



Evaluation of Best Practices Results

Survey January 2016

Summarised by Martin Oldenburg, OWL UAS
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1 Intention

The survey of „Best Practices“ on teaching courses related to water issues in the framework of Water Harmony wants to identify the current status at the participating universities. It has to be seen as a base for the next steps in the working program.

2 Survey

The survey has been done on a web-based environment. The participants had the opportunity to do the survey in the last weeks on January 2016.

A few statistical data concerning the survey.

No of Universities	9
(see Figure 1)	
No. of courses	77
No of lecturers	23

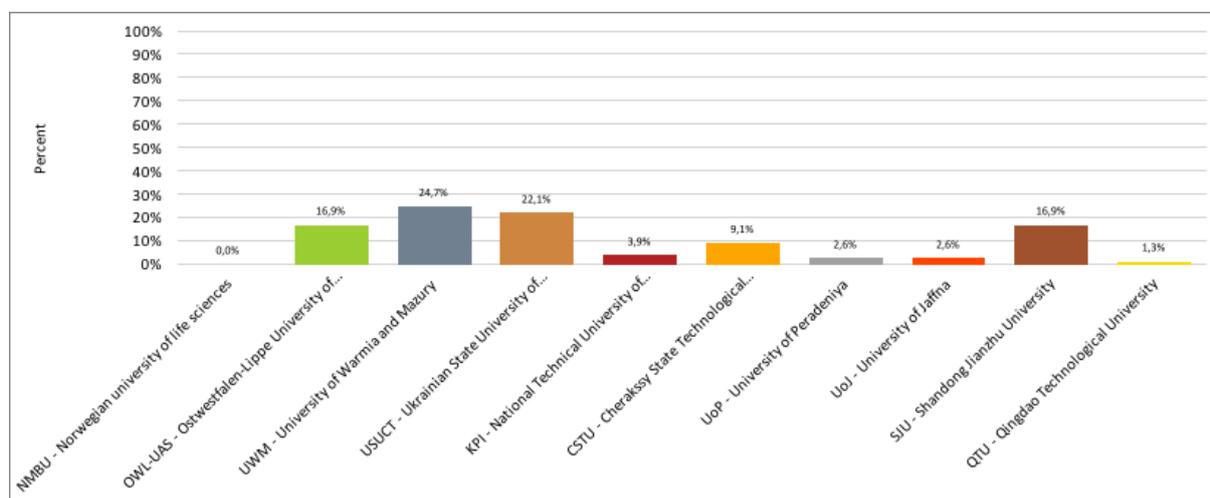


Figure 1: Universities participating on survey

The distribution of the courses on the various topics can be seen in Figure 2.

Course contents are covering a widespread band starting from issues concerning water, sewer, wastewater to more general topics like scientific writing and environmental aspects (here listed under “others”).

