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| **Identification** | **Subject**  | Hydraulics |
| **Department** | Civil Engineering |
| **Program** | Undergraduate |
| **Term** | Fall, 2017 |
| **Instructor** | Mirsadegh Seyedzavvar |
| **E-mail:** | mseyedzavvar@khazar.org |
| **Classroom/hours** | Fridays 13:40−15:10 |
|  | **Office hours** | Fridays 16−17 |
| **Prerequisites** | Fluid Mechanics |
| **Language**  | English |
| **Compulsory/Elective** | Compulsory |
| **Description** | Hydraulic engineering is the application of the principles of fluid mechanics to problems dealing with the collection, storage, control, transport, regulation, measurement, and use of water. Before beginning a hydraulic engineering project, one must figure out how much water is involved. The hydraulic engineer is concerned with the transport of sediment by the river, the interaction of the water with its alluvial boundary, and the occurrence of scour and deposition. The hydraulic engineer actually develops conceptual designs for the various features which interact with water such as spillways and outlet works for dams, culverts for highways, canals and related structures for irrigation projects, and cooling-water facilities for [thermal power plants](https://en.wikipedia.org/wiki/Thermal_power_plant). |
| **Required textbooks and course materials** | B.R. Munson, T.H. Okiishi, W.W. Huebsch, A.P. Rothmayer. **Fundaments of Fluid Mechanics**, 7th edition, John Wiley & Sons, Inc. R.E. FeatherStone, C. Nalluri. **Civil Engineering Hydraulics**, 3rd edition, Blackwell Science. |
| **Course outline** | Hydraulic engineering as a sub-discipline of [civil engineering](https://en.wikipedia.org/wiki/Civil_engineering) is concerned with the flow and conveyance of [fluids](https://en.wikipedia.org/wiki/Fluid), principally [water](https://en.wikipedia.org/wiki/Water) and sewage. One feature of these systems is the extensive use of gravity as the motive force to cause the movement of the fluids. This area of civil engineering is intimately related to the design of [bridges](https://en.wikipedia.org/wiki/Bridge), [dams](https://en.wikipedia.org/wiki/Dam), [channels](https://en.wikipedia.org/wiki/Channel_%28geography%29), [canals](https://en.wikipedia.org/wiki/Canal), and [levees](https://en.wikipedia.org/wiki/Levee), and to both sanitary and [environmental engineering](https://en.wikipedia.org/wiki/Environmental_engineering). |
| **Course objectives**  | The main aim of this course is to understand the basic concepts of laminar flow, turbulent flow, boundary layer, dimensional analysis & model studies etc. It also deals with the application of these theories for the Civil Engineering Problems such as pipe design, pipe network analysis, three reservoir problems, water hammer analysis, drag and lift, turbines and pumps etc. |
| **Learning outcomes** | On successful completion of this course students will be able to:* Calculate the hydrostatic forces on plane and curved submerged surfaces
* Understand the concepts of hydraulics including steady and unsteady flow, streamline and continuity equation, energy equation for fluid flow, energy loss and …
* Determine the resistance and head loss in circular and noncircular conduits and open channels
* Determine the flow rate of fluid in pipe networks using loop and nodal methods
* Determine the open cannel flow and geometry

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| **Teaching methods** | **Lecture**  |
| **Experiential exercise** | x |
| **Assisted work** | x |
| **Assisted lab work** | x |
| **Others** | x |
| **Methods** |  |
| **Evaluation** | **Midterm Exam** | **Date/deadlines** | **Percentage (%)** |
| **Class Participation** |  | 5 |
| **Quizzes (4-6)** |  | 35 |
| **Midterm** |  | 20 |
| **Final Exam** |  | 40 |
| **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!100 |

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| Tentative Schedule |
| Week | Topics | Textbook/Assignments |
| 1 | Hydrostatics thrust of plane surfaces | Chapter 1 |
| 2 | Hydrostatic thrust on curves surfaces  | Chapter 1 |
| 3 | Resistance in circular pipe flow | Chapter 1 |
| 4 | Colebrook and Jain equations | Chapter 2 |
| 5 | Pipe sizing | Chapter 2 |
| 7 | Hazen William equation and other local losses | Chapter 2 |
| 8 | Noncircular conduits and local losses | Chapter 2 |
| 9 | **Midterm Exams** |  |
| 10 | Nodal method | Chapter 3 |
| 11 | Hardy cross method | Chapter 3 |
| 12 | Water hammer | Chapter 4 |
| 13 | Pumps | Chapter 4 |
| 14 | Open channel flow and geometry  | Chapter 4 |
| 15 | Specific energy and critical flow | Chapters 4 |
|  | Final Exam |  |

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