University of Toledo
Mechanical Engineering Technology
Master Syllabus

Course Title: *Fluid Mechanics and Hydraulics*   **Course Code & Number:**   *MET 2050*

Credit Hour Total: *4*

Lecture Contact Hours: *3*   **Lab Contact Hours:** *2*

Prerequisite(s):   *PHYS 2010*

Text: *Applied Fluid Mechanics, 7th Edition, R. Mott and J.A. Untener, 2015*

Software: *none*

Course Description: (Approved Catalog Description)
Application of physical principles for the design of systems to transport liquids in closed hydraulic or process piping systems; friction, pumping, flow meters and gauges.

Related Program Outcomes:
Outcome b. To provide in-depth training in fluid power sufficient to prepare for the FPS Hydraulics Specialists test.
Outcome c. An ability to conduct, analyze, and interpret experiments as evidenced by the data and data analyses associated with laboratory notebooks and reports.
Outcome f. An ability to identify, analyze and solve technical problems associated with the basic principles of fluid mechanics as it applies to static and dynamic fluids, as evidence by the ability to solve an assortment of fluid design problems.
Outcome g. An ability to communicate effectively, as evidenced by laboratory reports.

Course Objectives:
At the end of the course the student should be prepared to:
   1. Develop an understanding of the measuring devices in fluid mechanics-manometers, barometers, pressure gauges, flowmeters, etc.
   2. Work effectively with Bernoulli's Eqn. to solve increasingly relevant problems in fluid design.
   3. Demonstrate an ability to understand the principles of fluid friction as it applies to circular pipes, hoses, and tubes for fluid flow systems.

4 Understand the principles of fluid power including the design systems incorporating cylinders, motors, pumps, and controls.

5 Analyze and interpret laboratory data concerning basic fluid theory.

6. Work effectively in the laboratory with lab partners.

7. Identify and solve fluid circuit problems.

8. Communicate the results of fluid analysis in written reports.

Course Outline:
- Fluid statics.
- Viscosity of fluid
- Pressure measurement
- Buoyance and stability
- Applications of statics to fluid power.
- Continuity and general energy equations.
- Bernoulli equation.
- Fluid pump and motor analyses.
- Simple fluid power circuits.
- Flow control in fluid power circuits.
- Pressure control valves.
- Fluid Power circuit applications.

Laboratory Topics:
- Fluid law of statics.
- Hydraulic forces.
- Torricelli's equation
- Venturi's equation
- Oil burner nozzle design.
- Centrifugal pumps.
- Positive displacement pumps.
- Fluid power circuits.