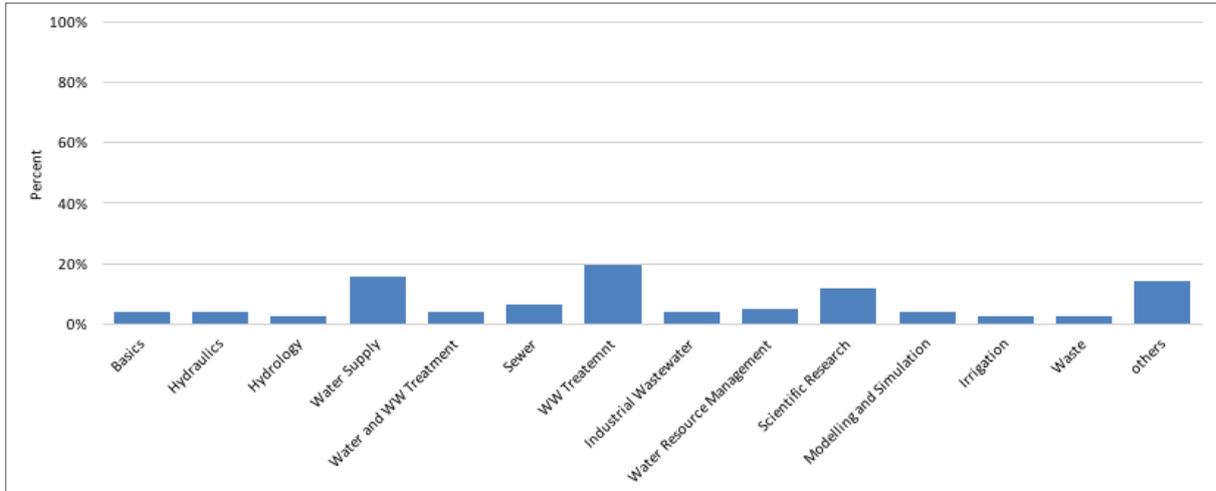


Figure 2: Distribution of topics on the course of the survey

3 Results of Survey

3.1 Organisation of courses

For the 77 courses in the survey nearly 90 % of them are using taught in the form of lecture. Approximately one third of the courses have exercises (37,7 %) or experiments in the lab (33,8 %). The form of seminar as teaching form is used only in nearly 25 % of the total number of courses. Other forms are term papers, project work or excursions in form of visits of wwtp (7,8 %).

Summarising one can state, that the most common form for education is the lecture, but nevertheless practical experiences are also used in more than 70 %. Project based work is on a very low level currently.

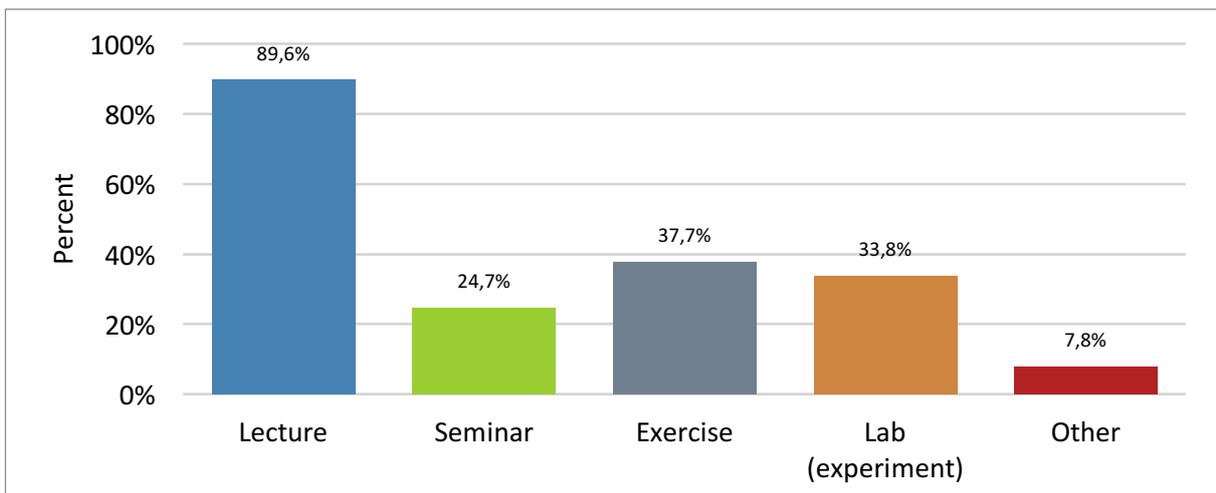


Figure 3: Form of education (no. of courses: 77)

Methods used in the courses are dominated by oral presentation by the lecturer (Figure 4). In addition to that the participation rate of the students is pretty high. The part of students work either on their own, in groups or supported by the teacher is also on a very high level

(for each form 31 – 46 %). For half of the courses students have to do work by their own at home. For one course reading of conference paper given as a method (other).

