**Water management and hydraulic structures**

**Code: MFVIZ31S04 -EN**

**ECTS Credit Points: 4**

**Evaluation: mid-semester grade (AW5)**

Year, Semester:3rd year/1st semester

Number of teaching hours/week:

Lecture: **2**

Practice: **2**

**Prerequisites:** Public Works I.: MFKOZ31S04-EN, Hydrology and hydrogeology I.: MFHIO31S04-EN

**Topics:**

Hydraulic structures are engineering structures constructed for the purposes of harnessing and using water resources (groundwater, surface water, lakes, sea, etc) or for the prevention of the negative and destructive actions (floods, shore erosion, etc) of water on the surrounding environment. There are a large variety of hydraulic structures to serve a lot of purposes for which water resources are put to use. Also case studies from Hungary’s complex water management issues - water resources management, excess water problems, flood management, settlement-scale water management issues, thermal water management, water quality control management, etc. - are discussed. However, several issues like water utilities, water treatment and water resources management are discussed in the frame of other courses; they get less emphasis during this course. Main topics are Classification of hydraulic structures by purpose and types; Site selection factors; design of gravity dams; classification of reservoirs;

**Literature:**

1. WFD(Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy)
2. A PRACTICAL GUIDE TO INTEGRATED LAND MANAGEMENT METHODS INTENDED TO IMPROVE LAND USE AND WATER MANAGEMENT EFFICIENCY IN THE TISZA RIVER BASIN;ICPDR 2010.
3. Larry W. Map; Hydraulic design handbook; Publisher: McGraw-Hill Education: New York, Chicago, San Francisco, Athens, London, Madrid, Mexico City, Milan, New Delhi, Singapore, Sydney, Toronto ;ISBN 0-07-041152-2
4. Download course material

**Schedule**

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| **1st week:**  **Lecture:** the aim of water management; the impacts of climate change on water management  **Practice:** river basin planning according to Directive 2000/60/EC  **2nd week:**  **Lecture:** the relation between water management and hydraulic structures  **Practice:** issuing task 1: study of one specific river basin management plan from given aspects  **3th week:**  **Lecture:** the aim and technical measures of harnessing and using water resources  **Practice:** examples for technical measures of harnessing and using water resources  **4th week:**  **Lecture:** the aim and technical measures of the prevention of negative water related events in plain areas  **Practice:** examples for technical measures of prevention of floods and excess water in plain areas; issuing the task 2:open channel design  **5th week:**  **Lecture:** the aim and technical measures of irrigation  **Practice:** examples for water saving technical measures of irrigation; issuing the task 3:culvert design | **6th week:**  **Lecture:** the aim and technical measures for the prevention of negative water related events in hilly areas  **Practice:** examples for technical measures for erosion and flood control in hilly areas; issuing task 4: designing a check dam  **7th week:**  **Lecture:** urban water management issues  **Practice:** examples for special cases like thermal water management, sewerage of small settlements, stormwater management, etc.  **8th week:**  **submitting tasks 1,2,3,4**  **Lecture:** environmental impacts of water management measures; sustainability issues  **Practice:** examples for environmental impacts of existing water management measures  **9th week:**  **Lecture:** classification of hydraulic structures by purpose and types  **Practice:** examples for purposes and types of hydraulic structures  **10th week:**  **Lecture:** storage structures and dams; types of reservoirs  **Practice:** functional elements of water reservoirs |
| **11th week:**  **Lecture:** types of dams (structure, material, purpose, advantages, disadvantages)  **Practice:** examples for different types of dams  **12th week:**  **Lecture:** factors for selection of site of dam  **Practice:** examples for site selection | **13th week:**  **Lecture:** energy dissipaters; sedimentation behind the dam; losses  **Practice:** examples for sedimentation behind dams and technical measures to avoid sedimentation  **14th week:**  **Lecture: End-term test;** technical measures of artificial recharge of groundwater  **Practice:** examples for technical measures of artificial recharge of groundwater  **15th week:**  **possibility for the improvement of End-term test result** |

**Requirements**

**A, for a signature:**

Attendance at **lectures** is recommended, but not compulsory.

Participation at **practice** is compulsory. Students must attend the practice classes and may not miss more than three times during the semester.

Students have to **submit all the four tasks** in time at a sufficient level.

During the semester there is one test in the 14th week. Students have to sit for the test. If the score of the test is below 60, the student once can take a retake test covering the whole semester material.

**B, for a grade:**

The course ends in a **mid-semester grade (AW5)**. It is based on the test results. The minimum requirement of the end-term test is 61% it is needed to have a mid-semester grade. Based on the score of the test, the **mid-semester grade** is given according to the following table:

Score Grade

0-60 fail (1)

61-70 pass (2)

71-80 satisfactory (3)

81-90 good (4)

91-100 excellent (5)