

University of Toledo

Mechanical Engineering Technology

Master Syllabus

Course Title: *Applied Fluid Mechanics* **Course Code & Number:** *MET 4100*

Credit Hour Total: 4

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

Prerequisite(s): *MET 2050, MATH 2460*

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

Software: *HydroFlo*

Course Description: (Approved Catalog Description)

Fundamentals of fluid statics and dynamics including differential analysis, dimensional analysis and similitude, laminar and turbulent flow, viscosity and boundary layer concepts, and compressible flow. Application of these principles to practical, applied problems. Flow of fluids in pipes and conduits. Pump selection and application. The design and analysis of HVAC ducts. Drag and Lift.

Related Program Outcomes:

Outcomes a, b: An ability to select and apply knowledge of math, science, engineering, as well as techniques and modern tools to fluid mechanics problems.

Outcome c, e: An ability to conduct standard measurements, to interpret experiments, to function as a part of a team, as evidenced by a series of laboratory work.

Outcome f: An ability to identify, analyzes, and solves broadly defined ET problems, as evidenced by solving fluid mechanics engineering problems.

Course Objectives:

Upon completion of this course, the students will be able to:

1. Demonstrate an ability to understand the principles of fluid friction as it applies to series, parallel, and branch flow systems.
2. Deliver a highly experience in the application of fluid mechanics in industry and commerce.
3. Design piping systems manually and with computer software.

4. Design air systems manually and with computer software.
5. Students should be able to work in teams to conduct laboratory experiments, analyze and interpret experimental data as well as produce written reports that are coherent and present the obtained results in a logical, convincing fashion.

Course Outline:

- Energy equation
- Darcy's equation
- Minor Losses
- Series Pipeline Systems: class I, II, and III
- Parallel and branching pipeline systems
- Pump selection and applications
- Flow measurements
- Flow of air in ducts
- Drag and lift

Major Laboratory Topics:

- Venturi effect
- Measuring the friction loss in pipes
- Minor losses in fittings
- Using software to investigate series pipeline systems
- Parallel flow
- Pump: System Resistance Curve
- Flow measurements
- Centrifugal fan characteristic curves