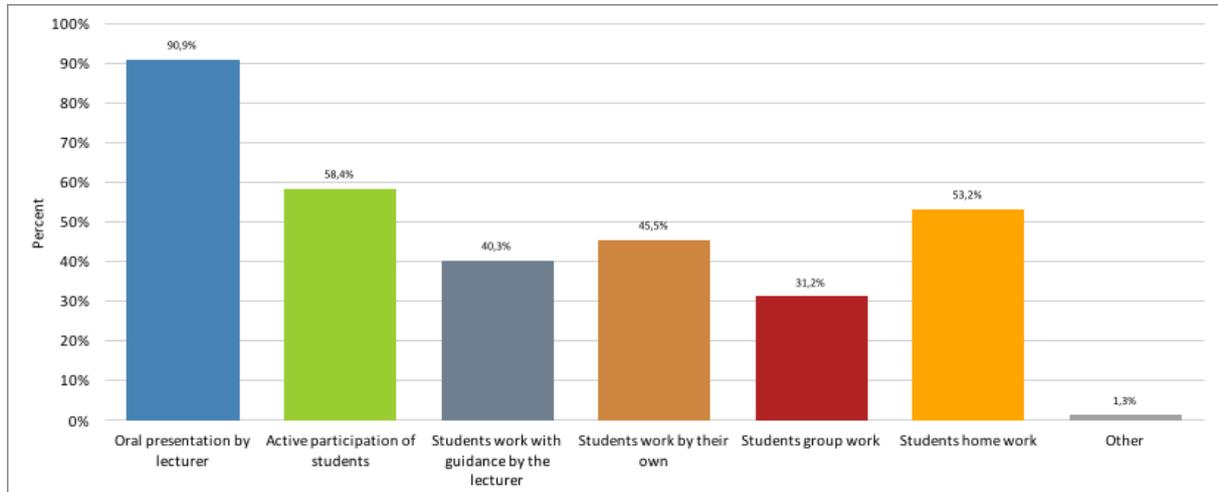


Figure 4: Methods of teaching (no. of courses: 77)

3.2 Tools used in the courses

Many forms of tools are used in the courses for the transfer of knowledge. The most frequent form is the presentation by projection of PowerPoint presentations (nearly 80 %) (

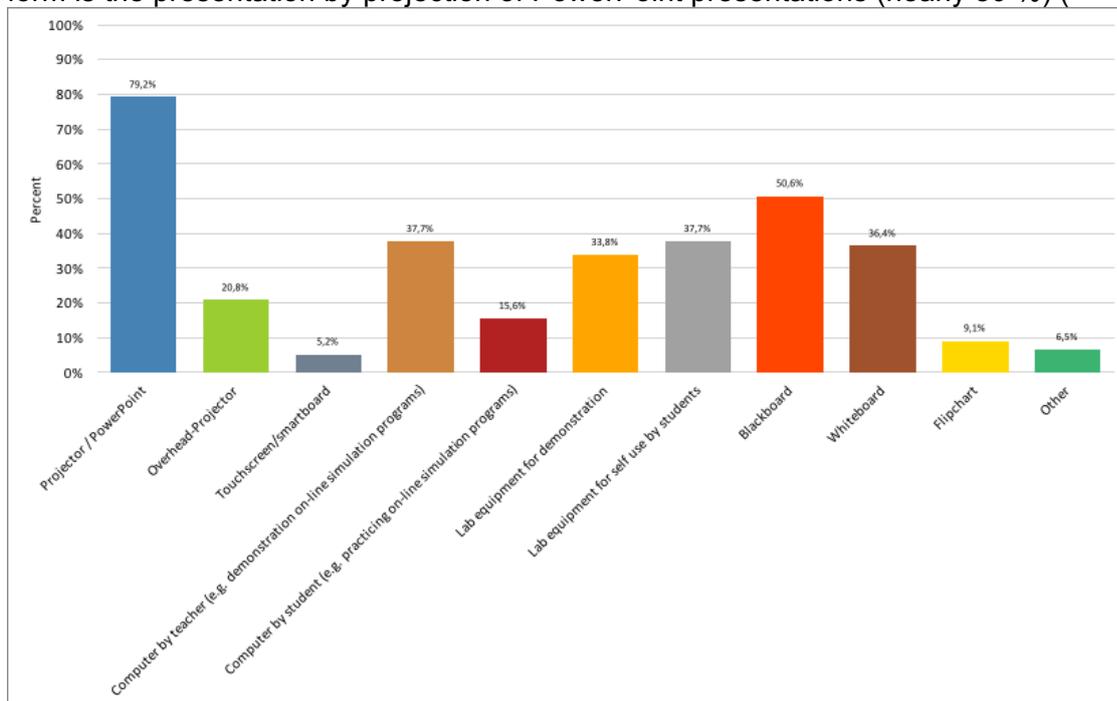


Figure 5). The use of other forms of projection (Overhead, Touchscreen or smartboard) is on a very low rate. But also conventional forms like black-, whiteboard or flipchart are very common and cover more than 90 % together.

Approximately 38 % of the courses uses computer for demonstration but only 15 % can be used by students to get experience by their own.

In the labs the use of the equipment by the students (38 %) is slightly higher than the use for demonstration purposes only (34 %).

