Course Information

Division: Industrial Technology Education
Course Number: AMT 211
Title: Fab Lab Workshop II
Credits: 1-3
Developed by: Nathan McCray and Dorian R. Nelson

Lecture/Lab Ratio
1 Credit = 0 Lecture/3 Lab
2 Credits = 0 Lecture/6 Lab
3 Credits = 0 Lecture/9 Lab

Transfer Status

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<tr>
<th>ASU</th>
<th>NAU</th>
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<td>Non Transferable</td>
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Activity Course: No
CIP Code: 48.0503
Assessment Mode: Portfolio
Semester Taught: Fall and Spring
GE Category: None
Separate Lab: No
Awareness Course: No
Intensive Writing Course: No
Diversity and Inclusion Course: No

Prerequisites
AMT 111 and DRF 154 or DRF 220 or instructor approval

Educational Value
Individuals will have an opportunity to continue to cultivate concepts and use ideas to develop and produce parts and projects from Fab Lab equipment and design software.

Description
This workshop allows students an opportunity to turn an idea into a small usable product using EAC Fab Lab equipment and CAD software. Students will investigate, develop, and bring ideas into reality. Students will be supervised and assisted to ensure proper safety procedures are followed and machine set-up is correct. Students will be guided to ensure equipment is used safely and correctly. Fab Lab students will work collectively to keep the Fab Lab safe, organized, and clean. Students will also be required to understand associated costs of supplies used in the fabrication process.
Supplies
No lab fees. Materials for personal projects must be provided by students.

Competencies and Performance Standards

1. **Explain and practice the safety procedures in the Fab Lab environment while using equipment (3D printer, laser cutter, material cutters, various hand tooling, and machine software).**

   **Learning objectives**
   What you will learn as you master the competency:
   a. Acquaint self with the safety procedure rules for each machine used.
   b. Demonstrate the ability to safely use the manufacturing equipment.
   c. Demonstrate the safety procedures within the Fab Lab environment.
   d. Identify the safety available equipment in the Fab Lab.

   **Performance Standards**
   Competence will be demonstrated:
   - in oral quiz and discussion
   - in written quiz

   Your performance will be successful when:
   - learner is productive, works safely and in a professional manner while working on task requirements for each Fab Lab equipment and in the lab area
   - learner properly sets-up Fab Lab equipment to make single dimension part or cut
   - learner operates each Fab Lab equipment according to strict machine protocols
   - learner cleans work area and performs routine maintenance and inspections on EAC Fab Lab equipment
   - learner attends required class and lab sessions and shows up on time
   - learner scores 90% on written safe operation quizzes and sets up of each FAB Lab equipment correctly (a redo is acceptable only after student relearns the process)

2. **Recognize various types of materials which can be used in Fab Lab machine or during the fabrication process (3D printer, Laser cutter, material cutters, various hand tooling & machine software).**

   **Learning objectives**
   What you will learn as you master the competency:
   a. Identify typical materials that can be safely used in EAC’s Fab Lab machines equipment.
   b. Identify material cost to produce a small, two-dimensional part using each Fab Lab.

   **Performance Standards**
   Competence will be demonstrated:
   - in written quiz and test

   Your performance will be successful when:
   - learner gives correct answers on written quiz/test
   - learner provides acceptable cost analysis on selected parts provided
   - learner identifies and lists characteristics related to selected material types
   - learner provides cost estimates on the two dimensional parts provided
3. **Identify the limits and operational cautions while using all Fab Lab equipment.**

   **Learning objectives**
   
   *What you will learn as you master the competency:*
   
   a. Acquaint self with each machine’s operational manual.
   b. View A/V instructional module related to all Fab Lab equipment.
   c. Demonstrate an understanding of operational procedures outlined in Fab Lab operation manuals and follow operational checklists.

   **Performance Standards**
   
   *Competence will be demonstrated:*
   
   o in oral discussion
   o in lab activities demonstrating an understand of basic machine operation per competency check list on each equipment in Fab Lab

   *Criteria – Performance will be satisfactory when:*
   
   o learner can pass with a 90% on an operational procedures quiz for Fab Lab equipment
   o learner is successful during a dry run process in each Fab Lab machine
   o learner utilizes guidance from Fab Lab technician for any project’s first run on Fab Lab’s equipment
   o learner demonstrates an understanding of basic machine operation per competency check list with equipment in Fab Lab

4. **Produce a useable product using varying Fab Lab equipment.**

   **Learning objectives**
   
   *What you will learn as you master the competency:*
   
   a. Demonstrate ability to properly set-up and produce a multi-dimensional part using one or various Fab Lab equipment.
   b. Perform proper clean-up and maintenance on machines, and also resets equipment correctly so it is ready for the next user.

   **Performance Standards**
   
   *Competence will be demonstrated:*
   
   o in writing assignments
   o in lab activities

   *Criteria – Performance will be satisfactory when:*
   
   o learner produces a product or part with recognizable form and function
   o learner is successful while using the Fab Lab equipment
   o learner utilizes guidance from Fab Lab technician to ensure Fab Lab equipment is being used properly during fabrication process
   o learner properly and safely produces a small part or product

**Types of Instruction**

Demonstration/Discussion
**Grading Information**

**Grading Rationale**

Students will be evaluated on their ability to follow proper industry safety procedures, machine tool setup and operation, and provide a simple cost analysis of the materials. Student completion of course competencies will be an ability to produce a product. Grading will be based on student productivity, professionalism, safety, work collaboration, and progress.

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<tr>
<th>Component</th>
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<tbody>
<tr>
<td>Project</td>
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<td>Lab activity</td>
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**Grading Scale**

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<tr>
<th>Grade</th>
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<tbody>
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