

Ministry of Higher Education and Scientific research



**Department of Civil Engineering**

**College of Engineering**

**University of Salahaddin-Erbil**

**Subject: Fluid Mechanics first semester**

**Course Book**

**Lecturer's name: Assistant Lecturer Evan O. Slewa**

**Academic Year: 2019/2020**

# Course Book

<b>1. Course name</b>	<b>Fluid Mechanics</b>
<b>2. Lecturer in charge</b>	<b>Evan O. Slewa</b>
<b>3. Department/ College</b>	<b>Civil Department – College of Engineering</b>
<b>4. Contact</b>	<b>e-mail: evanslewa74@gmail.com</b>
<b>5. Time (in hours) per week</b>	<b>For example Theory: 3 Practical: 1</b>
<b>6. Office hours</b>	<b>Email &amp; 4 days office availability</b>
<b>7. Course code</b>	
<b>8. Teacher's academic profile</b>	<b>B.sc in Civil Engineering 1996</b> <b>M.sc in Water and Hydraulic Civil Engineering 2002</b> <b>Assistant Lecturer 2004</b> <b>Teaching the following subject:</b> <ul style="list-style-type: none"> <li>• Building material and tests (1<sup>st</sup> stage)</li> <li>• Water supply practical (4<sup>th</sup> stage)</li> <li>• Engineering Hydrology (3<sup>rd</sup> stage)</li> <li>• Hydraulic structure (4<sup>th</sup> stage)</li> <li>• Fluid mechanics and tests (2<sup>nd</sup> stage)</li> </ul>
<b>9. Keywords</b>	<b>Fluid mechanics, Fluid Properties, static fluid, forces on submerged plane, forces on submerged curved surface, Archimedes principle, buoyancy and flotation.</b>
<b>10. Course overview:</b> <ul style="list-style-type: none"> <li>• <b>The course will introduce fluid mechanics and establish its relevance in civil engineering.</b> <ul style="list-style-type: none"> <li>• Develop the fundamental principles underlying the subject.</li> <li>• Demonstrate how these are used for the design of simple hydraulic components.</li> </ul> </li> </ul>	
<b>11. Course objective:</b> <p>What is the purpose for studying fluid mechanics on a Civil Engineering course? The provisions of adequate water services such as the supply of potable water, drainage, sewerage are essential for the development of industrial society. It is these services which civil engineers provide.</p> <p>Fluid mechanics is involved in nearly all areas of Civil Engineering either directly or indirectly. Some examples of direct involvement are those where we are concerned with manipulating the fluid:</p>	

- Sea and river (flood) protection;
- Water distribution / sewerage (sanitation) systems;
- Hydraulic design of water/sewage treatment works;
- Dams;
- Irrigation;
- Pumps and Turbines;
- Water retaining structures.

### **12. Student's obligation**

Attendance: Students should attend the lectures; the allowable absence during the year is 10% of total hours.

The course is 3hours per a week, 2hours as theory and 1hours as practice.

**13. Forms of teaching** To achieve the objectives of the course following forms and techniques will be followed during teaching process:

- 1- Power point presentation for parts of the course as required.
- 2-White board will be used to explain theories, equations, solve problems and draw the structures in the class.
- 3- Real images will be used to simplify the shape of structures for the students
- 4- Examples will be solved in the class through team work.
- 5- Notes about chapters will be handled to the students at the beginning of each chapter to facilitate easier understanding of books but they will not replace the use of books.

### **14. Assessment scheme**

1- Exams:

The student must provide the following exams, quizzes and homework's:

- |                      |       |
|----------------------|-------|
| - First Exam         | 15/50 |
| - Second Exam        | 15/50 |
| - Quizzes and H. W   | 10/50 |
| - Practical          | 10/50 |
| - Final Exam (Theo.) | 40/50 |
| - Final Exam (Prac.) | 10/50 |

At the end of each chapter students should prepare detail design drawings for each structure as homework, minimum two home works should be submitted during the semester.

Four quizzes are required during the semester.

**15. Student learning outcome:**

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.
2. To understand the types of pressure with its pressure gages.
3. 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.
4. To understand the operation of manometers for the measurement of fluid pressure and total energy head.
5. To become familiar with and become competent in the use of various measurement devices for the determination of fluid velocity and discharge.
6. To understand the Archimedes principle about buoyancy and flotation .

**16. Course Reading List and References:**

The following books help the student better understanding of the subject materials, the books may available in the college library as well as in the department library.

**Text Book**

- Streeter Wylie Bedford “**Fluid Mechanics**”, McGraw-Hill, 2007.
- Victor L. Streeter & E. Benjamin Wylie “**Fluid Mechanics**”, First SI Metric edition 2003.

**References:**

- Frank M. White, “**Fluid Mechanics**”, seventh edition. 2011
- Munson, Young, and Okiishi "Fundamentals of Fluid Mechanics" publisher, John Wiley & Sons, 2009
- John K. Vennard and Robert L. Street, “**Elementary fluid mechanics**” 7th Edition
- Bansal R. K. “**A Text Book of Fluid Mechanics**“, 1st Edition 2005.
- K. Subramanya “**Fluid Mechanics and Hydraulic Machines: Problems and Solutions**” Tata McGraw-Hill Education Pvt. Ltd. 2004.
- Douglas J. F. and Matthews R. D. “**Solving Problems in Fluid Mechanics**” vol. 1 3rd edition 2011.
- Merle C. Potter, David C. Wiggert, BassemH. Ramadan” **Mechanics of Fluids**” 4th edition.2012

<p>• <b>Jack B. Evett And Cheng liu ” 2500 Solved Problems In Fluid Mechanics and Hydraulics ”</b></p>	
<p><b>17. The Topics:</b></p>	<p><b>Lecturer's name</b></p>
<p>The following table shows the chapters and structures which will be covered and designed through the year and required duration for each one:</p> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Fluid Properties</li> <li>• Fluid Statics</li> <li>• forces on submerged plane</li> <li>• forces on submerged curved surface</li> <li>• Buoyancy and flotation</li> </ul>	<p>1 week 2 week 2 weeks 3 weeks 3 weeks 4 weeks</p>
<p><b>18. Practical Topics (If there is any)</b></p>	
<p>The following testes will be covered during this year:</p> <ul style="list-style-type: none"> <li>• Introduction.</li> <li>• Fluid density.</li> <li>• Fluid specific gravity.</li> <li>• Center of pressure of plane (fully &amp; partially) submerged body.</li> <li>• Buoyancy and flotation.</li> </ul>	<p>2 weeks 2 weeks 2 weeks 2 weeks 2 weeks</p>