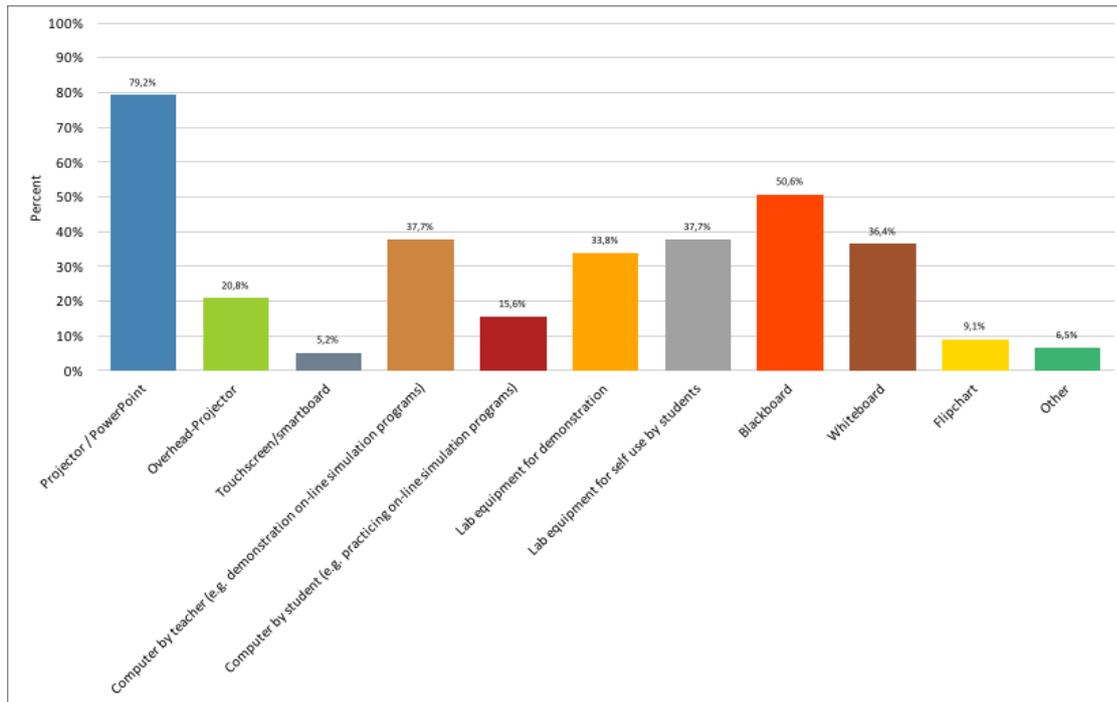


Figure 5: Tools used in the courses (no. of courses: 77)

Three quarter of the courses are using the lecture notes or print-outs (Figure 6). The distribution of copies of the lecture slides is also very common (46 %). The use of external textbooks is also very familiar (48 %); the list of textbooks in use is given in the Annexe.

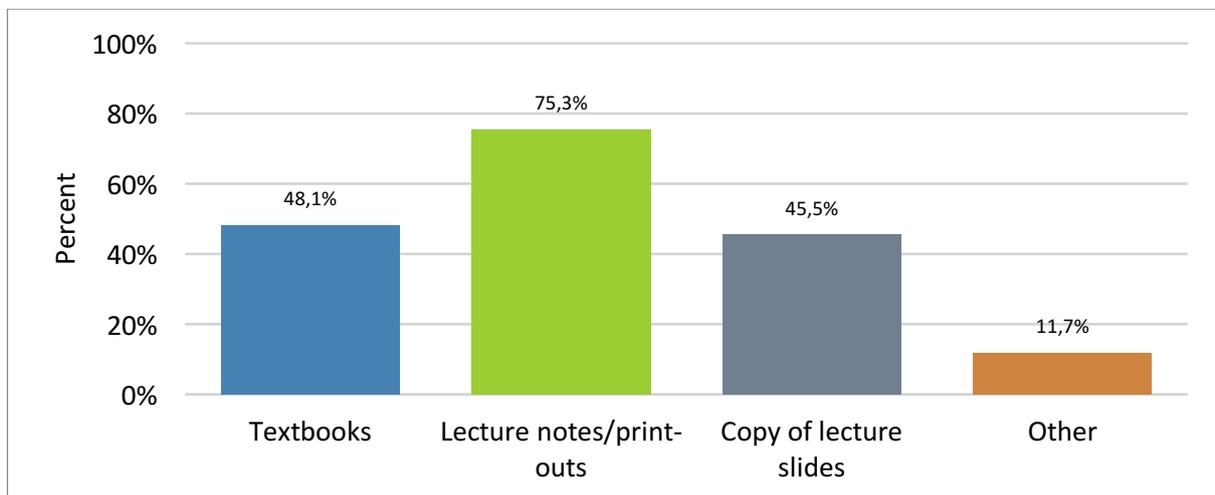


Figure 6: Teaching material in use

3.3 Use of E-Learning tools

The use of e-learning platforms is not very common for the courses (Figure 7). For only 22 % of the courses this tool is in use.

