6.4.3 University of Novi Sad – Faculty of technical sciences

At the Faculty of Technical Sciences, from its establishment until now, more than 17.000 students obtained Bachelor and Master degrees in engineering and more than 600 candidates obtained a PhD in engineering.

Based on recommendations of the University (initiated by the Faculty of Technical Sciences), the Rules on completion of the studies and acquisition of a title were adopted by the Law on Higher Education. According to that, the students were allowed to move into a new system of studies. They need to achieve 270 credits and then they can finish their studies after the defense of a Master thesis (30 credits). Therefore, in the end, the student achieves a total of 300 ECTS credits. The Faculty of Technical Sciences was the first faculty in Serbia to enable students to replace their degree with the ''new'' Master degree, according to the Law on Higher Education. So far, around 1,000 diplomas have been substituted at the Faculty. On the 23rd May 2008, the Faculty of Technical Sciences received the Decision on the accreditation of the Faculty as a higher education institution.

The Faculty of Technical Sciences originates from the Faculty of Mechanical Engineering, which was established by the Decree of the National Assembly of People's Republic of Serbia on 18th May 1960 as the Faculty of Mechanical Engineering in Novi Sad. At the beginning, it was a constituent part of the University of Belgrade. Then, after the founding of the University of Novi Sad on 28th June 1960, the Faculty of Mechanical Engineering as well as other six previously established faculties in Vojvodina became part of the University of Novi Sad.

In the first period of its development the Faculty of Mechanical Engineering provided educational activities for three different profiles of mechanical engineering. In 1971, electrical and civil engineering studies were also founded. The establishment of the Department of Electrical Engineering as well as of the Department of Civil Engineering brought - on 22nd April 1974 - to the change of the name into Faculty of Technical Sciences. In the academic year 1979/80, the studies in the area of traffic engineering started, and in 1996/97 the first generation of students of architectural engineering was enrolled. In the academic year 1999/2000 several different studies for the new professional profile were introduced: Industrial Engineering and Engineering Management, Graphic Engineering and Design, Environmental Engineering. Curricula for Postal Services and Telecommunications were introduced at the Department for Traffic Engineering in 1999/2000. Interdisciplinary studies of Mechatronics were established in the academic year 2002/03. In the academic year 2006/07, the first generation of students of specialist academic studies was enrolled at the Faculty (according to the Law on Higher Education). The studies of Geodesy and Geomatics engineering were introduced into the educational activities of the Faculty in the academic year 2007/08. Furthermore, in 2009/2010, the studies of Occupational Safety and Health were established at the Department of Environmental Engineering, as well as the undergraduate professional programme at the Department of Power Engineering – Renewable Energy Sources. In the academic year 2013/2014 the following curricula are established: Biomedical Engineering, Measurement and Control, Clean Energy Technologies, Stage Architecture, Engineering and Design, Electric Power Software Engineering, Software Engineering and Information Technology and undergraduate professional studies within the curriculum of Electronics and Telecommunication. Beside Treatment and Water Protection program, master studies are organized also at: Mathematics in Engineering; Energy Management; Logistic Engineering, Digital Technology, Design and Production of Architecture and Urban Planning, Industrial Engineering - Advanced Engineering Technology, Industrial Engineering – Development and Product Lifecycle Management, Planning and Management of Regional

Development as well as. The Faculty of Technical Sciences offers a very prominent educational profile for prospective engineers, which ranks it among the most developed institutions in the field of technology in Serbia. The Faculty of Technical Sciences is organized as a unique complex institution comprising smaller organizational units such as departments, chairs, research centers, registrar offices, etc. for appropriate scientific fields and laboratories.

CURRICULUM IN WATER TREATMENT AND PROTECTION ENGINEERING

The name of the curriculum is Water Treatment and Protection Engineering. It is a Master academic study at the Department of Environmental Engineering and Occupational Safety and Health, Faculty of Technical Sciences, University of Novi Sad. The acquired academic degree is Master in Water Treatment and Protection (M.Sc.). A student has to complete the undergraduate studies with a minimum of 180 ECTS and to pass an entrance examination in order to be enrolled in the curriculum.

This document has been developed based on the Serbian accreditation document of the University of Novi Sad: DOKUMENTACIJA ZA AKREDITACIJU STUDIJSKOG PROGRAMA: "INŽENJERSTVO TRETMANA I ZAŠTITE VODA" MASTER AKADEMSKE STUDIJE.

