

Course name Sludge and Waste Management *Code* *Credit points* **3**

Language of instruction **English**

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

Type of studies BSc

Unit running the programme Faculty of Environmental Protection and Engineering
Institute of Environmental Engineering

Course coordinator and academic teachers Prof. Lidia Wolny
Krystyna Malińska, PhD.
January Bień, PhD.

Form of classes and number of hours

Semester	Lec.	Tut.	Lab.	Proj.	Sem.	Credit points
V	30		30			3

Learning outcomes Understanding the waste management principles; processes for waste and sludge management and utilization; methods and technologies applied for waste and sludge management.

Prerequisites Technology of water and sewage treatment

Course description **LECTURES:**
Legislation aspects of waste management in Poland and EU. Waste - classification and generation places. Municipal waste – management methods. Industrial waste – characteristics, utilization methods. Sewage and water sludge – conditioning, dewatering, hygienization, ultimate disposal of sludge (composting, drying, combustion and landfilling). Hazardous waste – risk evaluation, methods of management and disposal.
LABORATORY:
Determination of waste characteristics (moisture content, organic matter content, bulk density, biodegradability, particle size). Determination of sludge dry matter and hydration, capillary suction time. Selection of proper polyelectrolyte dose for sludge conditioning. Investigation of filtration and centrifugation processes. Measurement of sludge viscosity and rheological properties.

Form of assessment Exam

Basic reference materials 1. Paul T. Williams, Waste Treatment and Disposal, 2nd edition, Wiley, 2005.

Other reference materials

1. Rosik-Dulewska Cz. Podstawy gospodarowania odpadami. PWN 2006.
2. Jędrzak A. Biologiczne przetwarzanie odpadów. PWN 2007.
3. Brońska K. Odpady medyczne Obowiązkowe instrukcje i procedury postępowania. Segregowanie, zbieranie i przechowywanie. Wyd. Forum 2008.
4. Bień J.B. Osady ściekowe – teoria i praktyka. Wyd. PCz. Częstochowa 2007
5. Oleszkiewicz J. Gospodarka osadami ściekowymi. Poradnik decydenta. Wyd. Lem, Kraków 1998.
6. Bień J., Bień J.D., Wystalska K. Problemy gospodarki osadowej w ochronie środowiska. Wyd. PCz, Częstochowa 1998.
7. Praca pod red. Oleszkiewicza J. Poradnik eksploatatora oczyszczalni ścieków. PZLiTS, Poznań 1997.
8. Heidrich Z., Nieścier A. Stabilizacja beztlenowa osadów ściekowych. PZLiTS, Warszawa 1999.
9. Buraczewski G., Bartoszek B. Biogaz. Wytwarzanie i wykorzystywanie. PWN, Warszawa 1990.
10. Praca pod red. Sity J. Przyrodnicze zagospodarowanie osadów ściekowych. PWN, Warszawa 1998.
11. Kempa E. Gospodarka odpadami miejskimi. Warszawa, Arkady, 1983.

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Average student workload (teaching hours + individ.)	
Remarks:	
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