

Study programme: Civil Engineering				
Study level: Undergraduate academic studies				
Course: Hydraulics and waste-water engineering				
Course lecturer: Mirjana Horvat				
Course status: Mandatory				
ECTS credits: 6				
Mandatory preceding courses: Hydraulics 1				
Coarse goals: Acquiring knowledge and practical experience in the planning, analysis, design and management of waste-water treatment systems.				
Course outcome: Developing skills for planning, management and control over the construction or reconstruction of a waste-water system.				
Course content: <i>Theoretical part of the course</i> Waste-water accumulation systems: mathematical modeling, measurements, hydraulic computation <ul style="list-style-type: none"> • Mathematical modeling of unsteady waste-water inflow • Hydraulic structures in the waste-water treatment system and their mathematical modeling as internal or external boundary conditions • Inflow and concentration measurements Waste-water treatment plant processes <ul style="list-style-type: none"> • Physical unit operations – screening, coarse solids reduction, gravity separation theory, grit removal, primary sedimentation • Fundamentals of biological treatment – objectives of biological treatment, composition and classification of microorganisms, biological nitrification, biological denitrification, biological phosphorous removal, suspended growth biological treatment processes, attached growth treatment processes • Treatment, reuse and disposal of solids Waste-water treatment plants – hydraulic considerations, design and construction <i>Practical part of the course</i> The practical part of the course closely follows the theoretical part.				
Literature: 1. W. H. Hager: <i>Wastewater Hydraulics – Theory and Practice</i> , Springer, 2008. 2. L.D.Mackenzie: <i>Water and Wastewater Engineering – Design Principles and Practice</i> , The McGraw-Hill, 2010. 3. N.L.Nemerow, F.J.Agardy, P.Sullivan, and J.A.Salvato, eds.: <i>Water, Wastewater, Soil and Grounwater Treatment and Remediation</i> , John Willey & Sons Inc. 2009. 4. P.A.Veslind, S..Morgan, and L.G.Heine: <i>Introduction to Environmental Engineering</i> , Cengage Learning, 2010.				
Number of weekly classes:				
Theoretical classes: 2	Practical classes: 3	Other forms of teaching: 0	Student research: 0	Other forms of classes: 0
Methods of teaching: Theoretical lectures, practical assignments for students, consultations with the course lecturer. (During the semester there will be assignments for the students, which should be completed within one or two weeks. The deadlines for the assignments will be enforced. The assignments will be graded, and if necessary corrected and commented by the course lecturer).				
Grading (maximum number of points: 100)				
Pre-exam obligations	points	Final exam	points	
Work during the semester	50	written exam	50	