The framework of the document is structured according to the EUR-ACE guidelines and to the following documents:

- EUR-ACE Framework Standards for the Accreditation of Engineering Programmes (as approved by the ENAEE Administrative Council on 5 November 2008).
- Modello CRUI/EUR-ACE per la Certificazione della Qualità e l'Accreditamento EUR-ACE dei Corsi di Laurea e dei Corsi di Laurea Magistrale in Ingegneria, Agenzia per la Certificazione della Qualità e l'Accreditamento EUR-ACE dei Corsi di Studio in Ingegneria - QUACING (2011).
- Rapporto di Autovalutazione a.a. 2012/2013, Università degli Studi di Firenze, Facoltà di Ingegneria, Corso di Laurea Magistrale in Ingegneria per la Tutela dell'Ambiente e del Territorio.
- Caporali E., Catelani M., Manfrida G., Valdiserri J., Accreditation of Environmental Engineering Education at the School of Engineering, University of Firenze (Italy), ENAEE Annual Conference (2013).

Needs, Objectives and Outcomes

The Master Program "Water Treatment and Protection Engineering" enables the students to concretize and expand their knowledge concerning waste water treatment. It allows understanding the basic principles of engineering in various fields of environment protection, acquiring additional expertise for the implementation of modern technical systems, gaining ability for knowledge integration to be applied in any particular case, ensuring them to be engaged in independent research and creative work during realization of the curriculum.

As matter of fact, developing countries often have to face uneven economic growth and need for sustainable development. It imperatively requires trained professionals, who will be prepared and trained for commercial and industrial systems, public enterprises and state institutions. They have to deal with all the complex problems accumulated in the field of environmental engineering and especially water treatment and protection.

In fact, the interdisciplinary nature of the curriculum Water Treatment and Protection Engineering, being a result of technical and engineering skills, specifically educates engineers in the field of environmental protection and enables them to solve the accumulated problems in the system of environmental and water protection, as well as in other industrial and commercial systems.

Evaluation

The curriculum Water Treatment and Protection Engineering is developed in response to the needs of the industry, business and institutions, which have to face environmental problems and ask for engineers with interdisciplinary expertise in the field of environmental engineering and water treatment and protection. This requirement is fulfilled because the curriculum was specifically designed on the basis of an extensive needs analysis and surveys of labor market needs. It ensures consistency and practical relevance of the academic program in the area of environmental protection at national and international level.

Program Educational Objectives

The aim of the curriculum is to achieve competence and academic skills in the field of Water Treatment and Protection Engineering. Being continued to undergraduate studies and including additional fundamental scientific disciplines as well as some vocational courses, such a master study enables students to develop creative skills and ability to consider issues with critical independent thinking, develop capacity for teamwork, cooperation and mastery of specific theoretical and applicative skills. The aim of the study is to educate a professional engineer who possesses the necessary knowledge in basic scientific disciplines, able to depict a realistic picture of the processes that occur in industrial systems and environment. In this regard, classic as well as special engineering disciplines are addressed. They are related to the fields of mechanical engineering, electrical engineering, programming and applied professional disciplines concerning water management and hazardous materials, environmental projects, management and risk reduction in environment.

One of the specific objectives, consistent with educational goals of experts from the Faculty of Technical Sciences, focuses on the development of knowledge and awareness among students about the need for permanent education (life-long learning 3L), and in particular on sustainable development and environmental protection.

Furthermore, the Faculty of Technical Sciences defined graduate master tasks and objectives for the purpose of education of highly competent staff in the field of industry, business, profession, science and engineering disciplines. The purpose of the curriculum in Water Treatment and Protection Engineering is fully consistent with these graduate master tasks and goals of the Faculty of Technical Sciences. The realization of such a curriculum results in education of Master engineers in Water Treatment and Protection Engineering that have competence, comparability and competitiveness in European and world levels. The final aim of the curriculum is to educate a master capable of teamwork, who can reveal the scientific results to experts and public and also able to be engaged in research.

Evaluation

The program educational objectives are consistent with the objectives pursed by the higher education institution, as well as with the needs of the labor market.

Program Outcomes

The purpose of the curriculum is to educate students for the profession of Master in Water Treatment and Protection Engineering, in accordance with the basic needs of society. The curriculum Water Treatment and Protection Engineering is designed to provide acquisition of competence and skills that are socially justified and useful.

