WASHINGTON STATE UNIVERSITY
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**School of Engineering and Computer Science**

# Mech 303: Fluid Mechanics

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| ***Catalog Data:*** | **Mech 303 Fluid Mechanics**; 3 credits<br>Physical properties, fluid statics, laminar and turbulent flow, impulse and momentum, similitude, pipe flow, boundary layers, and lift and drag. |
| ***Class Schedule:*** | Three 50-minute lectures per week, for one semester |
| ***Laboratory Schedule:*** | None |
| ***Prerequisites by Course:*** | Certified Mech major, Mech 212, Mech 301 or c// |
| ***Prerequisites by Topic:*** | 1. Knowledge of how to apply a basic free body diagram is required, as is basic understanding of dynamics of solid particles.<br>2. Basic knowledge of conservation of mass, conservation of energy, and fluid properties is required. |
| ***Required Texts:*** | Fundamentals of Fluid Mechanics, B.R. Munson, D.F. Young, and T.H. Okiishi, 5th Edition. John Wiley & Sons, Inc., 2005. |
| ***Course Coordinator:*** | Dr. Stephen Solovitz |
| ***Course Objectives:*** | 1. Ability to classify fluid flow problems according to relevant simplifying assumptions for a problem.<br>2. Ability to simplify and solve problems with the hydrostatics equation, the integral equations, and energy equation for viscous and inviscid flows.<br>3. An understanding of the differential conservation of mass and momentum and the utility of derived equations.<br>4. Ability to simplify specific fluid problems with the aid of dimensional analysis.<br>5. Ability to apply the methods of similitude for model analysis.<br>6. Ability to design a simple pipe network to meet realistic design constraints. |
| ***Topics Covered:*** | 1. Fluid Properties<br>2. Hydrostatics<br>3. Integral Equation Conservation of Mass, Momentum and Energy<br>4. Differential Conservation of Mass and Momentum<br>5. Dimensionless Groups and Similarity<br>6. Inviscid Fluid Flow<br>7. Viscous Internal Fluid Flow<br>8. Viscous External Fluid Flow |
| ***Lab Experiments and Activities:*** | N/A |

<table>
<tr><td rowspan="3">Course Outcomes:</td><td colspan="3">Students will be able to:</td></tr>
<tr><td>Assessed for Program Outcomes</td><td colspan="2">A-1. Apply mathematical principles to derive equations for conservation of mass, momentum, and energy for fluid flow problems.<br>A-2. Apply the fundamental equations of continuity, the Newton’s 2nd law, and 1st law of thermodynamics.<br>A-3. Apply mass, momentum, and energy balances to study fluid flow processes and engineering systems.<br>E-2. Examine different methods, such as integral or differential forms, for specific fluid flow problems.<br>E-3. Use analytical, computational, or experimental analysis to obtain solutions for a specific fluids problem.</td></tr>
<tr><td>Other</td><td colspan="2">E-1. Classify fluid flow problems, such as internal or external flow, depending on conditions or assumptions defined in engineering problems.<br>K-4. Use software/numerical codes for analyzing the fluid flow problems.</td></tr>
<tr><td colspan="2">Required or Elective Course:</td><td colspan="3">Required</td></tr>
<tr><td colspan="2">Contribution to Professional Component:</td><td colspan="3">Engineering Topics</td></tr>
<tr><td colspan="2">Relationship of Course to Program:</td><td colspan="3">Meets: Educational Objectives 1, 2<br>Program Outcomes A, E, K</td></tr>
<tr><td colspan="2">Prepared by:</td><td>Dr. Amir Jokar</td><td>Date:</td><td>October 10, 2008</td></tr>
<tr><td colspan="2">Approved by CAC:</td><td colspan="3"></td></tr>
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