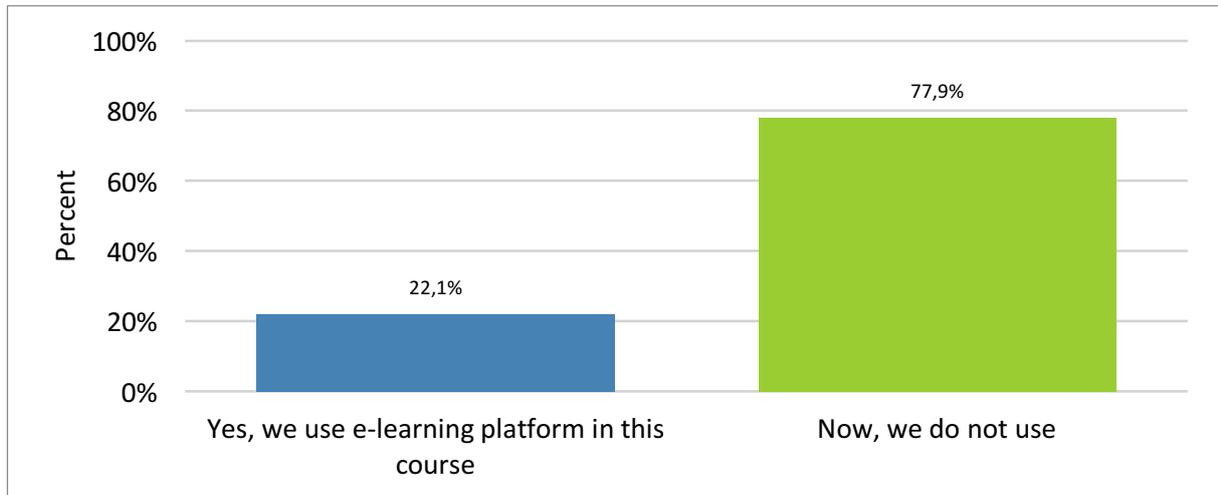


Figure 7: Use of e-learning platforms for teaching

In most of the cases e-learning platforms are used for the deposition of lecture material and additional material of the courses. The use for online courses of online tests isn't very common at the moment.

