

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Advanced technologies for surface water treatment</b>		Code <b>1010101251010137720</b>
Field of study <b>Environmental Engineering First-cycle Studies</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>3 / 5</b>
Elective path/specialty <b>-</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>elective</b>
Cycle of study: <b>First-cycle studies</b>	Form of study (full-time, part-time) <b>full-time</b>	
No. of hours Lecture: <b>15</b> Classes: <b>15</b> Laboratory: <b>-</b> Project/seminars: <b>-</b>		No. of credits <b>4</b>
Status of the course in the study program (Basic, major, other) <b>(brak)</b>		(university-wide, from another field) <b>(brak)</b>
Education areas and fields of science and art		ECTS distribution (number and %)
<b>Responsible for subject / lecturer:</b>  dr hab. inż. Alina Pruss email: alina.pruss@put.poznan.pl tel. 61 665 34 97 Faculty of Civil and Environmental Engineering ul. Berdychowo 4, 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Student should have a basic knowledge mathematics, chemistry, fluid mechanics and general knowledge from environmental engineering.
2	<b>Skills</b>	Student should be able to perform mathematical calculations, physical, chemical, mechanics of the fluids.
3	<b>Social competencies</b>	Awareness to constantly update and supplement knowledge and skills.
<b>Assumptions and objectives of the course:</b> Knowledge of water treatment processes as well as principles of design and operation of water treatment facilities. Creation an ability for solving problems concerning designing, investment and operation of installation and facilities of water treatment plants, including sludge management.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b>		
1. Student has structured and theoretically founded knowledge of methods of water treatment. - [[[K2_W03, K2_W04, K2_W07]]]		
2. Student has an ordered knowledge of design methods of basic technological processes used in the raw water treatment technology - [K2_W03, K2_W04, K2_W07]		
<b>Skills:</b>		
<b>Social competencies:</b>		
1. Student understands the need for teamwork in solving theoretical and practical problems - [K2_K03]		
2. Student understands the different roles in teamwork and the need for information and knowledge exchange in a group work - [K2_K03, K2_K04]		
3. Student understands the need for a systematic deepening and broadening his/her competences - [K2_K01]		
<b>Assessment methods of study outcomes</b>		

Written exam - A total of 10 open or test questions. For each question the maximum number of points 10. Criteria of evaluation depending on the number of points obtained:

Number of points - rating

91 -100 very good (5.0)

81 - 90 good plus (4,5)

71 - 80 good (4.0)

61 - 70 sufficient plus (3,5)

50 - 60 satisfactory (3.0)

Below 50 points - insufficient (2.0)

### Course description

Processes and object of water treatment: coagulation, storage and installation of reagents, mixing tanks, flocculation tanks; sedimentation, rectangular and vertical clarifiers, sludge blanket clarifiers, tube settler; slow sand filtration, rapid filtration, direct filtration, rapid filters, granular carbon filters, filtration materials, filter backwashing, drainage systems.

Learning methods:

Lecture: Lecture using multimedia presentations, combined with discussion with the listeners.

Classes: practice method using multimedia presentation.

### Basic bibliography:

1. Apolinary L. Kowal, Maria Świdorska - Bróz, Oczyszczanie wody, PWN, Warszawa 2009
2. Anna M. Anielak, Wysokoefektywne metody oczyszczania wody, PWN, Warszawa 2015
3. Apolinary L. Kowal, Maria Świdorska - Bróz, Oczyszczanie wody, PWN, Warszawa 2009
4. Anna M. Anielak, Wysokoefektywne metody oczyszczania wody, PWN, Warszawa 2015

### Additional bibliography:

1. M.M. Sozański, Peter M. Huck, Badania doświadczalne w rozwoju Technologii Uzdatniania Wody, Monografie Komitetu Inżynierii Środowiska PAN, vol. 42, Lublin 2007
2. 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.
3. M.M. Sozański, Peter M. Huck, Badania doświadczalne w rozwoju Technologii Uzdatniania Wody, Monografie Komitetu Inżynierii Środowiska PAN, vol. 42, Lublin 2007
4. 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.

### Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures (contact hours)	15
2. Participation in classes (contact hours)	15
3. Consulting (contact hours)	20
4. Classes preparation	25
5. Exam preparations	25

### Student's workload

Source of workload	hours	ECTS
Total workload	100	4
Contact hours	40	2
Practical activities	0	0