## *Course title: FUNDAMENTALS OF HYDRAULIC ENGINEERING*

| *Course code* | *Course status* | *Semester* | *Number of ECTS credits* | *Hours* |
|---|---|---|---|---|
| | *Mandatory* | *III* | *4* | *2P+1V+1L* |

***Study programs for which it is organized:*** Undergraduate studies - Study program Civil Engineering, duration 6 semesters and 180 ECTS credits.

***Conditionality to other subjects:*** No conditionality

***Course objectives:*** Introduction to applied hydrotechnical disciplines in the field of water protection, water protection as a resource and the use of water for various purposes.

***Learning outcomes:*** After passing the exam in this course, students will be able to: :

1. To acquire sufficient knowledge to understand hydrotechnical problems and activities in space and time as well as to acquire the ability to be able to assess the impact of these activities on the environment both naturally and socially.
2. Describe different hydrotechnical systems (water supply and sewerage systems, hydrotechnical structures, systems for regulating the water regime of watercourses and flood protection) and explain their way of functioning and their connections with the environment

***Teacher and assistant : Dr Goran Sekulic***

***Teaching method:*** Lectures, exercise, graphic works, field work, colloquium

***Course content:***

| | |
|---|---|
| I week of classes | Introduction, history of development of hydrotechnical disciplines |
| II week of classes | Hydrostatics: basic equations of fluid rest. Pressure force, action of pressure on hair and curved surfaces. |
| III week of classes | Hydrodynamics: Movement of a fluid bounded by a solid boundary - Bernoulli's equation |
| IV week of classes | Highlights under the constitution, overflows and overflow evacuation bodies. Movement in open streams. |
| V Sunday classes | Hydrology: Precipitation and runoff: hydrometric measurements - measurement of velocity and flow, flow curve, characteristics of runoff regime, coefficient and modulus of runoff. Medium, small and large waters. |
| VI week of classes | Hydrometry, basic measurements in hydrology |
| VII week of classes | Basic parametric methods of hydrology |
| VIII week of classes | COLLOQUIUM I |
| IX week of classes | Dams, division and basic principles of construction |
| X week of classes | Bulk, gravity, buttress and arch dams, basic principles of construction |
| XI week of classes | Use of water power. Types of hydropower plants. Reservoirs and their characteristics |
| XII week of classes | Watercourse regulation |
| XIII week of classes | Water supply - water supply systems, planning and design |
| XIV week of classes | Sewage systems, wastewater and their treatment |
| XV week of classes | COLLOQUIUM II |

***Student obligations during classes:*** Attendance at lectures and exercises, making graphic works, taking the colloquium

**STUDENT WORKLOAD**

| **weekly** | **During the semester** |
|---|---|
| **4 credits x 40/30 = 5,30 hours**<br>**Structure:**<br>**2 hours of lectures**<br>**2 hours of exercise**<br>**1.3 hours of independent work, including consultations** | **Teaching and final exam: (**5.30 hours) x 16 = 85.30 hours<br>Necessary preparations before the beginning of the semester (administration, enrollment, certification)<br>2 x (5.30 hours) = 10.60 hours<br>**Total load for the subject 5x30 = 150 hours**<br>Additional work for exam preparation in the remedial exam period, including taking the remedial exam from 0 to 30 hours (remaining time from the first two items to the total workload for the course 150 hours)<br>**Load structure:** 85.30 hours (Teaching) +10.60 hours (Preparation) +30 hours (Additional work) |

***Literature:***

1. G, Sekulić. I . Ćipranić, **Komunalna hidrotehnika ,** Građevinski fakultet, Podgorica , 2015.
2. R. Živaljević : **Osnovi hidrotehnike** , Podgorica , 2015.
3. Scripts and lecture slides

***Forms of knowledge assessment and grading:***

The knowledge test is performed continuously during the semester and at the final exam. A maximum of a student can earn 100 points during the semester. The following is evaluated:

Attendance continues: 2 to 5 (70% attendance 2 points, 100% attendance 5 points, <70% attendance 0 points)

- Graphic works: 5x (2.0 to 5.0) = 10 to 25 (for positively evaluated graphic work min 2.0 points are obtained)

Colloquia: 2 x 19 to 35

Final exam: up to 50

- A minimum sufficient number of points and a maximum number of points are given. Colloquia and the final exam are done in writing. A passing grade is obtained if 50 points are collected, as well as if at least 19 points are won in both the first and the second colloquium.

***Special indications for the subject:***

***Name and surname of the teacher who prepared the data: Dr. Goran Sekulić***

***Note:*** Additional information can be obtained with the subject teachers, assistants, head of the study program and the Vice Dean for Academic Affairs.