MASTER SYLLABUS

MECH 122 – INTRODUCTION TO 3D PRINTING

CIP Code: 14.1901

For assistance determining CIP Code, please refer to this webpage https://nces.ed.gov/ipeds/cipcode/browse.aspx?y=55
or reach out to Sarah Todd at todds@canton.edu

Created by: Cullen Haskins
A. TITLE: INTRODUCTION TO 3D PRINTING

B. COURSE NUMBER: MECH 122

C. CREDIT HOURS (Hours of Lecture, Laboratory, Recitation, Tutorial, Activity):

# Credit Hours: 1
# Lecture Hours _0_ per Week
# Lab Hours: 15 Weeks – 1, 2-hour lab per week
Other ___ per Week

Course Length (# of Weeks): 15

D. WRITING INTENSIVE COURSE: No

E. GER CATEGORY: None

F. SEMESTER(S) OFFERED: Spring

G. COURSE DESCRIPTION:
This course introduces the fundamental concepts of 3D extrusion printer technology, operation, maintenance, and repair. The components and technology that make 3D printing possible are investigated before students learn the processes involved in moving from a parametric 3D model through the slicing software and then to printing. Fundamental skills like safety, maintenance, troubleshooting, and repair are introduced and practiced during the course.

**NOTE:** In lieu of a textbook, students are required to purchase their own printer for this course. The recommended printer is a Creality Ender 3 which can be purchased through Amazon for $189.00. We will unbox and assemble printers on day 1 of the course, so please purchase your printer prior to the start of the semester and bring it to Lab 1.

H. PRE-REQUISITES: None
CO-REQUISITES: None

I. STUDENT LEARNING OUTCOMES:

<table>
<thead>
<tr>
<th>Course Student Learning Outcome [SLO]</th>
<th>PSLO</th>
<th>GER</th>
<th>ISLO</th>
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<tbody>
<tr>
<td>a. Describe the fundamental operation of 3D extrusion printers and their key components and safety risks.</td>
<td>ABET SO#1 Performance Indicator a – Overall knowledge, techniques, skills, and tools</td>
<td>5-Ind, Prof, Disc, Know Skills</td>
<td></td>
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<tr>
<td>b. Demonstrate proper (printer-specific) methods for installing and removing printer filament, cleaning, and maintenance.</td>
<td>ABET SO#1 Performance Indicator a – Overall knowledge, techniques, skills, and tools</td>
<td>5-Ind, Prof, Disc, Know Skills</td>
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c. Demonstrate competence in progressing from a 3D parametric model to a physical printed part.

<table>
<thead>
<tr>
<th>KEY</th>
<th>Institutional Student Learning Outcomes [ISLO 1 – 5]</th>
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<tbody>
<tr>
<td>ISLO #</td>
<td>ISLO &amp; Subsets</td>
</tr>
<tr>
<td>1</td>
<td>Communication Skills</td>
</tr>
<tr>
<td></td>
<td>Oral [O], Written [W]</td>
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<tr>
<td>2</td>
<td>Critical Thinking</td>
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<tr>
<td></td>
<td>Critical Analysis [CA], Inquiry &amp; Analysis [IA], Problem Solving [PS]</td>
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<tr>
<td>3</td>
<td>Foundational Skills</td>
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<tr>
<td></td>
<td>Information Management [IM], Quantitative Lit./Reasoning [QTR]</td>
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<tr>
<td>4</td>
<td>Social Responsibility</td>
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<td></td>
<td>Ethical Reasoning [ER], Global Learning [GL], Intercultural Knowledge [IK], Teamwork [T]</td>
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<tr>
<td>5</td>
<td>Industry, Professional, Discipline Specific Knowledge and Skills</td>
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J. APPLIED LEARNING COMPONENT:  Yes__X___  No_______

If Yes, select one or more of the following categories:

Classroom/Lab _X_  Civic Engagement___
Internship____  Creative Works/Senior Project___
Clinical Practicum___  Research___
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<tr>
<th>Practicum</th>
<th>Entrepreneurship</th>
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<tr>
<td>Service Learning</td>
<td>(program, class, project)</td>
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<tr>
<td>Community Service</td>
<td>**</td>
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</tbody>
</table>
K. TEXTS: None

L. REFERENCES:
   3D Printing Failures: How to Diagnose & Repair All Desktop 3D Printing Issues by Sean Aranda, Self-Published

M. EQUIPMENT:
   Computer Lab, 3D Printing Lab, Student Printers (Purchased with Lab Fees)

N. GRADING METHOD: A-F

O. SUGGESTED MEASUREMENT CRITERIA/METHODS:
   Homework, Quizzes, Labs, & Exams

P. DETAILED COURSE OUTLINE:
   See Lab Outline Below

Q. LABORATORY OUTLINE:
   Lab 1. (Brief) History of 3D Printing + Printer Assembly
   Lab 2. Filament Install & Removal + Bed Leveling + Test Print
   Lab 3. Anatomy and Function of FDM Printers
   Lab 4. STL Creation and Slicing Defaults (CURA)
   Lab 5. Part Orientation
   Lab 6. Additional Topics in Slicing
   Lab 7. 3D Printing Safety
   Lab 8. Tips for Printing Success
   Lab 9. Diagnosing Failed Prints and Malfunctions
   Lab 10. Cleaning, Inspection, & Maintenance
   Lab 11. Basic Repairs
   Lab 12. Final Print Project
   Lab 13. Course Content Review and Wrap-up
   Lab 14. Final Exam