ARCH A171: DESIGN FABRICATION 1

Item	Value
Curriculum Committee Approval Date	12/08/2021
Top Code	020100 - Architecture and Architectural Technology
Units	2 Total Units
Hours	54 Total Hours (Lecture Hours 27; Lab Hours 27)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	Yes
Basic Skills	Not Basic Skills (N)
Repeatable	No
Grading Policy	Standard Letter (S)
Associate Arts Local General Education (GE)	• OC Humanities - AA (OC1)
Associate Science Local General Education (GE)	• OCC Arts - AS (OSC1)

Course Description

This course introduces digital fabrication techniques for architecture and design, including shop safety. Emphasis is given to design iteration and fabricating basic projects using computer-assisted equipment (laser cutters, CNC routers, robotics, 3-D printers and scanners, etc.). Transfer Credit: CSU.

Course Level Student Learning Outcome(s)

1. Students will be able to design, develop and fabricate a basic project using Computer Numerically Controlled router, laser cutter, 3-D printer, and software, safely, and at a beginning level of craft as evaluated by the instructor.

Course Objectives

- 1. Safely work in a shop and operate computerized fabrication equipment.
- 2. Effectively use and maintain hand and powered tools and machinery.
- 3. Demonstrate basic use of computer software for export to fabrication machinery.
- 4. Design and develop a simple project for fabrication.
- 5. Fabricate a simple project and finish it for presentation (may be individual or team project).

Lecture Content

Shop Safety Safety procedures and test Shop organization, materials storage Intro to tools, equipment Clean up procedures Basic Laser Cutting skill level File export Job Set Up Operation Finishing Basic skills with CNC Router RhinoCAM, models Parts, configuration Tool, materials library Job Set Up Operation, tool paths Techniques: nesting, drill/block, pocketing, facing, engraving Basic 3-D Printing skill level File export (STL) Job Set Up Operation Finishing Project development – Simple project level Design, concept Shop drawings Tolerances, dimensions File transfer Student project – Simple project level Develop Execute Finish and present

Lab Content

Design and fabricate projects using laser cutter machinery (6-8 weeks) Design and fabricate project using CNC machinery (2-4 weeks) Design and fabricate project using 3-D printer (2-4 weeks)

Method(s) of Instruction

- Lecture (02)
- Lab (04)

Instructional Techniques

Lecture and in-class fabrication demonstrations, quizzes, individual and small group activities and instruction

Reading Assignments

Students will spend a minimum of 2 hours per week reading design fabrication manuals: Epilog laser cutter, Flexicam Stealth CNC router, Dimension and MakerBot 3-D printer, and KUKA robot manuals to support project specifics, research on contemporary design fabrication techniques, and review of blog posts from designers with written content about their projects

Writing Assignments

Students will spend a minimum of 2 hours weekly writing for this course including minor notations and short professional descriptors as evidenced in design drawings/models. Critical thinking is reinforced in the act of developing designs for fabrication and presenting them. A graphic survey and comparison of contemporary design fabrication will be required to help develop individual student interests.

Out-of-class Assignments

Students will spend a minimum of 2 hours per week reviewing design fabrication projects shared openly on the Internet. Development of a visual and written narrative to align individual student interests with contemporary design fabrication techniques.

Demonstration of Critical Thinking

Critical thinking is reinforced in the act of developing a design, fabricating and iterating 3-D solutions, and in the documentation and presentation of qualified results in each project.

Required Writing, Problem Solving, Skills Demonstration

Writing for this course includes minor notations and short professional descriptors, as evidenced in the design and fabrication methods employed and presented. Iterative design thinking and making is a focal point of problem solving. Skills are demonstrated by selection and use of individual fabrication and documentation techniques per student interest.

Eligible Disciplines

Architecture: Any bachelors degree and two years of professional experience, or any associate degree and six years of professional experience.

Textbooks Resources

1. Required Iwamoto, L.. Digital Fabrications: Architectural and Material Techniques , 1st ed. Princeton Architectural Press, 2009 Rationale:

This book is a primary source of information for contemporary design fabrication techniques and projects.

Manuals Resources

1. Hambly, J. Fugier, M.. Rhino 5 Training Manual: Level 1, McNeel , 09-30-2013 2. Epilog Laser. Epilog Mini/Helix Manual, Epilog , 04-22-2010

Periodicals Resources

1. Menges, A.. Instrumental Geometry, Architectural Design Volume 76 2006

Other Resources

1. Instructor handouts and reference materials as needed for project(s) 2. Digital Fabrication Equipment: CNC routers, laser cutters/engravers, 3-D printers, vacuum formers, robotic systems 3. Cleaning Supplies Equipment: vacuum, broom, dustpan, trash cans