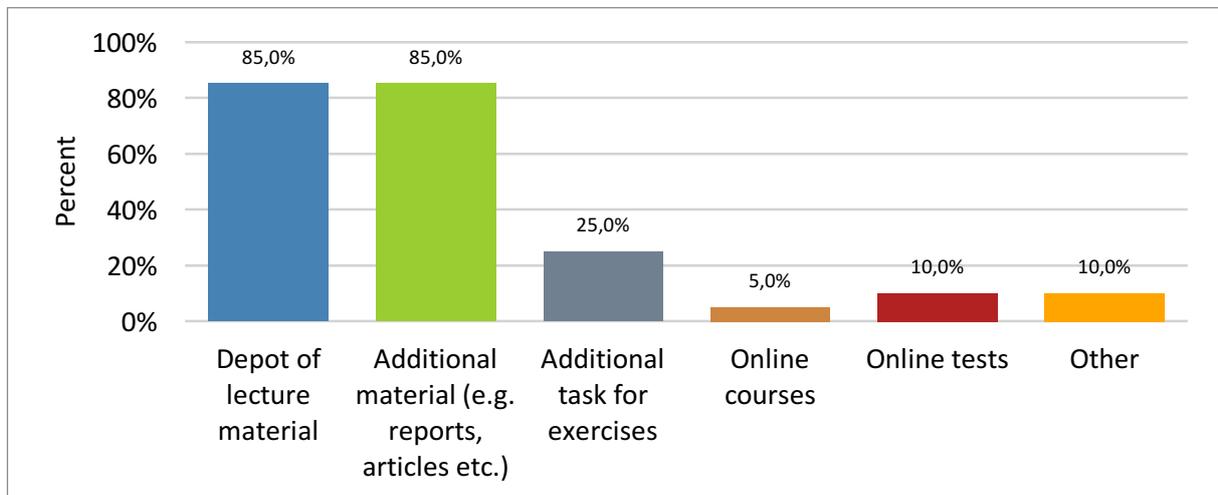


Figure 8: Kind of use of e-learning platforms for teaching

3.4 Examination of courses

Three quarter of the courses are finished with a written examination, for the other quarter an oral examination is in use (Figure 9). Also presentations in oral and written form prepared by the students are a well-known kind of examination. The use of online tests with e-learning methods are not in use at the moment.

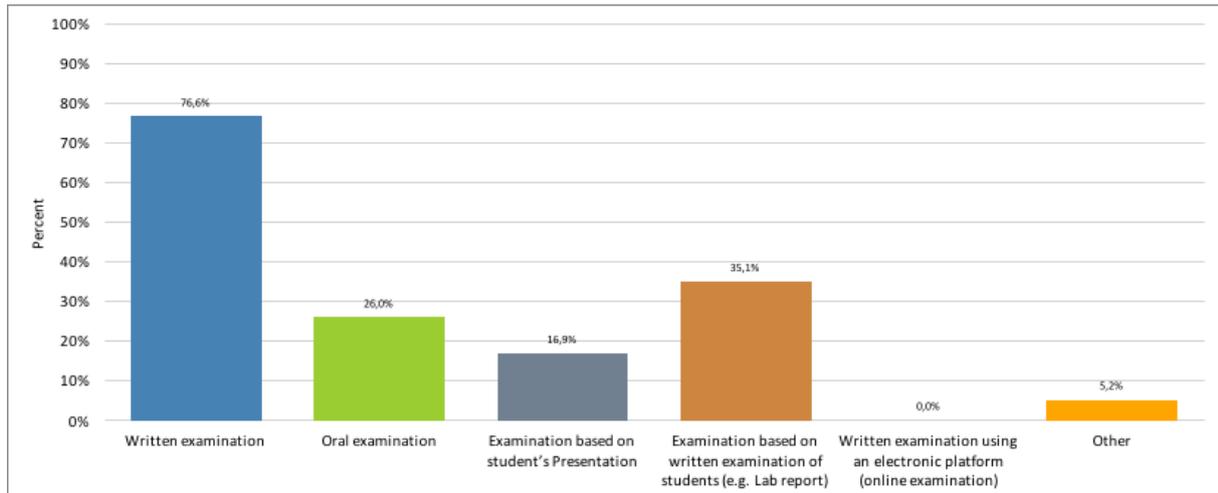


Figure 9: Form of examination of the courses

In one case the preparation of papers of conference reviews or conference readings are a kind of examination at SJU in China.

3.5 Recommendations for Best Practices

All participants have given recommendations for Best Practices based on their own experience:

- Visits to municipal water treatment plants and wastewater treatment plants
- Excursion to certified water laboratories
- Student's presentation based on their own experience, which obtaining during Lab work
- Integration of exercises into the lectures and monitoring off he exercises
- Computer modelling and simulation plants
- modern textbooks, e-learning platform as an addition
- expansion of the content with more mathematical and statistical methods for experimental, data conversion, extrapolation etc.
- participating in the application of assements or managements for one places (a city or field)
- students making survey from web or actual to learn the local water supply technologies, enhancing their understanding about the technology application, improving their interests
- A combination with field trips and presentations given by practitioners
- Active participation of students (and enough time) when defining the problems and discussing the results
- Students group project work, depending on the content of subject
- More group work for students on specific topics
- Quizzes for continuous assessment
- Assignments and quizzes for continuous assessment



4 Wishes and suggestions

4.1 Improvement of courses

A number of participants have given suggestions for the improvement of their courses:

- More use of software for design and operation
- Use of simulation software („green“ purification) with access for student’s use
- Better lab equipment
- more use of lab exercises
- more use of mathematical-statistical methods (excel) for lab data conversion for instance
- decreasing the relation teacher:student
- Using of video-lectures and presentations (e-learning) for
 - improvement of level of teaching by the use of partner’s curricula (for CHDTU)
 - using of simulation programs
- Group work on hydraulic designs
- students have a monitoring exercises in the monitoring companies for several days
- If some building models equipped with water supply system / drainage system / fire hydrant system is provided, the students will get a good understanding.
- Group work on hydraulic designs
- changing the group project in to individual project

