



**Course Syllabus**  
**According to JORDAN National Qualification**  
**Framework (JNQF)**

**Course Name: Fluid and hydraulics laboratory**

**Course Number: 04033272**

### General Course Information:

|   |                             |
|---|-----------------------------|
| Course title  | Engineering Statistics      |
| Course number                                       | 04033272                    |
| Credit hours  | Three Credit hours (Theory) |
| Education type                                      | [Face-to-Face]              |
| Prerequisites/corequisites                          | 04033131- 04033271          |
| Academic Program                                    | Civil engineering           |
| Program code  | 403                         |
| Faculty   | Engineering                 |
| Department  | Civil engineering           |
| Level of course                                     | 3 <sup>rd</sup> year        |
| Academic year /semester                             | First Semester 2021-2022    |
| Awarded qualification                               | B.Sc                        |
| Other department(s) involved in teaching the course | Non                         |
| Language of instruction                             | English                     |
| Date of production/revision                         | 3/01/2022                   |

### Course Coordinator:

|                               |                             |
|-------------------------------|-----------------------------|
| Coordinator's name            | Eng. Dua'a Almajali         |
| Office No                     | 4249                        |
| Office Phone extension number | 2662                        |
| Office Hours                  | Sun, Tue, Thu (12:00-01:00) |
| Email                         | Duaa.almajali@iu.edu.jo     |

### Other Instructors:

|                               |  |
|-------------------------------|--|
| Instructor name               |  |
| Office No                     |  |
| Office Phone extension number |  |
| Office Hours                  |  |
| Email                         |  |

### Course Description(English/Arabic):

|                |   |
|----------------|---|
| <b>English</b> | <p>This is an introductory course in Fluid hydraulics analysis. The intent of this course is to apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of hydraulic engineering problems.</p> <p>Center of flow, floating bodies, jet impact, head loss in pipes during laminar and turbulent flow, logarithmic velocity curve in pipe system, flow measuring devices, openings gates and orifice, Venturi meter, flow over sharp crested wires and over broad crested weirs, uniform flow in channel, wave speed, specific energy and critical depth, hydraulic jump resisting forces for cylindrical bodies, lifting and drag forces for irregular shape bodies, Venturi meters, partial channel, hydraulic machines, pump performance, fans, radial flow fans, centrifugal pumps, pumps in series and pumps in parallel.</p> |
|----------------|---|

|        |  |
|--------|--|
|        |  |
| Arabic |  |

**Textbook:** *Author(s), Title, Publisher, Edition, Year, Book website.*

Sravanthi, G., Fluid mechanics and hydraulics laboratory, Lab. Manual, Institute of Aeronautical Engineering, 2018, available online at:

<<https://www.iare.ac.in/sites/default/files/lab1/FMH%20LAB.pdf>

**References:** *Author(s), Title, Publisher, Edition, Year, Book website.*

1. Khalil M. Alastal, Mohammed Y. Mousa, Fluid Mechanics and Hydraulics Lab Manual, 2015, available online at:

<http://site.iugaza.edu.ps/mymousa/files/Fluid-Mechanics-and-Hydraulics-Lab-Manual-2015.pdf>, 2009

### Course Educational Objectives (CEOs):

|    |  |
|----|--|
| 1. | Knowledge of flow meters that used in open channels and methods of measurement of percentage error.              |
| 2. | studying the pressure gauges and how to calibrate these devices.   |
| 3. | Addressing the fundamental aspects of dams' gates and the path of the jet of the water discharged from the gates |
| 4. | Know the methods of measurement of flow in closed pipes and calculation of loss of energy.                       |
| 5. | Studying the theory of buoyancy and the critical state of floating objects                                       |

### Intended Learning Outcomes (ILO's):

| 1. | Subject Intended learning outcomes (ILOs) describe what students are expected to know and be able to do at the end of the course. These outcomes are related to the knowledge, skill and competence that students acquire: | Relationship to CEOs | Contribution to PLOs | Bloom Taxonomy Levels* | Descriptors** |
|----|--|----------------------|----------------------|------------------------|---------------|
| A  | Knowledge and Understanding:   |                      |                      |                        |               |
| A1 | To be able to calibrate the pressure gauge   | 1                    | 6                    | 3                      | K             |
| B  | Intellectual skills:   |                      |                      |                        |               |
| B1 | To be able to determine the center of pressure   | 2                    | 6                    | 3                      | K             |
| B2 | Analyse and solve problems related to fluid dynamics and its application   | 3                    | 6                    | 3                      | S             |

|    |   |   |   |   |   |
|----|---|---|---|---|---|
| B3 | To be able to measure flow over wier  |   |   |   |   |
| B3 | To know the buoyancy parameters of floating objects                             | 4 | 6 | 3 | S |
| C  | Subject specific skills:  |   |   |   |   |
| C1 | To be able to know the fundamental aspects related to the orifice and water jet | 5 | 6 | 3 | S |
| C2 | To be able to measure Head Loss due to Friction in a Smooth Pipe                |   |   |   |   |
| D  | Transferable skills:  |   |   |   |   |
| D1 |   |   |   |   |   |

