COURSE OUTLINE

MECH 241– FLUID MECHANICS

Prepared By: Michael J. Newtown, P.E.
Updated By: Daniel J. Miller (April 2012)
Updated By: Dr. Lucas Craig (May 2015)
A. **TITLE:** Fluid Mechanics

B. **COURSE NUMBER:** MECH 241

C. **CREDIT HOURS:** 3

D. **WRITING INTENSIVE COURSE:** No

E. **COURSE LENGTH:** 15 weeks

F. **SEMESTER(S) OFFERED:** Fall

G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**
   3 hours per week

H. **CATALOG DESCRIPTION:**
   This course develops a basic knowledge of fluids under static and dynamic applications. Properties of fluids, pressure, fluid statics, Bernoulli’s and the energy equation are explored in respect to applications in the mechanical industry. Flow rate, pipe sizing, and minor losses in piping systems are addressed.

I. **PRE-REQUISITES/CO-REQUISITES:**
   a. Pre-requisite(s): MATH 123: Pre-Calculus or MATH 121: College Algebra and PHYS 121/125 (Physics I and lab)
   b. Co-requisite(s): None

J. **GOALS (STUDENT LEARNING OUTCOMES):**
   By the end of this course, the student will be able to:

<table>
<thead>
<tr>
<th>Course Objective</th>
<th>Institutional SLO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Illustrate the difference between power and transportation systems.</td>
<td>1. Communication</td>
</tr>
<tr>
<td>2. Define fluid as a liquid or gas.</td>
<td>2. Critical Thinking</td>
</tr>
<tr>
<td>3. Manipulate Pascal and Bernoulli’s laws to solve basic fluid mechanic problems.</td>
<td>2. Critical Thinking</td>
</tr>
<tr>
<td>4. Determine horsepower and efficiency for pumps and fans</td>
<td>2. Critical Thinking</td>
</tr>
<tr>
<td>5. Size pipes, pumps, motors, cylinders, fans, ducts and accumulators.</td>
<td>2. Critical Thinking</td>
</tr>
<tr>
<td>6. Define the ideal gas laws.</td>
<td>1. Communication</td>
</tr>
<tr>
<td>7. Size air compressors to handle the pneumatic systems requirement.</td>
<td>2. Critical Thinking</td>
</tr>
<tr>
<td>8. Determine Reynolds number and differentiate between laminar and turbulent flow.</td>
<td>2. Critical Thinking</td>
</tr>
<tr>
<td></td>
<td>3. Professional Competence</td>
</tr>
<tr>
<td></td>
<td>3. Professional Competence</td>
</tr>
</tbody>
</table>

K. **TEXTS:**
L. REFERENCES:

M. EQUIPMENT: None

N. GRADING METHOD: A-F

O. MEASUREMENT CRITERIA/METHODS:
   • Exams
   • Quizzes
   • Homework
   • Participation

P. DETAILED COURSE OUTLINE:
   I. Intro to Fluid Mechanics
      A. Fluid as a liquid or gas
      B. Power vs. Transportation systems
      C. Pascal’s, Bernoulli’s law (introduced)

   II. Properties of Fluids
      A. Weight, Density, and Specific Gravity
      B. Force, Pressure, and Head
      C. Pascal’s Law
      D. Bulk Modulus
      E. Viscosity

   III. Energy and Forces
      A. Review Mechanics
      B. Pressures in liquids at rest
      C. Atmospheric Pressure
      D. Manometers
      E. Forces on plane surfaces
      F. Forces on inclined surfaces
      G. Buoyancy
      H. Bernoulli’s Equations applications

   IV. Sizing pipes and ducts
      A. Flow Rate
      B. Laminar flow and Turbulent flow
      C. Losses due to valves and fittings
      D. Compressible and Incompressible Flow

   V. Pneumatic Systems
      A. Sizing Compressors
      B. Sizing Cylinders

   VI. Pump Sizing
      A. Pumps
      B. Motors
      C. Horsepower and Efficiency
      D. Sizing Hydraulic Cylinders

   VII. Air Handling Systems
      A. Sizing Fans
      B. Velocity and Pressure Measurement
Q. **LABORATORY OUTLINE:** None