

**Misr University**

**for Science & Technology**

**IN EGYPT**

**Faculty of engineering science and technology**

**Mechanical Engineering Department**

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| **COURSE** | ME 312: Fluid Mechanics 3 | | | | Level | | 3 |
| **SEMESTER** | Fall 🗹 | | | Spring | | | |
| **INSTRUCTOR** | Dr/ Mahmoud Sharafeldin | | | | | | |
| **CLASS LOCATION** | ME Labs, | Engineering Building | | | | | |
| **CLASS MEETING TIME** | 11-13 | | | | | | |
| **OFFICE** | Room 464, PH Building | | | | | | |
| **OFFICE HOURS** |  | | | | | | |
| ***Online (virtual) OH*** | *Most Fridays, 5:00 pm–8:00 p* | | | | | | |
| **TELEPHONE** |  | | *SKYPE:* | | |  | |
| *E-MAIL* |  | | | | | | |
| **PREREQUISITES** | GE105,MATH202, ME211 | | | | | | |

For additional Information you may refer to the University website:

[***www.must.edu.eg***](http://www.must.edu.eg)

**Course Description**

The students should understand the fundamental’s principles of fluid mechanics, where the basic concepts of mass conservation are introduced and the fundamental energy equations and relations (such as the differential momentum and the Reynolds analogy) are developed. Also, this course presents a number of examples and problems that occur in some heat transfer equipment.

**Course Aims and Objectives**

* To understand the fluid properties and their effect on fluid dynamics.
* To apply fluid momentum and Bernoulli’s equations to determine the force produced by the fluid.
* To identify fluid flow resistance due to flow through conduits.

**Learning outcomes of the course (ILOS):**

**(FROM NARS 2018) according to the course**

**Down is an example**

|  |  |
| --- | --- |
| 1. Knowledge and Understanding: | Acquiring knowledge and understanding of:   1. Principles of design including elements design, process and/or a system related to specific disciplines. 2. Current engineering technologies as related to disciplines. 3. Fundamentals of problem identification, formulation and solution in the areas of Mechatronics; |
| 1. Intellectual Skills | 1. Assess and evaluate effectively the characteristics and performance of components, systems and processes 2. Solve engineering design and production problems, often on the basis of limited and possibly contradicting information; 3. Apply knowledge of basic science and engineering fundamentals. |
| 1. Practical and Professional Skills | The ability to:   1. Merge engineering knowledge and understanding to improve design, products and/or services. 2. Apply safe systems at work. 3. Utilize practical systems approach to design and performance evaluation. |
| 1. General and Transferable Skills | The ability to:  g) Search for information and adopt life-long self learning. |

**Teaching Methods**

Many assignments will require the use of word, PowerPoint and spreadsheets.

Each course is taught through lectures, tutorials and/or labs. MUST provide text book for each student per course. An online supplementary references and exercises are also available. E-books are also available for some selected courses.

**MUST Attendance Policy**

Students should attend all classes for which they are registered to obtain maximum educational benefits. Absence or lateness does not excuse students from required course work. Students whose absence records exceeds 25% of course hours are not allowed to sit in for the final examination and will receive a failing grade (F) in that course.

**Assessment**

MUST adopts an integrated policy for continuous assessments throughout the term for each course. This policy includes equivalent marks as per the shown schedule for attending lectures and tutorials, submitting assignments on time, sitting in two to three quizzes followed by a mid-term examination, then a final examination at the end of the term. Depending on the nature of the course, a project may also be assigned.

