AMERICAN UNIVERSITY OF IRAQ SULAIMANI

AUIS Department of Engineering

Spring 2018

Course Information

Course Number & Title: ENGR 356, Fluid Mechanics
Prerequisites/Co-requisite: MTH 332 and PHYS 352
Class time: Monday and Wednesday, 12.30 – 14.00, room B-F1-38
Credit: 4 credits, 4 hours (including laboratory work)

Instructor Information

Instructor: Dr.-Ing. habil. M. T. Horsch
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Office: B-F2-18
Office Hours: Tuesday and Thursday, 13.30 – 15.00

Course Description

ENGR 356 Fluid Mechanics

Fundamentals of fluid mechanics, including fluid statics and dynamics, equations of motion, dimensional analysis, boundary layers, flow in pipes, turbulence, fluid machinery, potential flow, Bernoulli and Navier-Stokes equations, and aerodynamics, including laboratory work to illustrate the concepts. Experiments may include fluid statics, forces on submerged bodies, manometers, surface tension, flow visualization, viscous flow in pipes, flow about bodies, and related topics.

Learning Outcomes

Upon successfully completing the course, the participants have acquired the ability and confidence to apply mathematical and physical reasoning to analyse and solve problems from fluid mechanics. In particular, they learn to use systematic approaches to solving fluid problems by adequately defining systems, applying conservation laws and the second law of thermodynamics, process the given information to obtain a solution, and assess the accuracy and the validity of underlying assumptions.

Materials

- R. W. Fox, A. T. McDonald, P. J. Pritchard, J. W. Mitchell, *Fluid Mechanics (SI version)*, 9th edn., Wiley, **2016**.

Evaluation & Grading

Major assessments: The course includes laboratory work, and there will be two written term exams (120 minutes) as well as a final exam (details to be announced). The course grade is based on laboratory work, quizzes, and exams. Corresponding credits, out of 100 credits for the whole course:

- Quizzes: 10 credits (two unannounced quizzes, each contributing five credits)
- First term exam: 15 credits (120 minutes, date: Sun, Mar 11, from 18.30 onward)
- Second term exam: 15 credits (120 minutes, date: Sun, Apr 8, from 18.30 onward)
- Laboratory work: 20 credits (five laboratory reports, each contributing four credits)
- Final exam: 40 credits (details to be announced)

Exams will be graded in the same way for all students; no exceptions will be made. In no way will any grade ever be improved by appealing to the Head of Department, the Vice Chair of the Board of Trustees, or other people who have assumed rôles of leadership within the community. As usual, plagiarism, cheating, and other unacademic practices are not tolerated. Submissions which are (even partly) copied from each other are graded with zero as a whole, including parts which are not copied.

No distinction is made between submissions which contain copied material and submissions which served as the source for copying; it is the duty of all students to protect their material from being copied. It is explicitly ruled out to employ the assistance of any person, internal or external, for any work which will be graded. This also applies to plagiarizing external sources; all such cases will be communicated to the Dean of Students. Furthermore, general AUIS policies apply as detailed below.

Grading Scale

A	(4.0)	more than 92 credits	Superior
A–	(3.7)	more than 89 credits (up to 92)	
B+	(3.3)	more than 86 credits (up to 89)	Good
B	(3.0)	more than 82 credits (up to 86)	
B–	(2.7)	more than 79 credits (up to 82)	
C+	(2.3)	more than 76 credits (up to 79)	Satisfactory
C	(2.0)	more than 72 credits (up to 76)	
C–	(1.7)	more than 69 credits (up to 72)	
D+	(1.3)	more than 66 credits (up to 69)	Unsatisfactory
D	(1.0)	up to 66 credits (at least 60)	
F	(0)	below 60 credits	Fail

Course Policies and Expectations

While You Are in the Class

Students should be alert and willing to participate in class activities and discussions and refrain from having disruptive conversations during class. Students must bring to the class: Copies of the textbooks, a notebook for writing notes, a calculator, all the relevant notes and handouts for the course, and the syllabus. Textbooks are protected by copyright laws. Students are asked to limit the use of their laptop computers or tablets to class purposes. Those who violate this will not be allowed to bring to the class their laptops and tablets anymore and are not allowed to use their personal laptop computers and tablets during the class lecture. Students must switch off their smart/cell phones during the class lecture, quizzes, and tests. Anyone who does not respect this will be asked to leave the classroom and marked absent for that lecture. Students are not allowed during the class lecture to study any other material beyond the course subject and will be asked to leave the classroom and marked absent for that lecture. Also, eating in the class is prohibited. All students need to put away any irrelevant items.

Classroom Conduct

Students are expected to behave in a collegial manner at all times when in class. Rude, disrespectful, aggressive, or threatening behavior will not be tolerated, and students displaying this will be removed from class. Distracting behavior will not be tolerated, and students behaving in this way will be asked to leave the class. Examples of distracting behavior include: Side conversations while others are speaking; using a cell phone in any way; leaving during the middle of class; eating in class; using the computers for any purpose other than course material; any behavior that a student is warned against during class.

