ARCH A172: DESIGN FABRICATION 2

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)

Course Description

This course promotes intermediate digital fabrication techniques for architecture and design. Emphasis is given to independent project design and construction using computer-assisted equipment (laser cutters, CNC routers, robotics, 3-D printers and scanners, etc.). ADVISORY: ARCH A171. Transfer Credit: CSU.

Course Level Student Learning Outcome(s)

1. Students will be able to design, develop and fabricate a challenging project safely using Computer Numerically Controlled router, laser cutter, 3-D printer, and software, and at a skilled 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 skilled use of computer software for export to fabrication machinery.
- 4. Design and develop a challenging project for fabrication.
- 5. Fabricate a challenging project and finish it for presentation (may be individual or team project).

Lecture Content

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

Lab Content

Design and fabricate skilled project using laser cutter machinery (2-4 weeks) Design and fabricate skilled project using CNC machinery (2-4 weeks) Design and fabricate skilled project using 3-D printer (2-4 weeks) Design and fabricate basic project using robotic systems (4-8 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

Reading of 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, including creation of individual and/or group blog content

Writing Assignments

Writing for this course includes minor notations and short professional descriptors as evidenced in design drawings/models, including blog post(s). Critical thinking is reinforced in the act of developing designs for fabrication and presenting them. A graphic blog post using course outcomes related to contemporary design fabrication will be required to help refine individual student interests.

Out-of-class Assignments

Review of design fabrication projects shared openly on the Internet. Development of a visual and written narrative to refine 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, including blog post(s), as evidenced in the design and fabrication methods employed and presented. Iterative design thinking and making is a focal point of problem solving. Intermediate/Advanced skills are demonstrated by selection and refinement 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: Primary source of digital fabrication techniques and projects in contemporary design fabrication.

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