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| **Identification** | **Subject**  | ENGR210 - Fluid Mechanics  |
| **Department** | Petroleum Engineering |
| **Program** | Undergraduate |
| **Term** | Spring, 2017 |
| **Instructor** | Masoud Mehrizadeh |
| **E-mail:** | mmehrizadeh@khazar.org |
| **Phone:** | 055 4625367 |
| **Classroom/hours** | Mondays and Fridays |
|  | **Office hours** |  |
| **Prerequisites** | ENGR205 |
| **Language**  | English |
| **Compulsory/Elective** | Compulsory |
| **Required textbooks and course materials** | * *“****Brief Introduction to Fluid Mechanics****” by Donald F. Young, Bruce R. Munson, Theodore H. Okiishi, Wade W. Huebsch-A, Fifth Edition,**published by Wiley Publication, 2010.*
* *“****Fluid Mechanics with Engineering Applications****” by E. John Finnemore and Joseph B. Franzini, 10th. Edition, published by McGraw Hill, 2001.*
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| **Course outline** | This class provides students with an introduction to principal concepts and methods of fluid mechanics. Topics covered in the course include pressure, hydrostatics, and buoyancy; open systems and control volume analysis; mass conservation and momentum conservation for moving fluids; viscous fluid flows, flow through pipes; dimensional analysis; boundary layers, and lift and drag on objects.  |
| **Course objectives**  | The course helps students to gain a basic understanding of properties of fluids and how to measure them. These knowledge lead to determination of behavior of fluids in various conditions. Moreover, the course enables students to apply the concepts in broad range of engineering problems from blood in human body to galaxies. Students will work to formulate the models necessary to study, analyze, and design fluid systems through the application of these concepts, and to develop the problem-solving skills essential to good engineering practice of fluid mechanics in practical applications. Stress and strain rate descriptions, fluid statics, and use of differential and finite control volume analysis with continuity, momentum, and energy equations, Bernoulli and Euler equations, and incompressible viscous flow using Naiver-Stokes equations.Quizzes will be provided during the classes are based on the topic covered previously. Four quizzes will be provided during semester. |
| **Learning outcomes** | * Determination of basic characteristics of fluids,
* Calculation of hydrostatic pressure at any given point in fluids,
* Calculation of forces exerted by fluids,
* Describing properties of fluid flows under various conditions,
* Formulating conservation of mass, moment and energy for different systems of fluids,
* Apply governing equations of fluid flows to different engineering problems,
* Navier-Stokes equation
* Turbulent flow
* Reynolds equation
* One dimensional pipe flow
* Non Newtonian fluid flow
* The Rabinowitsch equation
* Properties of multiphase mixtures
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| **Teaching methods** | **Lecture**  | x |
| **Experiential exercise** | x |
| **Assisted work** | x |
| **Assisted lab work** | x |
| **Others** |  |
| **Evaluation**  | **Methods** | **Date/deadlines** | **Percentage (%)** |
| **Midterm Exam** |  | 30 |
| **Class Participation** |  | 5 |
| **Quizzes (4)** |  | 20 |
| **Lab Exercises** |  |  |
| **Project (3 phases)** |  | - |
| **Final Exam** |  | 45 |
| **Total**  |  | 100 |
| **Policy** | * NO CELL PHONES are allowed during lecture and lab sessions. PLEASE turn them off before lecture! (Not silent or vibrating mode). This is a university policy and violators will be reprimanded accordingly.
* Participation and interaction in classes are more important than just attendance.
* No late assignments will be accepted without prior arrangement with the instructor for acceptable excuses. Medical and family emergency will be considered on case-by-case basis.
* No late homework will be accepted. Homework is to be completed on an individual basis. Students may discuss homework with classmates, but students are responsible for your own work. If students have consulted classmates, please note the individuals name on the top of students’ assignment.
* Quizzes may be given unannounced throughout the term and will count as one homework. There will be no make-up quizzes.
* No make-up exams. If students miss an exam, a zero score will be assigned to the missed exam.
* If students should miss class due to personal emergency or medical reasons, please notify the instructor by email immediately. A doctor’s note will be required for make-up work.
* Students are responsible for completing the reading assigned from the textbook related to the covered topics and for checking email regularly for important information and announcements related to the course.
* University policy on academic honesty concerning exams and individual work will be strictly enforced.
* BE ON TIME!
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| Tentative Schedule |
| Week | **Date/Day**(Tentative) | Topics | Textbook/Assignments |
| 1 | 13.02.2017&19.02.2017 | Introduction to Fluid Mechanics | Chapter 1 |
| 2 | 20.02.2017&24.02.2017 | Fluid Properties; Dimensions and Units | Chapter 1 |
| 3 | 27.02.2017&02.03.2017 | Viscosity and Compressibility, Surface Tension+ **Quiz** | Chapter 1 |
| 4  | 06.03.2017&10.03.2017  | Introduction to Fluid Statics | Chapter 2 |
| 5 | 13.03.2017&17.03.2017 | Pressure calculation at a point  | Chapter 2 |
| 6 | 18.03.2017&20.03.2017 | **Novruz Holliday** |  |
| 7 | 27.03.2017&.31.03.2017 | Pressure variations and measurements | Chapter 2 |
| 8 | 03.04.2017&07.04.2017 | Hydrostatic force calculations + **Quiz** | Chapter 2 |
| 9 | 08.04.2017&16.04.2017 | **Midterm Exams** | Chapters 2 |
| 10  | 17.04.2017&21.04.2017 | Hydrostatic force calculations | Chapter 3 |
| 11 | 24.04.2017&28.04.2017 | Introduction to Fluid Kinematics  | Chapter 3 |
| 12 | 01.05.2017&05.05.2017 | Velocity and acceleration field | Chapter 3 |
| 13 | 08.05.2017&12.05.2017 | Bernoulli equation + **Quiz** | Chapter 4 |
| 14 | 15.05.2017&19.05.2017 | Introduction to Control Volume analysis | Chapter 4 |
| 15 | 22.05.2017&26.05.2017 | Reynolds Transport Theorem and conservation of mass | Chapter 4 |
| 16 | 29.05.2017-02.06.2017(29th May is Holliday) | Conservation of Momentum and Energy+ **Quiz**  | Chapters 4 |
|  |  | Final Exam |  |

This syllabus is a guide for the course and any modifications to it will be announced in advance.