Course Syllabus for MENG 341 Fluid Mechanics

American University of Ras Al Khaimah

ACADEMIC EXCELLENCE - REDEFINED

School Of Engineering

Course Syllabus

1. Course Information:

1.1 Course Title: **Fluid Mechanics** (Core Course)

1.2 Course Code: MENG 341

1.3 Credit Hours: 3

1.4 Pre-requisites: MATH 214, PHYS 110

1.5 Department: Mechanical and Industrial Engineering

1.6 Designation: Mechanical Engineering

1.7 Class Time: Sunday, Tuesday and Thursday 11:00-11:50 AM

1.8 Class Room: G 205

2. Instructor Information:

Name: Ahmad Sakhrieh

Email: ahmad.sakhrieh@aurak.ac.ae

Office: G 318

Office Hours: Posted on the office door

3. Course Materials and Basic Resources:

- **Text Book: Engineering Fluid Mechanics, by Clayton T. Crowe, Donald F. Elger, and John A. Roberson, 2005, Eighth Edition.**
- ***Notes and Handouts by instructor***

4. Course Description

Flow classification, fluid properties, fluid in statics, pressure measurements, buoyancy, fluids in motion, continuity equation, pressure gradient in fluid flow, Bernolli's, momentum and energy equations, dimensional analysis and similitude, and flow in conduits..

5. Student Learning Outcomes:

On successful completion of this course, students will be able to:

CLSLO 1: Apply principles of overall energy, momentum and mass balances to identify, formulate, and solve engineering problems, which involve fluid flow (a, e)

CLSLO 2: Calculate fluid friction and apply Bernoulli's equation to calculate pressure drop (a, e)

CLSLO 3: Identify and solve engineering problems involving Newtonian and non-Newtonian fluids (a, e, k)

CLSLO4: Identify the fluid mechanics of the common fluid flow devices with emphasis on pumps and compressors (a, e, k)

6. MENG Program Learning Outcomes:

Students who successfully complete the MENG program will be able to

a. An ability to apply knowledge of mathematics, science, and engineering

b. An ability to design and conduct experiments, as well as to analyze and interpret data

c. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

d. An ability to function on multidisciplinary teams

e. An ability to identify, formulate, and solve engineering problems

f. An understanding of professional and ethical responsibility

g. An ability to communicate effectively

h. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

i. A recognition of the need for, and an ability to engage in life-long learning

j. A knowledge of contemporary issues

k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

7. Mapping of CSLO to PLO:

		Program Student Learning Outcomes (PLO)										
		PLO (a)	**PLO (b)**	**PLO (c)**	**PLO (d)**	**PLO (e)**	**PLO (f)**	**PLO (g)**	**PLO (h)**	**PLO (i)**	**PLO (j)**	**PLO (k)**
Course Student Learning Outcomes (CSLO)	**CSLO 1**	x				x						
	CSLO 2	x				x						
	CSLO 3	x				x						x
	CSLO 4	x				x						x
Summary Course Contribution to Program SLOs		**x**				**x**						**x**

8. Weekly Topics and Assignments (Tentative Schedule)

Week	Topics/In-Class Activities	Assignment Due
Week 1	Introduction and Overview	
Week 2	Properties of fluids, flow regimes	
Week 3	Manometers, pressure and force calculations under hydrostatic conditions.	
Week 4		
Week 5	Buoyancy and stability of floating and submerged bodies.	
Week 6		
Week 7	Elementary fluid dynamics.	
Week 8	Conservation equations: mass, energy and momentum	Midterm Exam
Week 9		
Week 10	Continuity and Bernoulli equations	
Week 11		
Week 12	Hydraulic gradient line and total energy line.	
Week 13		
Week 14	Linear and angular momentum equations.	
Week 15		
Week 16	**Final Exam**	

9. Schedule of Laboratory and other non-lecture and on-line sessions: N/A

10. Evaluation of Learning

The grade breakdown is as follows:

Methods	Dates	Weights
Midterm Exam	Week 8	20%

Homework's		20%
Quizzes		20%
Final Exam	Week 16	40%

11. Methodologies for Teaching and Learning:

- Lectures
- Open Discussion
- Videos
- Quizzes
- home works
- Exams

12. Grading System and Scale

University course work is measured in terms of quantity and quality. A credit normally represents one hour per week of lecture or recitation or not fewer than two hours per week of independent or laboratory work throughout a semester. The number of credits is a measure of quantity. The grade is a measure of quality. The university system for undergraduate grading is as follows:

Undergraduate Grading Scale		
Grade	**Score**	**Quality Points**
A	90 – 100	4
A-	87 – 89	3.7
B+	84 – 86	3.3
B	80 – 83	3
B-	77- 79	2.7
C+	74 – 76	2.3
C	70 – 73	2
C-	67 – 69	1.7
D+	64 –66	1.3
D	60 – 63	1
F	0 – 59	0

Relevant Policies

A. Academic Misconduct.

The Honor Code and Honor System

The Honor Code is an integral part of university life. Students are responsible, therefore, for understanding the code's provisions. Cheating and attempted cheating, plagiarism, lying, and stealing of academic work and related materials constitute Honor Code violations. In the spirit of the code, a student's word is a declaration of good faith acceptable as truth in all academic matters. To maintain an academic community according to these standards, students and faculty must report all alleged violations to the Honor Committee.