Graduate Master Students of Water Treatment and Protection Engineering are competent and qualified to solve complex multidisciplinary problems, both from the theoretical and practical point of view. Competencies include, above all, developing skills of critical and independent thinking, skills of problem analysis, solution synthesis, prediction and behavior of selected budget solutions with a clear idea of good and bad sides of the chosen solution.

Qualifications and competences for the completion of the graduate academic studies are gained by the students, who:

- demonstrated theoretical knowledge and understanding in the field of environmental engineering, also increased by the knowledge gained at undergraduate studies. It is the basis to develop critical and independent thinking;
- are able to apply knowledge for solving complex problems in the new or unknown environment;
- who have the ability to integrate knowledge, solve complex engineering problems and to reason on the basis of information available, including considerations and responsibilities;
- are able to clearly and unambiguously transfer the knowledge and way of reasoning to professionals and general public;
- possess the ability to continue their studies in individual way.

Regarding specific abilities, it is worth mentioning that through a graduate academic curriculum, a student acquires basic knowledge and understanding of all disciplines of the selected study group and ability to solve specific problems using scientific methods and procedures.

A student with a Master degree in Water Treatment and Protection Engineering is capable to adequately define and present the results by intensive use of information and communication technologies. A student with a Master degree has an additional competency, compared to students in undergraduate studies, for application of knowledge in practice, monitoring and implementation of innovations in the profession. An important educational outcome is to train the students to independently apply the previously acquired knowledge, that was gained in the different fields previously studied. This allows to review the structure of the given problem and its system analysis and to draw conclusions on possible directions for its resolution. By reading literature, the students

expand their knowledge in the selected field and study various methods and papers relating to similar problems. In this way, the students develop the ability to conduct analyses and identify problems within the given topic.

Students are especially trained to design, organize and manage environmental protection. During education, a student acquires the ability to independently plan and conduct experiments with statistical data processing and to formulate and make the appropriate conclusions. Furthermore, a student with a Master degree in Water Treatment and Protection Engineering acquires special competence to sustainably use and protect the natural resources of the Republic of Serbia in accordance with the principles of sustainable development.

Evaluation

The program outcomes are consistent with the educational objectives and the market needs. In the future, it would be advisable to compare the outcomes of these curricula with those of other similar programs in other universities.

EDUCATIONAL PROCESS

Admission requirements

Every year a certain number of students is enrolled at the Faculty of Technical Sciences, depending on the social needs and the infrastructure resources, either through budget financing or self-financing. This is annually defined by special decisions of Scientific Educational Council of the Faculty of Technical Sciences. Students from other academic programs as well as persons who have completed other studies can apply for enrollment in the curriculum Water Treatment and Protection Engineering. In this respect, the evaluation committee (comprising heads of all departments involved in the realization of the curriculum) evaluates all the passed activities of candidates for enrollment. The evaluation is based on the recognized number of points determined by the year of study in which a student needs to be enrolled. The passed activities can be recognized in full, in part (Commission may require the proper supplement) or they cannot be recognized at all.

Evaluation

The criteria for enrollment are clearly defined by the recognized number of points determined by the year of study that the student applies for. It would be advisable, in the future, to develop some agreements with the other curriculums in order to facilitate the enrollment of students without educational debts.

Planning

The curriculum of graduate academic studies in Water Treatment and Protection Engineering is designed for the purpose of achieving defined goals and competencies. The structure of the curriculum includes elective courses with at least 30% points. Through elective courses, students meet their affinities profiled during undergraduate academic studies. The fundamental scientific disciplines, which are studied at this level, define the research character of the program and enable even better understanding of the complex processes in the environment. They also lie the

foundations for further scientific research at academic level. All courses last one semester and carry a certain number of points (one point corresponds to about 30 hours of student activities).

The study program includes the description of each course containing the name, the type of article, the year and the semester, the number of ECTS credits, the name of the teacher, the aims of the course and the expected outcomes, the knowledge and the competencies, the prerequisites for attending the course, the course content, the recommended literature, the methods of teaching, the way of testing and assessment knowledge. The study program is consistent with European standards in terms of conditions of enrolment, duration of study, conditions of transition to the next year, graduation, and modes of study.

