

Tadeusz Kosciuszko Cracow University of Technology

Course Card

Faculty of Civil Engineering

Field of study: Civil Engineering

Study profile: general academic

Study form: full-time

Field of study code: BUD

Study cycle: 1st

Specialty: no specialty

1 COURSE INFORMATION

| | |
|------------------------|--------------------------|
| Course name | Hydraulika i hydrologia |
| Course name in English | Hydraulics and Hydrology |
| Course code | WIL BUD oIS C21 24/25 |
| Course category | Basic |
| No. of ECTS points | 2.00 |
| Semester | 2 |

2 CLASS TYPE, NUMBER OF HOURS ACCORDING TO THE STUDY PLAN

| Semester | Lecture | Class exercise | Laboratory | Computer lab | Design exercise | Seminar |
|----------|---------|----------------|------------|--------------|-----------------|---------|
| 2 | 15 | 0 | 0 | 0 | 15 | 0 |

3 COURSE OBJECTIVES

Objective 1 The aim of the course is to provide basic knowledge in the field of hydraulics, including: Hydrostatics - pressure distribution in the field of mass forces, practical methods of calculating static loads exerted by a liquid,

Objective 2 Hydrodynamics - calculation of flow parameters in pressure pipelines (calculation of energy losses), elements of pipeline network, calculations for the siphon and pumps' characteristics

Objective 3 Introduction to basic hydrological concepts and formulas including hydrological cycle, basic precipitation formulas, normative flows

4 PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Basic knowledge of physics and mathematics at the academic level

5 LEARNING OUTCOMES

LO1 Knowledge The student knows the mathematical description of the hydrostatic pressure distribution, under- stands its consequence for static load calculations

LO2 Skills The student knows the general flow laws for incompressible liquids, remembers and understands the Bernoulli equation and ditch. continuity

LO3 Knowledge The student knows how to apply practically known flow laws supplemented with additional semi-empirical formulas regarding energy losses, contracting effects, etc.

LO4 Skills The student learned the calculation methods used to describe uniform flow in open channels

6 COURSE CONTENT

| Design exercise | | |
|-----------------|---|--------------------------|
| No. | Subject matter of the course Detailed description of thematic blocks | No. of class hours |
| P1 | Hydrostatics; pressure, pressure distribution, pressure measurement, hydrostatic forces on plane surfaces, forces on curved surfaces. | 6 |
| P2 | Pipe flow; friction losses, Moody diagram, pressure and energy distribution lines, application of continuity and Bernoullis equations for pipe flow parameters determination. | 6 |
| P3 | Open channels flow; application of Manning formula for flow parameter calculation. | 2 |
| P4 | Visiting hydraulic laboratory; demonstration of Reynolds experiment, siphon, orifice and weir flow. | 1 |

| Lecture | | |
|-----------|--|--------------------------|
| No. | Subject matter of the course Detailed description of thematic blocks | No. of class hours |
| L1 | Principles of hydrostatics; pressure, hydrostatic forces, stability of floating bodies, forces on plane and curved surfaces | 4 |
| L2 | Basic principles of hydrodynamics; kinematical descriptions of fluid motion, flow governing equations. Pipe flow principles, flow continuity and Bernoullis equations, Darcy-Weisbach equation | 4 |

| Lecture | | |
|-----------|--|--------------------|
| No. | Subject matter of the course Detailed description of thematic blocks | No. of class hours |
| L3 | Uniform flow in open channels; Chazy-Manning formula. | 2 |
| L4 | Hydraulics of water engineering structures; weirs and orifices rating curves. | 2 |
| L5 | Porous material filtration; Darcy law, well and ditch charging. | 1 |
| L6 | Introduction to hydrology; water cycle, hydrometric measurements, characteristic discharges. | 2 |

7 TEACHING TOOLS

N1 Lectures

N2 Design exercises

8 Student workload

| Activity form | Number of hours of activity |
|--|-----------------------------|
| Hours realized in contact with the teacher | |
| Hours resulting from the study plan | 30 |
| Consultation hours | 7 |
| Exams and tests during session | 3 |
| Hours of autonomous student work | |
| Preparing for classes, studying literature | 7 |
| Developing results | 7 |
| Preparing of reports, projects presentations, discussion | 6 |
| Total number of hours devoted to the subject | 60 |
| Total number of ECTS points | 2.00 |

9 Methods of grading

Colloquium grade

Partial grades

F1 Colloquium grade

Summary grade

P1 Colloquium grade

Conditions for passing the course

L1 Colloquium graduation