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| | Ministry of Higher Education and Scientific Research - Iraq<br><br>University of Warith Al-Anbiyaa<br>College of Engineering<br>Aircraft Engineering Department | |

# MODULE DESCRIPTOR FORM

## Module Information

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|---|---|---|---|---|
| **Module Title** | Fluid Mechanics | | **Module Delivery** | |
| **Module Type** | CORE | | **Theory**<br>**Lab**<br>**Tutorial** | |
| **Module Code** | ENG232 | | | |
| **ECTS Credits** | 6 | | | |
| **SWL (hr/sem)** | 150 | | | |
| **Module Level** | 2 | **Semester of Delivery** | 3 | |
| **Administering Department** | Aircraft Engineering | **College** | Engineering | |
| **Module Leader** | Dr. Mohammed Aljibory | **e-mail** | Dr.mohamma.wahab@uokerbala.edu.iq | |
| **Module Leader's Acad. Title** | Professor | **Module Leader's Qualification** | Ph.D. | |
| **Module Tutor** | None | **e-mail** | None | |
| **Peer Reviewer Name** | | **e-mail** | | |
| **Review Committee Approval** | 01/06/2024 | **Version Number** | 2024 | |

## Relation with Other Modules

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| **Prerequisite module** | ** | **Semester** | |
| **Co-requisites module** | None | **Semester** | |

## Module Aims, Learning Outcomes and Indicative Contents

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| **Module Aims** | 1. To develop problem solving skills and understanding of fluid mechanics theory through the application of techniques.<br>2. Explain the concept of manometers and apply appropriate equations to determine pressures.<br>3. Calculate the hydrostatic pressure force on a plane or submerged surface.<br>4. Understand and describe the fundamental principles and governing equations of fluid.<br>5. Analysis the Friction losses in pipes.<br>6. Understand and describe the momentum Equation, applications of momentum, principal Analysis<br>7. Explain Dimensional analysis and similarity |
| **Module Learning Outcomes** | 1. Recognize how fluid static effect on the system that contain fluid.<br>2. List the various terms associated with fluid static from pressure and properties of fluid.<br>3. Summarize the means to calculate the hydrostatic pressure force.<br>4. Fluid dynamics involves the application of mathematical equations and models to describe fluid behavior.<br>5. Fluid dynamics enables learners to analyze and interpret fluid flow patterns. They gain the ability to identify and understand different types of flow, including laminar flow, turbulent flow, and transitional flow. This understanding helps in predicting and characterizing fluid behavior in various scenarios.<br>6. Summarize the means to. The Bernoulli Equation and it Application.<br>7. Discuss Liner momentum Equation, Applications of momentum principle.<br>8. Explain Friction losses in pipes and Analysis of piping system |
| **Indicative Contents** | 1. General introduction to fluid science, Dimensions, Dimensional Homogeneity, and Units, Viscosity, Vapor Pressure, cavitation, Surface Tension. [4 hrs]<br>2. Pressure at a point. Variation of pressure in a static fluid with Depth. Pressure measurement (barometer pressure, Bourdon pressure gages, manometers). Hydrostatic Force on submerged Plane Surface. [16 hrs]<br>3. Classification of fluid flow, The continuity equation. Euler's equation of motion along streamline. Bernoulli's equation and its applications. Pitot and Pitot static tube, Orifice and Venture Meter (Flow Measurement). Energy equation. [16 hrs]<br>4. Laminar flow and Turbulent flow. Pump and turbine Major and secondary losses in pipes Connecting pipes in series, parallel and mixed. [16hrs] |

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| | 5. Impact of a jet on a plane surface. Force due to flow round a curved vane. Force due to the flow of fluid round a pipe bend. [10 hrs]<br>6. The Pi-theorem, Dimensionless parameters. Models study. [10 hrs] |

## Learning and Teaching Strategies

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| **Strategies** | The main strategy that will be adopted in delivering this module is Encourage students to pay attention to the subject by linking it to the daily reality in which a person lives and the importance of studying this course because of its impact on his real life real world . |

## Student Workload (SWL)

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| **Structured SWL (h/sem)** | 78 | **Structured SWL (h/w)** | 5 |
| **Unstructured SWL (h/sem)** | 72 | **Unstructured SWL (h/w)** | 4.8 |
| **Total SWL (h/sem)** | 150 | | |