Table 1. Study program and distribution of courses per semester - first year (S-semester; T-Teaching; E-Exercises; SR – Study Research; OFC - Other forms of teaching, O – obligatory; E – elective; EC – Elective choice)

Table 1. Study program and distribution of courses per semester - first year (S-semester; T-Teaching; E-Exercises; SR – Study Research; OFC - Other forms of teaching, O – obligatory; E – elective; EC – Elective choice)

FIRST YEAR												
No.	Course code	Course title		S	Type	Status	Active classes				Other classes	ECTS
							T	E	SR	OFT		
1	MPK001	Statistical and numerical methods		1	AGE	O	3	1	0	1	2	9
2	MRKI	Elective Course 1 (choose 1 of 2)		1		EC	2	2	0	0	0	5
		MPK004	Fundamentals in hydrotechnics and hydromechanics	1	SE	E	2	2	0	0	0	5
		MPK021	Sources and pollution of the environment	1	SE	E	2	2	0	0	0	5
3	MPKI2	Elective Course 2 (choose 1 of 2)		1		EC	2	2	0	0	0	5
		MPK022	Hydrometry	1	TM	E	2	2	0	0	0	5
		MPK023	Basics of biological principles of the environmental protection	1	TM	E	2	2	0	0	0	5
4	MPKI3	Elective Course 3 (choose 1 of 2)		1		EC	2	2	0	1	0	6
		MPK005	Analysis of the system of environmental protection	1	PA	E	2	2	0	1	0	6
		MPK028	Hydrotechnical objects and systems	1	PA	E	2	2	0	1	0	6
5	MPK026	Technological processes of water quality control		1	SE	O	3	2	0	0	0	7
6	MPK027	Management of envirnmental protection systems		2	TM	O	2	3	0	0	0	5
7	MPK009	Hazards and the environment		2	PA	O	3	3	0	0	2	9
8	MPK015	Technologies of renewable energy sources		2	SE	O	2	2	0	0	0	6
9	MPK029	Groundwater hydraulics		2	PA	O	3	2	0	1	0	8
Total number of active classes:							44					
Total number of ETCS credits: 60												

Types of courses:

AGE - Academic general education,

SE - Scientific-Expert,

TM - Theoretical and methodological,

PA - Professional and applicative

Table 2. Study program and distribution of courses per semester - second year (S – semester; T – Teaching ; E – Exercises; SR – Study Research; OFC - Other forms of teaching; O – obligatory; E – elective; EC – Elective choice)

SECOND YEAR													
No.	Course code	Course title		S	Type	Status	Active classes				Other classes	ECTS
							T	E	SR	OFT		
10	MPKI21	Elective Course 1 (choose 1 of 3)		3		IB	2	2	0	0	0	4
		MPK003	Advanced sanitary engineering	3	PA	I	2	2	0	0	0	4
		MPK012	Solid waste management	3	TM	I	2	2	0	0	0	4
		MPK014	Monitoring and system management	3	SE	I	2	2	0	0	0	4
11	MPK025	Design of drinking water treatment processes		3	PA	O	3	2	0	0	1	5
12	MPK024	Design of wastewater treatment processes		3	PA	O	3	2	0	0	1	5
13	MPK018	River basin management		3	PA	O	3	2	0	0	1	5
14	MPKI22	Elective Course 2 (choose 1 of 2)		3		IB	2	2	0	0	0	4
		MPK017	Fundamentals in geotechnics	3	SE	I	2	2	0	0	0	4
		MPK019	Risk management	3	PA	I	2	2	0	0	0	4
15	MPK020	Management of environmental impact assessment		4	PA	O	2	3	0	0	0	4
16	MPK0SP	Internship		4	PA	O	0	0	0	0	3	3
17	MPKSIM	Research work on theoretical aspects of master thesis		4	PA	O	0	0	15	0	0	15
18	MPK0ZR	Preparation and defence of master thesis		4	PA	O	0	0	0	0	10	15
Total number of active classes							43					
Total number of ETCS credits: 60												

Types of courses:

AGE - Academic general education,

SE - Scientific-Expert,

TM - Theoretical and methodological,

PA - Professional and applicative

An integrated part of the curriculum in Water Treatment and Protection Engineering is constituted by professional practice and practical work, for a total amount of 80 hours. This can be implemented in the relevant scientific research institutions, in organizations for innovation activities, in organizations which provide infrastructural support to innovation activities, in enterprises and public institutions. The educational goal of professional practice is to gain a direct knowledge about the working principles and the organization of those companies and institutions dealing with matters for which the student is getting qualifications and where he/she has the possibility of applying the acquired knowledge into practice. The students learn how to apply the previously acquired theoretical and professional knowledge to solve specific practical engineering problems in the selected companies or institutions.

