| Date: | Examination No.: | Version: January 7/2024 | Start: January 7/2024 |
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| **Module Name - Code** | Fluid Mechanics 1117 | | |
| **Module Language:** | English | | |
| **Responsible:** | Evan Oghstin Slaiwa | | |
| **Lecture (s):** | Mr. Evan Oghstin Slaiwa/ MSc | | |
| **College:** | College of Engineering – Salahaddin University | | |
| **Duration:** | 15 week – Spring (Second Semester) | | |
| **Course outcomes:** | At the end of the semester, students would be able to<br>**1.** To understand the behavior, properties, and definition of a fluid. The key concepts to be acquired include density, viscosity, specific gravity, pressure, shear stress, and fluid forces.<br>**2.** To be able to define the different types of fluid flow (laminar, turbulent, and transition) and the appropriate discharge model for each.<br>**3.** To be able to describe and distinguish between pressurized and free surface flow and model each with an appropriate theoretical or empirical equation.<br>**4.** To understand the application of the continuity expression for engineering hydraulics problems for both steady-state and transient systems. To be able to express this relationship both in narrative form and symbolic form.<br>**5.** To understand the momentum equation for force calculations in both pressurized and free surface flow systems. To be able to correctly apply this equation for solution of forces on pipe elements (bends, reducers, nozzles, etc.) and for solution of internal forces generated in a hydraulic jump.<br>**6.** To understand the derivation of the energy equation (Bernoulli equation) and its application to pressurized flow and open channel flow systems. To be able to solve for losses in energy head due to friction and minor losses.<br>**7.** To understand the definition of and distinction between parallel and series hydraulic elements, and to be able to solve for the flow distribution and total head loss for such elements.<br>**8.** To be able to solve for the fluid forces acting on submerged bodies in a static fluid system. To understand and be able to apply the different approaches used for horizontal, inclined, and curved surfaces.<br>**9.** To understand the operation of manometers for the measurement of fluid pressure and total energy head.<br>To become familiar with and become competent in the use of various measurement devices for the determination of fluid velocity and discharge. | | |
| **Course Content:** | 1st week Introduction to fluid mechanics.<br>2nd week Fluid properties,<br>3rd week Fluid Statics pressure gages<br>4th week forces on submerged plan surface<br>5th week forces on submerged curved surface and Archimedes principle.<br>6th week Fluid Kinematics, Conservation of Mass,<br>7th week Conservation of Energy,<br>8th week Application on Conservation of energy (head loss, pump in system and turbine in system).<br>9th week Application on Conservation of energy (orifice, Venturi meter, nozzle, siphon and pitot tube.<br>10th week midterm exam and Conservation of Momentum,<br>11th week application on Conservation of Momentum (Force Exerted by a jet on fixed and moved flat plate).<br>12th week application on Conservation of Momentum (Force Exerted by a jet on fixed and moved curved Vance).<br>13th week losses due to sudden expansion in pipe, hydraulic jump and sluice gate.<br>14th week weirs | | |

<table>
<tr><td></td><td>15th final exam.</td></tr>
<tr><td>Literature:</td><td>
<ul>
<li>Streeter Wylie Bedford “Fluid Mechanics”, McGraw-Hill, 2007. (Text Book)</li>
<li>Victor L. Streeter & E. Benjamin Wylie “Fluid Mechanics”, First SI Metric edition.</li>
<li>Frank M. White, “Fluid Mechanics”, seventh edition. 2011</li>
<li>Munson, Young, and Okiishi "Fundamentals of Fluid Mechanics" publisher, John Wiley & Sons, 2009</li>
<li>John K. Vennard and Robert L. Street, “Elementary fluid mechanics” 7th Edition</li>
<li>Bansal R. K. “A Text Book of Fluid Mechanics“, 1st Edition 2005.</li>
<li>K. Subramanya “Fluid Mechanics and Hydraulic Machines: Problems and Solutions” Tata McGraw-Hill Education Pvt. Ltd.</li>
<li>Douglas J. F. and Matthews R. D. “Solving Problems in Fluid Mechanics” vol. 1 3rd edition.</li>
<li>Merle C. Potter, David C. Wiggert, BassemH. Ramadan” Mechanics of Fluids” 4thedition.2012</li>
<li>Jack B. Evett And Cheng liu ” 2500 Solved Problems In Fluid Mechanics and Hydraulics ”</li>
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</td></tr>
<tr><td>Type of Teaching:</td><td>2 hrs. theory per week<br>1 hr. tutorial per week<br>2 hrs. practical per week</td></tr>
<tr><td>Pre-requisites:</td><td>None</td></tr>
<tr><td>Frequency:</td><td>Yearly in spring semester</td></tr>
<tr><td>Requirements for credit points:</td><td>For the award of credit points, it is necessary to pass the module exam.<br>The module exam contains:<br>A mid-term exam, class room activities, quizzes, home works and final exam on June. So, the final grade will be based upon the following criteria:
<table>
<tr><td>First Mid-term exam</td><td>15%</td></tr>
<tr><td>second Mid-term exam</td><td>15%</td></tr>
<tr><td>Activities and Quizzes</td><td>10%</td></tr>
<tr><td>Practical</td><td>10%</td></tr>
<tr><td>Final exam (theoretical 40% + practical 10%)</td><td>50%</td></tr>
<tr><td>Total</td><td>100%</td></tr>
</table>
Student's attendance is required in all classes.</td></tr>
<tr><td>Credit point:</td><td>5</td></tr>
<tr><td>Grade Distribution:</td><td>The Grade is generated from the examination result(s) with the following<br>Annual Effort (w): 50%<br>Final Exam (w): 50%</td></tr>
<tr><td>Work load:</td><td>The workload is 162h. It is the result of 75h attendance and 87h self-studies.</td></tr>
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