MECH 101L: PROTOTYPE MANUFACTURING AND MACHINING LAB/
LIGHT FABRICATION TRAINING SEMINAR

1 Unit

Contact Hours: Laboratory one day each week, 2 hours 45 minutes per day for ten weeks.
Light Fabrication Safety Training Seminar, two 2 hour 45 minute meetings.

Course Coordinator/Instructor: Don MacCubbin (Mechanical Engineering Lab Manager)

Textbook: None.

Catalog Description: Practical experience with manual machine tools such as mills, lathes, drill press, sheet metal tools, etc. Basic training in safe and proper use of the equipment associated with simple mechanical projects. Laboratory. MECH 101L Must be taken in conjunction with MECH194 or MECH195. P/NP (1 unit).

Prerequisites: None.
Co-requisite: MECH 194 or MECH 195, Senior standing
Light Fabrication Training Seminar must be completed to qualify for grade in MECH 101L.

Course Type: Required

Course Learning Objective:
The primary purpose of this course is to offer an overview of prototype manufacturing and machining processes as well as provide practical experience using machine tools and light fabrication equipment to translate concepts/ideas/designs into prototypes. Students will receive instruction and participate in “hands on” exercises to achieve this objective. Successful completion of MECH 101L with approval of Machine Shop Manager will qualify students to use the Student Projects Machine Shop for approved University class related projects (including Senior Design).

Course Learning Outcomes:
Students successfully completing this course:

- Will be aware of the need to work safely and develop good work habits in the manufacturing environment.
- Will develop improved engineering drawing interpretation and 3D visualization skills.
- Will begin to be able to identify the proper processes to employ for prototype development.
- Will become familiar with the safe operation of light fabrication tools.
- Will learn the basic set-up and safe operation of milling machines, engine lathes and band saws and be able to apply this knowledge for manufacturing simple projects
- Will master the use of precision measuring tools.
- Will understand the capabilities/limitations and benefits/drawbacks of different machining techniques.

Assessments of Learning Outcomes:
MECH 101L is graded Pass/Not Pass. Students will be evaluated on both written assignments as well as “hands-on” lab applications.

Relationship of course to program outcomes:
MECH 101L contributes under category

- **Develop the ability to reduce concepts to working prototypes.** (Nn)
Topics Covered:

**Light Fabrication Safety Training Seminar**
- Safe operation of light fabrication equipment.
  - Sanders and grinders
  - Drill Presses
  - Scroll Saw, Band Saw and Hack Saw
  - Spot Welder
  - Punch, Brake and Shear
- Conceptual Design
  - Brainstorming
  - Working sketches/drawings.
- Proof of Concept Prototype
  - Fabrication constraints.
  - Problem identification/resolution
  - Iterative design

**MECH 101L**
- Safe operation of vertical milling machines.
  - Identify machine components/controls
  - Basic set-up/operation
  - Cutting tool types
  - Squaring material
  - Face milling/Contour milling
  - Drilling/Tapping/Reaming
- Safe operation of engine lathes
  - Identify machine components/controls
  - Basic set-up/operation
  - Lathe tools
  - Turning/Facing
  - Drilling/Tapping/Reaming
  - Taper turning
- Production machining.
  - Dedicated set-ups
  - Axis stops
  - Location of datums
- Device assembly
  - Keyed shaft, key-ways and key stock
  - Roll pin/split pin/spring pin
  - Eccentric cams
  - Fixed bushings/bearings
- 2 Axis CNC Machining
  - Shop Floor/Conversational programming
  - Program verification
- Laser Cutting and 3D Printing
  - CAD design/modeling and file format conversion