4.2 Improvement of tools

A number of participants have given suggestions for the improvement of the tools for their courses:

- Power Point presentations
- Use of e-learning tools:
 - lecture material
 - online tests
 - online studying courses
- Use of software for data conversion and also for modelling, even demanding some expenses
- Use of models about balances of the water resources (ground water, surface water, etc.)
- Use of simulation software of treatment processes (comparison „green“ methods with conventional ones) for various processes (water treatment, pumping etc.)
- Lab equipment for demonstration or Lab equipment for self use by students
- Use of modelling software for the support of lab experiments
- atomic absorption spectrophotometer and the interactive whiteboard.



5 Annex

5.1 List of Textbooks used for the courses

American Water Works Association	Standard Methods for the Examination of Water and Wastewater (2012)
Astrelin, I.M, Ratnaweera, H (editors) Bobalo Y.A.; Piha Z.G.	Physical and chemical methods of water treatment, Water Harmony Project, 2015 "Tests of professional English". Part I and II, Lviv, National university- Lviv Polytechnic, (2011)
Burke, K.; Carey, P.	Data Analysis in Microsoft Excel, Moscow.: Publishing House "Williams, (2005)
Crittenden, J. C.; Rhodes Trussell, R.; Hand Kerry, D.W.; Howe, J.; Tchobanoglous, G. Dakhno I.I	Water Treatment: Principles and Design (2012) Intellectual property in Ukraine: Textbook, Kyiv, Lybid, (2003)
Danilov-Danilyan V. I.; Khranovich I. L..	Water resources management. Harmonizing water use strategies. - M.: NAUCHNYI, MIR, (2010)
Dolina L.F	Design of the wastewater treatment plant for villages, Dnepropetrovsk. Continent , (2002)
Dolina L.F.	New technology and facilities for oily wastewater, Dnepropetrovsk: Continent, (2005)
Dolina L.F.	Modern equipment and technologies for wastewater treatment from heavy metal salts, Dnepropetrovsk: Continent, (2008)
Draginsky V.L. DWA DWA	Ozonation in water treatment processes (2007) Sustainable sanitation (in german) Wastewater discharge and sewer system (in german)
Gevod, V.S.	Bubble-Film Extraction Fundamentals and Application, Handbook of Surface and Colloid Chemistry, Third Edition. CRC Press Taylor and Francis Group: Boca Raton, London, New York, (2009)
Gevod, V.S.; Reshetnyak, I.L.	Water Purification Devices: State-of-the Art Review, Handbook of Surface and Colloid Chemistry, Fourth Edition, K.S.Birdi. CRC Press Taylor and Francis Group: Boca Raton, London, New York, (2015)
Gleick, P and others	The World's Water Volume 8: The Biennial Report on Freshwater Resources (2014)
Gomelia M.D.; Krysenko T.V.; Deykun I.M. Gursky D. E.	Treatment plants. Fundamentals of design, NTU "KPI", (2007) Turbina Calculations in MathCad, Peter: St. Petersburg, (2006)
Gutsal I.A.	The technology of sewage treatment, Kharkov: KSAME, (2009)
Hayrapetyan T.S.	Technology of industrial waste water treatment, Lectons. Kharkov: KSAME, (2008)
Ismuhambetov J.D.; Sagitov A.O. and others	Recommendations for Ozone ion-ozone disinfection technology of grain in storage, Almaty KazAgroInnovation (2011)
Karmanov A.P.; Pauline I.N.	Karmanov A.P.; Pauline I.N. Waste water technology, Syktyvkar: SFI, (2015)
Khokhryakova E.A.	Modern methods of water disinfection» "Aqua-Therm" (2014)
Klimenko P.	Technoecology. - Odessa: Tavriya, (2000)