The issue of professional practice is to introduce the students into the activities of the selected companies or institutions, their ways of doing business and management. Performing professional practice is done in agreement with the management of companies or institutions, and in accordance with the needs of the profession for which the student is qualified.

The student completes his/her studies by the elaboration of a master thesis. It involves theoretical and methodological preparation for in-depth understanding of the chosen field of study. Prior to the defense of the thesis, the candidate has to give proof of his/her theoretical and methodological competences in front of a Commission. The final assessment of the master thesis is performed on the basis of the theoretical and methodological preparation, on the evaluation of the contents of the thesis and on its defense. The final thesis is defended in front of a committee consisting of at least three professors, of whom one member has to be from another Department or Faculty. The educational goal of the master thesis is the application of theoretical, methodological, scientific, technical and professional knowledge, as well as the application of methods to solve specific problems within the selected area of study. By studying literature, students are introduced to the methods that are designed for solving similar tasks in engineering practice. In this way, the student acquires the necessary experience to solve complex problems and tasks and explores the possibilities to apply the previously acquired knowledge in practice. Then, in the second part of the master thesis, the candidate studies the problem and the complexity of its structure and draws conclusions on the possible ways of solving it.

The Master Thesis is formed in accordance with the individual needs. At first, the student studies the literature and learns about other projects that deal with similar topics. Then, he makes analyses of possible solutions to the specific task of the master thesis. Part of the work is conducted through independent research. It includes active monitoring of the current state of knowledge, organization and conduction of experiments, numerical simulations and statistical analysis of data. The Mentor compiles and submits to the student the tasks of the master thesis. The student is required to work within the given framework to the development of a given topic, which is defined task of master thesis work, by using literature from the proposed mentor. During the preparation of the master thesis, a mentor can give students additional guidance and references to specific literature. In the research study, the student consults the supervisor, if necessary, and also other teachers who are dealing with related topics. In case of need, the student performs measurements, tests, counts, surveys and other research on statistical data.

Evaluation

The planning of the curriculum is consistent with the educational objectives and outcomes. Particular relevance is given to the internships - which allow a practical application of the previously

acquired knowledge - and to the outline of the master thesis, in accordance with the individual needs and interests.

Delivery and Learning Assessment

Classes are taught through lectures and exercises. In the teaching process, special stress is put on the independent student research as well as on increasing his personal involvement in the educational process.

Lectures are supposed to explain the teaching material, through the use of appropriate didactical means. On this occasion, the students are also informed about research trends in the respective areas. During the exercises, which follow the lectures, specific tasks are presented and examples that further illustrate the material are exposed. In addition, exercises are supposed to provide additional information to the teaching material explained during the lectures. Exercises can be auditory, laboratory, computing or calculating. The part of the exercises can be performed in factories or other institutions. Student's obligations regarding exercises can include the elaboration of seminar papers and homework, project assignments or graphic works. Each student's activity during the teaching process is monitored and evaluated according to the rules adopted at the department level. Each course carries a certain number of ECTS. The entire study is considered completed when the student fulfils all the obligations under the study program and thereby gains a minimum of 60 ECTS.

Teaching methods are expressed through lectures, exercises and consultations. Examinations may be taken in the form of two colloquiums, each one presenting a chapter of the teaching material. Both colloquiums are taken in a written form. Colloquiums are held during the semester of instruction. Students who do not pass through colloquiums are obliged to take the entire exam at the final examination session. The final grade for each course of the curriculum is formed by continuous monitoring of students work and results during the academic year and the final exam. A student fulfill the study program by taking exams and acquiring a certain number of points. Each individual course in the program carries a certain number of points, which is achieved when a student successfully pass the exam. The number of points per each course is defined by a unified methodology of the Faculty of Technical Sciences for all curricula. It reflects how the student is burdened with obligations, on the basis of student's workload. The student success in mastering a particular course is continuously monitored during the teaching, and is expressed in points. The maximum number of points a student can achieve on the course is 100.

