorithms, animations, loops and fractals using Rhinoceros 3D (modeling; software) and Grasshopper (parametric design software).

Week 4: Computer controlled cutting

Design and build a large scale prototype to optimize design and manufacturing through the application of parametric design techniques and cutting CNC (Computer Numerical Control). Using wood as a construction element, explore the creation of experimental architectural spaces, test complex geometries and pursue creative solutions within the framework of innovation.

Week 5: Conferences: Digital Fabrication for Architecture and Design

Understand the benefits of digital fabrication in Architecture, Engineering and Design and learn how the basic principles of digital fabrication are applied in diverse fields through conferences and visits to different spaces in the city of Madrid.