Kolesnikov O.V Komarova L.F.; Kormina L.A.	Basics of scientific research, (2011) Engineering methods of environmental. Technique of protection of the atmosphere and hydrosphere from industrial pollution.-Barnaul: Altai, (2000)
Komarova L.F; Poletaeva M.A	Water use in enterprises and Wastewater treatment in various industries Textbook – Barnaul, Altai State Technical University, (2010)
Konyk O.A; Kuzivanova A.V. Kopajev E.V.	Solid waste technology, Syktyvkar: SFI, (2013) Basics of the scientific research. Lectures, Dnepropetrovsk: DNU, (2010)
Koroteeva, A.S. (editor)	Experience of membrane technology using for the purification and desalination of water, Chemistry (Moscow), (2008)
Kozhinov V. F.; Kozhinov I.V. Kozhinov V.F.	Ozonation of water, Moscow, Stroyizdat, (1974) Drinking and industrial water, Moscow, Bastet, - (2008)-
Kulskiy L.A.; Strokach P.P. Mikulonok I.O.	Treatment Technology of Natural Water (1986) Fundamentals of Intellectual Property:
Makarov E.G	Handbook, Polytechnic publishing Libra, (2005) Engineering calculations in MathCad, Peter: St. Petersburg, (2005)
Novak, P.; Moffat, A.I.B.; Nalluri, C.; Narayanan, R.	Hydraulic Structures, (1990)
Orlov V.A. Panteleev A.A.; Ryabchikov B.E. and others Pryazhinskaya V.G.; Yaroshevskiy, D.M.; Levit-Gurevich, L.K. Shashkoff I.V.; Klinkof A.S; Belyaev P.S; Sokolov M.V	Ozonation of water, Moscow, Stroyizdat, (1984) Membrane separation technology in the industrial water treatment”, DeLee Plus, (2012) Computer modeling in water resources management.- M.: PHIZMATLIT, (2002) Equipment and technology of continuous recycling of film termoplasts, Tambov, - Publishing House of VPO "TSTU“, (2012)
Shevchenko M.A; Lyzunov V.V. Shtripling L.O.; Tarasenko F.P.	Water Treatment Technology, Kyiv, (1980) Fundamentals of waste water treatment and solid waste management Textbook. Omsk:
Stadnichenko O.O.; Matsehora I.L	Omsk State Technical University, (2005) Basis of scientific researches and informational culture of students, Zaporizhzhya National University, (2009)
Stashuk V.A	To the question of water policy in Ukraine through the principles of Basin Water Management, - Economy – Compilation of scientific papers- Rovno NUWMNRU, (2007)
Stolyarenko G.S.; Klimenko T.V.	Water Treatment Technology: Laboratory Tutorial, Cherkasy: CSTU (2010)
Svyatotskii O.D. (Editor); Petrov V.L.	Intellectual Property: Dictionary-Directory, Volume 2 - Industrial Property, Kyiv "In Jure", (2000)
Switz A.A.	Introduction to membrane technology, Mendeleev University of Chemical Technology of Russia, (2006)
Szklaarska V.I	Methodological basis of scientific research, Lviv: "Lviv Polytechnic", (2007)
Tavartkiladze I.M.; Nechypor O.M.	Sewerage. Wastewater treatment, 2 books. Book 1. Treatment of urban and industrial wastewater. Kyiv: KNUBA. 252 p. (2014)
Timonin A.S.	Engineering-ecological reference book.-T.1-3.- Kaluga: Mir, (2003).
Tsybulov P.M; Chebotarev V.P.; Zinoviy V.G.; J. Sweeney Y.	Intellectual Property Management, edited by Tsybulov P.M., (2005)



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Xi, D.
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Zapolskiy A.K.; Miirjva-Klimenko N.A.;
Astrelin I. M.; M.T. Brik; Gvozdyak P.I.;
Knyazkova T.V.
Zengzhang, W.
Zharov V.
Гевод В.С. и др.
Гевод В.С., Гевод С.В.
Капица ПЛ.
Огурцов О.М.
Сиденко В.М., Грушко ИМ.
Чкалова О.Н.
Балуха М.Т..
- Water Supply „Znanie“ (2009)
English for Professional Communication.
Textbook, (2010)
Environment Monitoring, 4th edition, Donghua
University publishing house, (2010)
The national policy of water management in
Ukraine, e-resource -
<http://gntb.gov.ua/files/conf08/zak.pdf>
Physical and chemical Technology of Waste
Water Treatment, Kiev, Libra, (2000).
Building water supply and drainage, China
Architecture & Building Press, 5th edition,
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Protection of intellectual property in Ukraine:
Textbook, (2005)
Fundamentals of scientific research. Guidance
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with scientific information, Dnipropetrovsk
USCTU, (2008)
Integrated Water Resources Management.
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Поверхностно-активные и другие загрязнения
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Эксперимент, теория, практика. — М.: Наука,
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