MENG353 FLUID MECHANICS

Department:
Mechanical Engineering

Program Name: Mechanical Engineering	**Program Code:** 23	
Course Number: MENG353	**Credits:** 4 Cr	**Year/Semester:** 2018 FALL

☒ Required Course ☐ Elective Course (click on and check the appropriate box)

Prerequisite(s):
MATH201

Catalog Description:
This course is an introduction to fluid mechanics, and emphasizes fundamental concepts and problem-solving techniques. Topics to be covered include fluid properties, fluid statics, fluid kinematics, control volume analysis, dimensional analysis, internal flows (pipe flows), differential analysis (including approximations such as creeping flow, potential flow, and boundary layers), and external flows (lift and drag). If time permits, brief introductions to computational fluid dynamics (CFD) and turbomachinery (pumps and turbines) will be provided.

Course Web Page:
htpp://me.emu.edu.tr/hacisevki/meng353.htm

Textbook(s):
Munson, Okiishi,Huebesh and Rothmayer, *Fluid Mechanics*,Wiley Ed. 7, 2013.
Lab Manual:
htpp://me.emu.edu.tr/hacisevki/meng353.htm

Indicative Basic Reading List :
1. Frank M. White, "Fluid Mechanics", Mc Graw Hill
2. Y. A. Çengel and J. M. Cimbala, *Fluid Mechanics: Fundamentals and Applications*, McGraw-Hill, 2006.
3. J. F. Douglas, J.M. Gasiorek, J.A. Swaffield, L.B. Jack "Fluid Mechanics", Pearson
4. M. C. Potter and D. C. Wiggert , "Mechanics of Fluids", Cengage Learning
5. E. J. Shaughnessy Jr., I. M. Katz, J. P. Schaffer``Introduction to Fluid Mechanics`` Oxford University Press (2005)

Topics Covered and Class Schedule:
(4 hours of lectures per week)

Week 1	1. Introduction and basic concepts and Fundamentals
Week 2	2. Pressure and fluid statics
Week 3	3. Elementary Fluid Dynamics
Week 4-5	4. Fluid Kinematics
Week 6-7	5. Finite Control Volume analysis
Week 8-9	Mid-Term Examination
Week 10	6. Differential Analysis of Fluid Flow:
Week 11	7. Dimensional Analysis and Modeling
Week 12-13	8. Viscous Flow in pipes:
Weeks 14	9. Introduction to Computational Fluid Dynamics
Week 15:	Final Examination

Laboratory Schedule:
(Group list for each experiment will be announced later.)

Course Learning Outcomes:
At the end of the course, student must be able to
(1) develope an understanding of the broad range of engineering applications which involve fluid mechanics;
(2) recall the basic principles and the use of manometers, and hydrostatic forces on submerged surfaces;
(3) recall and use the Lagrangian and Eulerian descriptions of flows, flow visualization, vorticity;

(4) apply the fundamental conservation laws of mass, momentum, energy and Bernoulli equations to engineering problems;
(5) apply the Reynolds transport theorem to linear and angular momentum using control volume analysis;
(6) apply Buckingham Pi theorem of dimensional analysis and similarity;
(7) Evaluate understand laminar and turbulent flow, major and minor losses, piping networks;
(8) understand the differential analysis of fluid flow including the derivation and application of the continuity, the Cauchy and the Navier-Stokes equations;
(9) develope an understanding of the use of pumps, and pump design based on dynamic similarity laws;
(10) develope an understanding of the application of Computational Fluid Dynamics to engineering problems;

	Method	No	Percentage
Assessment	Midterm Exam(s)	1	20 %
	Lab Work(s)	3/4	15 %
	Quiz(s)	4	10 %
	Homeworks / Project	1	15 %
	Final Examination	1	40 %

Contribution of Course to Criterion 5
Credit Hours for:
Mathematics & Basic Science : 0
Engineering Sciences and Design : 4
General Education : 0

Relationship of Course to Program Outcomes
The course has been designed to contribute to the following program outcomes:
(a) an ability to apply knowledge of mathematics, science and engineering
(b) 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
(e) identify, formulate, and solve engineering problems
(k) use the techniques, skills, and modern engineering tools necessary for engineering practice

Prepared by: Assoc.Prof. Dr. Hasan Hacışevki | **Date Prepared:** 17 September 2018

QUIZ Dates

Number of Quiz	Quiz Dates	Class
Quiz 1	18 / 10 / 2018	MESEM 2
Quiz 2	08 / 11 / 2018	MESEM 2
Quiz 3	06 / 12 / 2018	MESEM 2
Quiz 4	20 / 12 / 2018	MESEM 2

Important Notes:

- ***Attendance:*** All students must attempt to lectures minimum 70% and Labs 100% otherwise they will get ``**NG** `` grade. If your attendance is less than **80%** you will not get any benefit from curve if applied. If you miss any Lab (only one) you must submit a report within first three days.
- **Late submission of any Homework or Project will not accepted and evaluated.**

IMPORTANT NOTE:

- ***IF YOU MISS ANY QUIZ OR EXAM YOU MUST SUBMIT A DOCTOR REPORT APPROVED BY THE EMU HEALTH CENTER, WITHIN THREE DAYS OTHERWISE YOU CAN NOT ENTER MAKE – UP EXAM.***
- ***IF YOU DO NOT COMPLETE AND SUBMIT TERM PROJECT ON REQUIRED DATE YOU WILL BE FAILED FROM THE COURSE.***