

*Course name* Water and Wastewater Technology *Code* *Credit points* **6**

*Language of instruction* **English**

*Programme* Intelligent Energy (IE), Biotechnology for Environmental Protection (BI),

*Type of studies* BSc studies

*Unit running the programme* Faculty of Environmental Protection And Engineering  
Department of Chemistry, Water and Wastewater Technology

*Course coordinator and academic teachers* **Maria Włodarczyk-Makuła, DSc**  
Lidia Dąbrowska, PhD; Elżbieta Sparczyńska, PhD; Ewa Wiśniowska, PhD; Maria Włodarczyk-Makuła, DSc

*Form of classes and number of hours*

Semester	Lec.	Tut.	Lab.	Proj.	Sem.	Credit points
V	30	-	30	-	-	6

*Learning outcomes* Understanding of processes which take place in water and wastewater treatment facilities; water and wastewater treatment works and equipments design; design and application of water supply and sewerage systems.

*Prerequisites* The basic knowledge of mathematics, physics, chemistry and biology.

*Course description*

**LECTURES:**

Water as a solvent, physico-chemical characteristic of surface and ground waters. Physical, chemical and bacteriological requirements for drinking water. Settling tanks and their function in technological systems. Flotation. Filtration. Using slow-rate filters, rapid filters and specially destined filters in water technology. Sorption. Removal of pollutants in coagulation process using conventional system, integrated facilities and contact filters. Chemical oxidation. Iron removal and manganese removal from water. Removal of micropollutants from water. Methods of water disinfection. Physico-chemical characteristic of wastewater. Requirements for treated effluents. Unit processes and equipments for mechanical, chemical and biological wastewater treatment. Use of activated sludge and biological beds in wastewater treatment. Removal of biogenic compounds from wastewater. Integrated biological removal of carbon, phosphorus and nitrogen from wastewater. Characteristic of flowing and batch systems. Methane digestion of wastewater. Membrane processes. Processing of sewage sludge. Wastewater treatment under natural conditions.

**LABORATORY:** Coagulation. Sorption. Iron and manganese removal. Disinfection. Activated sludge. Biogenic compounds removal. Biological beds. Methane fermentation of wastewater.

*Form of assessment*

*Basic reference materials*

1. Double M., Kumar A.: Biotreatment of Industrial Effluents, Elsevier, Amsterdam-Tokio, 2005.
2. Eckenfelder W.W., Grau P.: Activated Sludge Process Design and Control: Theory and Practice, Water Quality Management Library, Vol. 1, Eed. By W.W. Eckenfelder and P. Grau, Technomic Publishing Company Inc., Lancaster, PA, USA 1998.
3. Malina J. F., Pohland F.G.: Design of Anaerobic Processes for the Treatment of Industrial and Municipal Wastes, Water Quality Management Library vol. 7, Technomic Publishing Company Inc., USA-Pennsylvania 1992.
4. Tchobanoglous G., Burton F.L., Stensel H.D., Metcalf & Eddy Inc.: Wastewater Engineering 4/e, McGraw-Hill Professional, New York 2002.
5. Water Treatment Student Workbook, American Water Workers Association, Denver Colorado 2003.

*Other reference materials*

1. Anonim: Uzdatnianie wody. Poradnik WABAG, Oficyna Wydawnicza ProjPrzem-EKO, Bydgoszcz 2000.
2. Bever J., Stein A., Teichmann H.: Zaawansowane metody oczyszczania ścieków. Projprzem-EKO, Bydgoszcz 1997.
3. Bień J.: Osady ściekowe. Teoria i praktyka, Wydawnictwo Politechniki Częstochowskiej, Częstochowa 2002.
4. Hartmann L.: Biologiczne oczyszczanie ścieków, Wydawnictwo Instalator Polski, Warszawa 1996.
5. Imhoff K., Imhoff K.R.: Kanalizacja miast i oczyszczanie ścieków, Poradnik. Wydawnictwo Projprzem - EKO, Bydgoszcz 1996.
6. Janosz-Rajczyk M.: Biologiczne metody usuwania azotu z wybranych wód odpadowych, Wydawnictwo Politechniki Częstochowskiej, Częstochowa 2004.
7. Kowal A., Świdrska-Bróż M.: Oczyszczanie wody, PWN, Warszawa 2007.
8. Poradnik eksploatatora oczyszczalni ścieków. Praca zbiorowa, Wydawnictwo PZITS, Poznań 1997.
9. Praca zbiorowa pod red. Hiedrich Z.: Gospodarka wodno-ściekowa, Verlag Dashofer, Wydawnictwo bieżąco aktualizowane
10. Praca zbiorowa pod red. Janosz - Rajczyk M.: Badania wybranych procesów oczyszczania ścieków. Wydawnictwo Politechniki Częstochowskiej, Częstochowa 2009.
11. Praca zbiorowa pod red. Janosz-Rajczyk M.: Ćwiczenia laboratoryjne z technologii wody. Wydawnictwo Politechniki Częstochowskiej, Częstochowa 2009.

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Average student workload (teaching hours + individ.)	
Remarks:	
<i>Updated on</i>	