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| --- | --- |
| Quizzes | 6.67% |
| Homework | 6.67% |
| Attendance | 6.67% |
| Mid-term Exam | 20% |
| Final Exam | 60% |

At the end of each term the student receives a transcript that include the grade, grade point average (GPA) as well as the accumulative grade point average (CGPA)

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| --- | --- | --- | --- |
| Grade | Description | Grade Point Average | Percentage |
| A\* | Excellent | 4 | 95 – 100 |
| A | Excellent | 4 | 90 < 95 |
| A- | Excellent | 3.6 | 85 < 90 |
| B+ | Very Good | 3.3 | 80 < 85 |
| B | Very Good | 3 | 75 < 80 |
| B- | Very Good | 2.7 | 72 < 75 |
| C+ | Good | 2.3 | 70 < 72 |
| C | Good | 2 | 65 < 70 |
| C- | Pass | 1.7 | 63 < 65 |
| D+ | Pass | 1.3 | 62 < 63 |
| D | Pass | 1 | 60 < 62 |
| F | Fail | Zero | < 60 |

**Academic Dishonesty**

MUST University has regulations that control misconduct, dishonesty, and any inappropriate behavior or acts that may affect the academic environment in any negative way.

It includes articles that describe inappropriate behavior that may lead to disciplinary actions, the dishonest behavior including cheating, penalties from “verbal or written warning” up to “Academic Expulsion”, disciplinary committees that apply the different level of penalties, the formation of disciplinary committees, the mechanisms of executing the rulings and the rights of the student for defense and submittal of petition for re-evaluation of the ruling to be viewed by the University Council.

With regard to “Academic Dishonesty and Cheating”, the university has very strict regulations stating that any student who commits a fraud in an exam or a project and is caught up during the exam by the dean or one of his representatives shall be expelled from the examination. The student receives a failing grade in this course in addition to a failing grade in another additional course (courses) selected by the committee and shall be subjected to actions by the disciplinary committee.

In cases, if cheating is discovered after the examination is completed, the exam grade is invalidated by a decision of the disciplinary committee, which might result in the invalidity of the degree even if it was granted to the student before the fraud was revealed.

**Required Reading**

* Yunus A. Cengel and John M. Cimbala. “Fluid Mechanics Fundamentals and Applications”, 3rd edition, McGraw Hill Education., New York, 2018.

**Recommended Additional/Supplemental Reading**

* Frank M. White. “Fluid Mechanics”, 8th edition, McGraw Hill Education, New York, 2016.

**Academic Assistance**

Teaching assistants are available for each course. Tutorials as well as labs are mostly directed by one or more teaching assistants supervised by the faculty member teaching the course.

In addition to electronic service, MUST Central library have professional librarians that can provide assistance with research and required information. Available also an online public access catalog and data base services.

**Course Schedule**

(Subject to change if required)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Week # | Topic | No. of  hours | Lecture | Tutorial /  Practical |
| 1 | Fluid Properties | 4 | 2 | 2 |
| 2 | Surface tension | 4 | 2 | 2 |
| 3 | Pressure determination inside static fluid | 4 | 2 | 2 |
| 4 | Pressure variation due to fluid motion as a single body | 4 | 2 | 2 |
| 5 | Fluid forces on submerged bodies | 4 | 2 | 2 |
| 6 | Fluid kinematics and differential form of continuity equation | 4 | 2 | 2 |
| 7, 8 | Mid Term | | | |
| 9, 10 | Reynolds transport theorem and integral form of continuity equation.  Rate of change of fluid momentum applications | 8 | 4 | 4 |
| 11, 12 | Rate of change of fluid moment of momentum applications  Derivation of Bernoulli’s equation | 8 | 4 | 4 |
| 13, 14 | Applications of Bernoulli’s equation  Friction losses determination inside pipes | 8 | 4 | 4 |
| 15 | Moody chart usage and pumping power determination  Dimensionless analysis | 4 | 2 | 2 |
| 16 | Final Test | | | |

From NARS 2018

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| **Code No.** | **Course title** | **Program ILOs (By No.)** | | | |
| **Knowledge and Understanding** | **Intellectual Skills** | **Professional and Practical Skills** | **General and Transferable Skills** |
| ME XXX |  |  |  |  |  |