

Course Title:	Industrial water systems: characterisation and treatment
Lecturer:	Prof. Tomislav Bolanča, Ph.D., Prof. Krešimir Košutić, Ph.D., Assoc. Prof. Danijela Ašperger, Ph.D., Assoc. Prof. Marija Vuković Domanovac, Ph.D., Assist. Prof. Šime Ukić, Ph.D.
Course Type:	Elective
ECTS:	6
Total Hours:	30 hours
Content of the Course:	The course provides an insight into the industrial water systems with an emphasis on water characterisation and water treatment methods.
Competences:	Acquisition of knowledge and competences required for assessment, planning, implementation and application of sustainable management strategies of industrial water systems.
Teaching Methodology:	Lectures, field work
Course Units:	<p><u>Chemistry of water:</u> Water molecule and aggregate states. Structure and thermodynamic properties of water. Hydrogen bonding theory. The regulation of the chemical composition of water in nature. The basics of efficient water resources management.</p> <p><u>Analysis of water:</u> Sampling and sample storage. Ion analysis. Organic pollutant analysis. Metal analysis. Trace element analysis. Analysis of results and obtaining useful information.</p> <p><u>Chemical treatment of water:</u> Removal of carbonates, phosphates, sulphates, cyanides, ammonia and other nitrogen compounds. Removal of metals, organometallic and organic compounds. Water softening. Disinfection. Selection of optimum conditions.</p> <p><u>Physical-chemical treatment of water:</u> Adsorption, coagulation–flocculation and membrane separations – physical-chemical principles and application in industrial water systems.</p> <p><u>Biological treatment of water:</u> The basics of biological treatment of water. The role of microorganisms. Types of biological processes during water treatment. Biological indicators.</p>
Examination method:	Oral exam
References:	<ol style="list-style-type: none"> 1. W. Stumm, J.J. Morgan, Aquatic Chemistry, Chemical Equilibria and Rates in Natural Waters, 3rd edition, John Wiley and Sons, New York, 1996. 2. R.N. Reeve, Introduction to Environmental Analysis, John Wiley and Sons, Chichester, 2002. 3. A.P. Sincero, G.A. Sincero, Physical-Chemical Treatment of Water and Wastewater, IWA Publishing, CRC Press, Boca Raton, 2003. 4. J.D. Seader, E.J. Henley, Separation Process Principles, 2nd edition, John Wiley and Sons, Chichester, 2006. 5. G. Bitton, Wastewater Microbiology, John Wiley & Sons, New York, 2005. 6. U. Wiesmann, I.S. Choi, E.-M., Dombrowski, Fundamentals of Biological Wastewater Treatment, Wiley-VCH, Weinheim, 2007.
Course in English:	Yes
Quality Monitoring Method:	Course quality and performance monitoring in accordance with the quality management system of the University of Zagreb. Self-evaluation of lecturers and student poll.