**\*Bloom Taxonomy Levels**

| Level#     | 1         | 2             | 3           | 4        | 5          | 6         |
|------------|-----------|---------------|-------------|----------|------------|-----------|
| Level Name | Knowledge | Comprehension | Application | Analysis | Evaluation | Synthesis |

**\*\* Descriptor (National Qualification Framework Descriptors): K : Knowledge, S: Skill, C: Competency.**

**Program Learning Outcome (PLOs):**

|   |               |   |   |
|---|---------------|---|---|
| Program Learning Outcomes describe what students are expected to know and be able to do by the time of graduation. These relate to the knowledge, skills, and behaviours that students acquire as they progress through the program. A graduate of the (CE) program will demonstrate: | Descriptors** |   |   |
|   | K             | S | C |

|    |  |   |   |   |
|----|--|---|---|---|
| 1. | 2. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.  | ✓ |   |   |
| 2. | 3. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.                   |   |   | ✓ |
| 3. | 4. An ability to communicate effectively with a range of audiences.  |   | ✓ |   |
| 4. | 5. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts. |   |   | ✓ |
| 5. | 6. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.   |   | ✓ |   |
| 6. | 7. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.  |   | ✓ |   |
| 7. | 8. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies  | ✓ |   | ✓ |

**\*\* Descriptors according to the national qualifications framework (K: knowledge, S: skill, C: Competency)**

## Weekly Schedule

### ✓ Face to Face

| Week | First Hour + Second Hour + Third Hour         | Ach. ILOs | Ach. PLOs | Descriptors* |
|------|---|-----------|-----------|--------------|
| 1    | Calibration of a Bourdon Pressure Gage        | A1        | 6         | S            |
| 2    | Centre of Pressure on Submerged Plane Surface | A1        | 6         | S            |
| 3    | Centre of Pressure on Submerged Plane Surface | C1        | 6         | K            |
| 4    | Impact of Jet                                 | A1        | 6         | S            |
| 5    | Flow over Weirs I                             | A1        | 6         | k            |
| 6    | Flow over Weirs II                            | A1        | 6         | S            |
| 7    | Flow Through Small Orifice                    | A1        | 6         | S            |
| 8    | Flow Meter Demonstration                      | A1        | 6         | S            |
| 9    | Head Loss due to Friction in a Smooth Pipe    | A1        | 6         | S            |
| 10   | Pressure Measurement                          | C2        | 6         | K            |
| 11   | Stability of Floating Bodies                  | A1        | 6         | S            |
| 12   | Med Exam                                      | A2        | 6         | S            |
|      |   |           |           |              |

\* K: Knowledge, S: Skills, C: Competency

### Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

Interactive videos  
Practice Labs  
Discussion Forums  
Quizzes  
Other Interactive online activities  
Reports

### Course Policies:

A- Attendance policies:

The maximum allowed absences is 15% of the lectures.

B- Absences from exams and handing in assignments on time:

Midterm exam can be retaken based on approval of excuse by the instructor's discretion.

Not handing assignment on time will incur penalties.

C- Academic Health and safety procedures

D- Honesty policy regarding cheating, plagiarism, and misbehaviour:

Cheating, plagiarism, misbehaviour will result in zero grade and further disciplinary actions may be taken.

E- Grading policy:

- All homework is to be posted online through the e-learning system.
- Exams will be marked within 72 hours and the marked exam papers will be handed to the students.
- Online Activities (Course Videos, Practice labs, Discussion Forums, Quizzes) **20%**
- Midterm **30%**
- Final Exam **50%**

F- Available university services that support achievement in the course: **E-Learning Platform, Labs, Library.**

### Required equipment:

- **PC / Laptop with webcam and mic**
- **Internet Connection**
- **Access to the IU E-Learning Platform at: <https://elearn.iu.edu.jo/course/view.php?id=2105>**
- **E-learning plan**
- **Satisfaction questionnaires for online and face-to-face learning**
- **Software for e-learning**
- **Training**

### Assessment Tools implemented in the course:

- ✓ **Final Exam**

- ✓ Midterm Exam
- ✓ Homework
- ✓ Discussion Forums
- ✓ Periodic reports for learning assessment
- Improvement plans for online or face-to-face teaching
- Others: Quiz

### Responsible Persons and their Signatures:

|  |                             |                       |                     |
|--|-----------------------------|-----------------------|---------------------|
| <b>Course Coordinator</b>                | <b>Eng. Dua'a Al-Majali</b> | <b>Completed Date</b> | <b>13/ 2/ 2022</b>  |
|  |                             | <b>Signature</b>      |                     |
| <b>Received by<br/>(Department Head)</b> | <b>Dr. Ibrahim Varooqa</b>  | <b>Received Date</b>  | <b>15/ 2 / 2022</b> |
|  |                             | <b>Signature</b>      |                     |