AURAK expects its students to uphold high standards of academic integrity and conduct. In particular, students are required to:

- Attend classes regularly and punctually.
- Be actively involved in class discussions and other course related classroom activities.
- Complete assignments on time.
- Meet the requirements for course and program completion.
- Abide by high standards of academic integrity, ethics, and honesty.
- Refrain from cheating on homework and examinations, plagiarizing other people's work by submitting it as their own, or any other forms of academic dishonesty.
- Adhere to the published test or examination rules and regulations.
- Make every effort to maintain good academic standing.

Given the internet and easy access to information and knowledge sources, the University is committed to students' learning in an ethical manner. For all academic assignments, project work, and presentations, students need to ensure that due acknowledgement is given to the source of any information which they incorporate in their work. The following are some examples of academic misconduct:

- Cheating/using unfair means in examinations
- Significant paraphrasing in written academic work that is unacknowledged
- Unacknowledged use of information or ideas unless such ideas are common place
- Citing sources which student has not read or referred to
- Breaching the word limit of assignments and mentioning wrong word count
- Plagiarism

Plagiarism

Plagiarism is a serious academic offense. Plagiarism is the use of someone else's ideas, words, projects, artwork, phrasing, sentence structure or other work without properly acknowledging the ownership (source)

of the property (item). Plagiarism is dishonest because it misrepresents the work of someone else as one's own. It is intellectual theft as it robs others of credit for their work. Plagiarism takes many forms including:

- Using someone else's words without putting those words in quotation marks and providing full information about their source, sufficient information so that another person could easily locate the words that are being quoted, whether it is in an article, a book, or on the web.

- Using unique, original ideas, phrases, sentences, paragraphs, or other materials, etc. from a single source or a variety of sources such as a text, journal, web page, electronic source, design, artwork, etc. in one's work without citing all sources. For a student found plagiarizing, the punishment will be a failing grade in the assignment without the right to redo the assignment up to a failing grade in the course.

Examples of Cheating. Acts of cheating include, but are not limited to, the following:

1. Copying from another student's paper during an exam, or allowing or encouraging another student to copy from your paper during an exam.

2. Having someone else take your exam in your place, or taking an exam for someone else.

3. Obtaining unauthorized access to exams and accepting exams obtained by unauthorized access.

Examples of Plagiarism. Acts of plagiarism include, but are not limited to, the following

1. Handing in as 'original', work prepared by someone else or preparing/completing someone else's work.

2. Copying from a book or other publication without citing sources.

3. Using the same work to satisfy the requirements of two or more courses (during the same or different terms).

4. Having someone else rewrite a rough draft or rewriting a rough draft that is not your own work.

Violations of plagiarism are subject to evaluation according to the criterion of "reasonable doubt". The student's right to appeal and the procedures to be followed in carrying out the appeal of the University's decision is clearly stated in the *Student Handbook*.

Any violations of the University's academic rules, regulations or directives are reported to the Deputy Vice Chancellor Academic Affairs and may result in one of the following disciplinary measures.

- Verbal or written warning

- Repeating the term

- Dismissal from the University

Please refer to the relevant section in the *Handbook* and ensure a clear understanding of the provisions of the University honor code and honor system in order to avoid infringement of the policy and attendant penalization.

B. **Concerns about grades or other course matters**.

Students are responsible for their learning experiences. If you are concerned about a class matter, first discuss it with the instructor. If the matter is not resolved, the next step is to meet with the Program Chair. If you still have a concern, meet with the Dean. The matter is likely to be resolved before it reaches that point, but if it is not, then the following positions are next on the organization chart: the Deputy Vice Chancellor for Academic Affairs, and, finally, the Vice Chancellor. Students who decide to "jump to the top" will be referred back to the appropriate next step.

C. **Assignments**

University policy is that assignments are due on the date assigned. Instructors may refuse to accept late assignments or lower the grade that would be otherwise given.

D. Attendance.

- Attend all learning and teaching sessions associated with their program of study.
- Notify their course instructors in advance (in person, by phone or email) that they will be absent from time-tabled class sessions.
- Obtain prior permission from their instructor or course manager, for planned absences of two or more consecutive class sessions during the semester.
- Provide a medical certificate or other corroborating evidence to explain their absence, if required by the University.

Unsatisfactory student attendance includes failure to regularly attend learning and teaching sessions without providing a satisfactory reason to instructors for absence and/or persistent late arrival at, or early departure from, learning and teaching sessions.

Where a student fails to attend classes for **two weeks cumulatively** without the University's permission, the student will receive a **"non-attendance warning (NAW)",** and will be required to provide satisfactory explanation for their non-attendance. With each subsequent NAW issued, a formal report on the student's non-attendance is made to their sponsor.

Where a student fails to attend classes for **four or more weeks cumulatively,** or where a recurring pattern of non-attendance (that is more than **two** NAWs) is observed, over the course of the semester, the student may be deemed to have failed the course, in which case they will receive an "F (Fail)" or "U (Unsatisfactory)" grade, as appropriate. At this point, and at the instructor's recommendation, the dean has the authority to instruct the registrar to remove the student from the course.

E. Mobile Phones

All mobile phones, pagers and/or other communication devices should be turned off before entering the classroom.

F. Diversity and the Use of English

English is the common language of the AURAK campus, the use of which includes everyone. It is the only language to be used in the classroom. AURAK brings together students and faculty from diverse cultural and linguistic backgrounds, which is one of the strengths of the university. This diversity provides an opportunity to share our different experiences and enlarge our understanding of the world.