A. **TITLE:** Fluid Mechanics

B. **COURSE NUMBER:** MECH 241

C. **CREDIT HOURS:** (Hours of Lecture, Laboratory, Recitation, Tutorial, Activity)
   - # Credit Hours: 3
   - # Lecture Hours: 3 per week
   - # Lab Hours: per week
   - Other: per week

   **Course Length:** 15 Weeks

D. **WRITING INTENSIVE COURSE:** Yes ☐ No ☒

E. **GER CATEGORY:** None: ☒ Yes: GER
   *If course satisfies more than one:* GER

F. **SEMESTER(S) OFFERED:** Fall ☒ Spring ☐ Fall & Spring ☐

G. **COURSE 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.

H. **PRE-REQUISITES:** None ☒ Yes ☒ If yes, list below:
   - MATH 123
   - PHYS 121
   - PHYS 125

   **CO-REQUISITES:** None ☒ Yes ☐ If yes, list below:
I. **STUDENT LEARNING OUTCOMES:** *(see key below)*

By the end of this course, the student will be able to:

<table>
<thead>
<tr>
<th>Course Student Learning Outcome [SLO]</th>
<th>Program Student Learning Outcome [PSLO]</th>
<th>GER [If Applicable]</th>
<th>ISLO &amp; SUBSETS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define and analyze hydrostatic forces.</td>
<td>6</td>
<td>2-Crit Think ISLO ISLO</td>
<td>PS Subsets Subsets Subsets</td>
</tr>
<tr>
<td>Define and analyze the ideal gas law.</td>
<td>6</td>
<td>2-Crit Think ISLO ISLO</td>
<td>PS Subsets Subsets Subsets</td>
</tr>
<tr>
<td>Determine horsepower and efficiency for pumps and fans.</td>
<td>6</td>
<td>2-Crit Think ISLO ISLO</td>
<td>PS Subsets Subsets Subsets</td>
</tr>
<tr>
<td>Size pipes, pumps, motors, cylinders, fans, ducts and accumulators.</td>
<td>6,7</td>
<td>2-Crit Think 1-Comm Skills ISLO</td>
<td>PS W Subsets Subsets</td>
</tr>
<tr>
<td>Determine Reynolds number and differentiate between laminar and turbulent flow. Use Darcy’s equation to calculate the friction losses of pipes and fittings.</td>
<td>6</td>
<td>2-Crit Think ISLO ISLO</td>
<td>PS Subsets Subsets Subsets</td>
</tr>
<tr>
<td>Manipulate Pascal and Bernoulli’s laws to solve basic fluid mechanic problems.</td>
<td>6</td>
<td>2-Crit Think ISLO ISLO</td>
<td>PS Subsets Subsets Subsets</td>
</tr>
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<td>KEY</td>
<td>Institutional Student Learning Outcomes [ISLO 1 – 5]</td>
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<tr>
<td>ISLO #</td>
<td>ISLO &amp; Subsets</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 1 | Communication Skills  
Oral [O], Written [W] |
| 2 | Critical Thinking  
Critical Analysis [CA], Inquiry & Analysis [IA], Problem Solving [PS] |
| 3 | Foundational Skills  
Information Management [IM], Quantitative Lit./Reasoning [QTR] |
| 4 | Social Responsibility  
Ethical Reasoning [ER], Global Learning [GL], Intercultural Knowledge [IK], Teamwork [T] |
| 5 | Industry, Professional, Discipline Specific Knowledge and Skills |

*Include program objectives if applicable. Please consult with Program Coordinator*
J. **APPLIED LEARNING COMPONENT:**  Yes ☑  No ☐

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

- [ ] Classroom/Lab
- [ ] Internship
- [ ] Clinical Placement
- [ ] Practicum
- [ ] Service Learning
- [ ] Community Service
- [ ] Civic Engagement
- [ ] Creative Works/Senior Project
- [ ] Research
- [ ] Entrepreneurship
  (program, class, project)

K. **TEXTS:**


Or


L. **REFERENCES:**

N/A

M. **EQUIPMENT:** None ☑  Needed:

N. **GRADING METHOD:** A-F

O. **SUGGESTED MEASUREMENT CRITERIA/METHODS:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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</thead>
<tbody>
<tr>
<td>Homework</td>
<td>25%</td>
</tr>
<tr>
<td>Exams (3)</td>
<td>60%</td>
</tr>
<tr>
<td>Final Exam / Project</td>
<td>15%</td>
</tr>
</tbody>
</table>

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

VI. Air Handling Systems  
A. Sizing Fans  
B. Velocity and Pressure Measurement

Q.  LABORATORY OUTLINE: None ☒ Yes ☐