Title	Code
Water Treatment Systems	**1010102221010130576**
Field: **Environmental Engineering Second-cycle Studies**	Year / Semester: **1 / 2**
Specialty: **Water Supply, Water and Soil Protection**	Course: **core**
Hours: Lectures: **2** Classes: **-** Laboratory: **2** Projects / seminars: **2**	Number of credits: **6**
	Language: **polish**

Lecturer:

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Status of the course in the study program:

Course for specialization Water Management, Water and Soil Protection

Assumptions and objectives of the course:

Knowledge of principles of design of processes and water treatment technological systems. Knowledge of possibilities and methods of intensification of treatment effectiveness. Skill of pilot research design and procedures at pre-design study of processes and objects of water treatment as well as ability of managing of design, inwestment and operation of water treatment plants.

Contents of the course (course description):

Sources of anthropogenic contamination of natural water: surface water, groundwater. Classification of anthropogenic pollutants: toxicity, biodegradability. Water quality, mineralization, trophic. Experiment in water treatment designing, conception of treatment, pilot research, treatment train selection. Technological systems: effectiveness and reliability of treatment, multiple barrier treatment rule. Design of processes: sedimentation, coagulation with pH adjustment and adsorption, adsorptive resins, rapid and membrane filtration, chemical and catalytic oxidation, biological processes, disinfection, by-products, post disinfection reactivation of microorganism. Water quality in distribution systems: organoleptic quality, chemical stability of water, chemical and electrochemical corrosion, biological stability, biological corrosion, water conservation. Sludge management: mass and volume balance of backwash water and sludge, sedimentation, gravital thickening, mechanical dewatering, non-newtonian flow of sludge, drying, freezing, final sludge disposal and utilization.

Introductory courses and the required pre-knowledge:

Environmental Chemistry, Environmental Biology and Ecology, Water Protection, Water Technology, Fluid Mechanics, Materials Technology.

Courses form and teaching methods:

Lectures, design exercises.

Form and terms of complete the course - requirements and assessment methods:

Examination, defence of design.

Basic Bibliography:

1. Apolinary L. Kowal, Maria Świderska - Bróż, Oczyszczanie wody, PWN, Warszawa 2009
2. Zbigniew Heidich i inni, Urządzenia do uzdatniania wody, zasady projektowania i przykłady obliczeń, Arkady, Warszawa 1987

3. Hanna Majcherek, Podstawy hydromechaniki w inżynierii oczyszczania wody, wyd. Politechniki Poznańskiej, Poznań 2006
4. Marek M. Sozański, Peter M. Huck, Badania doświadczalne w rozwoju Technologii Uzdatniania Wody, Monografie Komitetu Inżynierii Środowiska PAN, vol. 42, Lublin 2007

Additional Bibliography:

1. Praca zbiorowa, Wodociągi i Kanalizacja w Polsce, tradycja i współczesność, Polska Fundacja Odnowy Zasobów Wodnych, Poznań ? Bydgoszcz 2002
2. AWWA, Technical Editor F. W. Pontius, Water Quality and Treatment, McGraw ? Hill, Inc, New York. 1990
3. MWH, Water Treatment Principles and Design (Secondo Editio, Revised by J. C. Crittenden, R. R. Trussell, D. W. Hanol, K. J. Howe and G. Tchobanoglous), John Wiley & Sons, Inc., Hoboken, NY, 2005.