## Module Evaluation

| | | Time/ Number | Weight (Marks) | Week Due | Relevant Learning Outcome |
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| **Formative assessment** | **Quizzes** | 4 | 20% (20) | 3,6,9,12 | All |
| | **Assignments** | 2 | 10% (10) | 5,8 | All |
| | **Projects / Lab.** | Lab. 4 | 10% (10) | Continuous | All |
| | **Report** | - | - | - | - |
| **Summative assessment** | **Midterm Exam** | 2 hrs. | 10% (10) | 7 | All |
| | **Final Exam** | 3 hrs. | 50% (50) | 16 | All |
| **Total assessment** | | | 100% (100 Marks) | | |

## Delivery Plan (Weekly Syllabus)

| | Material Covered |
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| **Week 1** | General definitions, Newton's law of viscosity, Surface tension, Vapor Pressure, cavitation. |
| **Week 2** | Pressure at a point in a static fluid, Variation of pressure in a static fluid with depth. |
| **Week 3** | Pressure measurement (barometer pressure, Bourdon pressure gauge ,manometers). |

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| **Week 4** | Hydrostatic Force on submerged Plane Surface. |
| **Week 5** | Classification of fluid flow, The continuity equation. Euler's equation of motion along streamline. Bernoulli's equation |
| **Week 6** | Bernoulli's equation and its applications. Pitot and Pitot static tube, Orifice and Venture Meter (Flow Measurement). |
| **Week 7** | Energy equation. |
| **Week 8** | Laminar flow and Turbulent flow. |
| **Week 9** | Major and secondary losses in pipes Connecting pipes in series, parallel and mixed. |
| **Week 10** | Pump and turbine |
| **Week 11** | Impact of a jet on a plane surface. |
| **Week 12** | Force due to flow round a curved vane. |
| **Week 13** | Force due to the flow of fluid round a pipe bend. |
| **Week 14** | The Pi-theorem, Dimensionless parameters. |
| **Week 15** | Models study. |
| **Week 16** | **Final Exam** |

| **Delivery Plan (Weekly Lab. Syllabus)** | |
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| | **Material Covered** |
| **Week 1** | Exp. 1: Determination of coefficient of viscosity for a liquid by stokes method. |
| **Week 2** | Exp. 2: Borden gauge calibration. |
| **Week 3** | Exp. 3: Center of pressure. |
| **Week 4** | Exp. 4: Volume flow rate measurement/Flow through Venturi meter. |
| **Week 5** | Exp. 5: Discharge through an orifice. |
| **Week 6** | Exp. 6: Impact of jet. |
| **Week 7** | Exp. 7: Friction loss along pipes. |

| **Learning and Teaching Resources** | | |
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| | **Text** | **Available in the Library?** |
| **Required Texts** | White, "Fluid Mechanics", 7th Edition, McGraw Hill, 2011.<br>2- Cengel and Cimbala, Fluid Mechanics, Fundamentals | Yes |

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| | and Applications, 2nd Edition, McGraw Hill, 2013. | |
| **Recommended Texts** | Fundamentals of Fluid Mechanics, Bruce R. Munson, Ted H. Okiishi, | No |
| **Websites** | https://www.coursera.org/browse/physical-science-and-engineering/mechanical-engineering | |

**APPENDIX:**

| GRADING SCHEME | | | | |
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| **Group** | **Grade** | التقدير | **Marks (%)** | **Definition** |
| **Success Group (50 - 100)** | **A** - Excellent | امتياز | 90 - 100 | Outstanding Performance |
| | **B** - Very Good | جيد جدا | 80 - 89 | Above average with some errors |
| | **C** - Good | جيد | 70 - 79 | Sound work with notable errors |
| | **D** - Satisfactory | متوسط | 60 - 69 | Fair but with major shortcomings |
| | **E** - Sufficient | مقبول | 50 - 59 | Work meets minimum criteria |
| **Fail Group (0 – 49)** | **FX** – Fail | مقبول بقرار | (45-49) | More work required but credit awarded |
| | **F** – Fail | راسب | (0-44) | Considerable amount of work required |
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| Note: | | | | |

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.