Grade Disputes

Unless grades are added up incorrectly, the grades will not change after exams and assignments are handed back to the students. If there is a dispute concerning the final grade for the course, students have the right to make a formal grade appeal within the period set by the Registrar Office. Details on this process can be found in the Academic Catalog.

Incomplete Grades

In the unlikely event that it becomes necessary to assign an "I", for incomplete, as the final grade in the course, the affected student(s) and the instructor will adhere to the incomplete grade policy specified in the Academic Catalog.

Revisions to the Syllabus

This syllabus is subject to change. It is the duty of the instructor to inform students of changes in a timely fashion. Students are obliged to be cognizant of any changes.

Attendance

Every week there are two sessions of the course. The duration of each session is one and a half hours. Students are expected to attend all scheduled classes, arrive on time, and remain in class until dismissed. Delayed arrivals and early departures are disruptive for the students as well as the lecturer and are unacceptable. Students who leave the class will be marked absent for the lecture; no excuse will be accepted.

As per university policy, at the sixth absence session the student will be dismissed from the course with a grade of F. These cutoffs are absolute. Per university policy, as stated in the Academic Catalog, there are no excused absences.

Students will be warned after the fifth absence session that they will be dismissed from the course with a grade of F if they are absent one more session. Students may ask, outside the class time, to learn how many classes they missed.

Expectations of Student Time

AUIS adheres to the United States federal definition of a credit hour, as established by the US Department of Education. As a three credit-hour course, you are expected to attend three hours of direct instruction per week, and spend a minimum of six hours out of class per week in homework, studying, preparing, and otherwise engaging with the material of this course.

Academic Integrity

Academic Integrity is honest behavior in a school setting. Academic integrity is more than the absence of cheating. It is necessary for students to truly learn new skills and develop as human beings. By struggling with his/her own studies and by making honest mistakes and discoveries, a student learns about the world and himself/herself. Using another's work inappropriately prevents this intellectual and emotional growth. **Academic Dishonesty** ("cheating") is any form of deceit, fraud, or misrepresentation in academic work. Academic dishonesty is the opposite of learning, because it prevents the student-writer from genuinely learning and responding to material. Plagiarism is one of the most serious forms of academic dishonesty. **Plagiarism** is using other people's ideas and/or words without clearly acknowledging the source of the information. If a student uses content from the internet, a professional writer, or another student and does not inform the reader, he plagiarizes.

Cheating will not be tolerated. A student found to be cheating for the first time will receive a zero for the assignment, and the Dean of Students will be notified. In the event of a second offense confirmed by the Dean of Students, the student will fail the course. A third instance of cheating will result in that student being dismissed from AUIS. Students are directed to the AUIS Honor Code and the Academic Integrity policy section of the Academic Catalog (available online on the AUIS website). These documents provide guidance in cases of academic dishonesty.

Time Table

Cal. Week	Dates	Topics	Book Chapters from Fox, McDonald, *et al.* [FMPM]	Assessment
4	Jan 21 – 27	Concepts of Fluid Mechanics	[FMPM] Sect. 1.1 – 1.4	
5	Jan 28 – Feb 3		[FMPM] Sect. 1.4, 1.5, 2.1 – 2.4, 2.6, 3.1 – 3.3	
6	Feb 4 – 10	Heterogeneous Fluid Statics, Surface Tension	[FMPM] Sect. 2.5, 3.4, 3.5	
7	Feb 11 – 17	Conservation Laws	[FMPM] Sect. 4.1, 4.3	**Lab report (1) due on Feb 17**
8	Feb 18 – 24	Closed Systems and Control Volumes	[FMPM] Sect. 4.2, 4.5, 4.7	
9	Feb 25 – Mar 3	Bernoulli Equation, II. Law of Thermodynamics	[FMPM] Sect. 4.8, 6.3, 6.4	**Lab report (2) due on Mar 3**
10	Mar 4 – 10	Recapitulation		
11	Mar 11 – 17	Navier-Stokes Equation, Dimensional Analysis	[FMPM] Sect. 5.1, 5.3, 5.4, 7.1 – 7.3	**Term exam I on Mar 11;** **Lab report (3) due on Mar 17**
12	Mar 18 – 24	(Nawroz Break Week)		
13	Mar 25 – 31	Dimensional Analysis, Laminar Flow	[FMPM] Sect. 7.4, 7.5, 8.1 – 8.3	**Lab report (4) due on Mar 31**
14	Apr 1 – 7	Flow in Pipes	[FMPM] Sect. 8.4 – 8.8	
15	Apr 8 – 14	Flow Measurement, Boundary Layer Theory	[FMPM] Sect. 8.9, 8.10, 9.1, 9.3	**Term exam II on Apr 8;** **Lab report (5) due on Apr 14**
16	Apr 15 – 21	Boundary Layer Theory	[FMPM] Sect. 9.4, 9.5	
17	Apr 22 – 28	Immersed Bodies	[FMPM] Sect. 9.6, 9.7	
18	Apr 29 – May 5	(Reading Period)		
19	May 6 – 12	(Final Exam Week)		**Final Exam**