A student obtains the points of the course through involvement in the teaching process and fulfillment of pre-examination obligations. Each course of the curriculum has a clear way of gaining points. The way of gaining points during the teaching process includes a number of points that a student can obtain on the basis of a particular type of activities during the teaching process or through performing the pre-examination obligations and taking exams. The minimum number of points which a student can obtain by fulfilling the pre-examination obligations during the teaching process is 30 and the maximum number is 70.

The final success of the student for a given course is expressed by grades from 5 (failed) to 10 (excellent). Assessment of students is based on the total number of points obtained by their fulfillment of obligations and taking exams, including the quality of acquired knowledge and skills.

Table 3. List of points achievable during the different courses (O – Obligatory; E – Elective)

No.	Course title	Status	Lecture Attendance	Prerequisites	Final examination
1	Statistical and numerical methods	O	5.00	45.00	50.00
2	Fundamentals in hydrotechnics and hydromechanics	E	5.00	45.00	50.00
3	Sources and pollution of the environment	E	10.00	40.00	50.00
4	Hydrometry	E	10.00	40.00	50.00
5	Basics of biological principles of the environmental protection	E	10.00	40.00	50.00
6	Analysis of the system of environmental protection	E	10.00	20.00	70.00
7	Hydrotechnical objects and systems	E	10.00	40.00	50.00
8	Technological processes of water quality	O	10.00	20.00	70.00
9	Management of enviornmental protection systems	O	10.00	20.00	70.00
10	Hazards and the environment	O	10.00	20.00	70.00
11	Technologies of renewable energy sources	O	10.00	20.00	70.00
12	Groundwater hydraulics	O	10.00	20.00	70.00
13	Advanced sanitary engineering	E	10.00	20.00	70.00
14	Solid waste management	E	10.00	20.00	70.00
15	Monitoring and system management	E	10.00	20.00	70.00
16	Design of drinking water treatment processes	O	10.00	20.00	70.00
17	Design of wastewater treatment processes	O	10.00	20.00	70.00
18	River basin management	O	10.00	40.00	50.00
19	Fundamentals in geotechnics	E	10.00	20.00	70.00
20	Risk management	E	10.00	40.00	50.00
21	Management of environmental impact assessment	O	10.00	40.00	50.00
22	Internship	O	0.00	50.00	50.00
23	Research work on theoretical aspects of master thesis	O	0.00	0.00	100.00
24	Preparation and defence of master thesis	O	0.00	0.00	100.00

The Faculty also has a Student Web Service. Application for examinations through web service started at the Faculty of Technical Sciences in the academic year 2005/06. Since then, it is possible to apply for examinations from home or any other location, without coming to the registrar office and waiting in a queue.

In order to use the web service, a student has to be enrolled for that school year. At enrolment a student opens a web account, gets a personal identification number with a password and a number for making payments to the Faculty. They have to complete the so-called SV20 form, with all their personal data and information about their parents. This is then sent to the Provincial Bureau of Statistics. Higher year students are required to periodically update their personal data.

A student can make or cancel an exam application up to two days ahead of the examination date. When the application is completed, the list of applicants is sent electronically to the teacher of the course, who will electronically return the file to the registrar office once the exam is completed. The introduction of student's web service has also enabled students to electronically register for the courses, view the list of the courses they have already done, together with the grades and the state of their financial card.

Evaluation

The teaching is delivered according to planning and the examinations demonstrate the achievement of the learning outcomes. Questionnaires to the students (see Appendix) prove the quality of teaching and quantify the amount of workload, as perceived by the students.

Curriculum specification of selected courses in the field of water management

Table 4. Specification of course: Technological processes of water quality control

<table>
<tr><td colspan="2">Course:</td><td colspan="5" rowspan="3">Technological processes of water quality control</td></tr>
<tr><td>Course code</td><td>MPK026</td></tr>
<tr><td>ECTS credits:</td><td>8</td></tr>
<tr><td colspan="2">Lecturers:</td><td colspan="5">PhD Marina Šćiban, Full Professor; PhD Milutin Darko, assistant professor</td></tr>
<tr><td colspan="2">Course status:</td><td colspan="5">O</td></tr>
<tr><td colspan="7">Number of classes (per week)</td></tr>
<tr><td>Lectures:</td><td>Practice:</td><td colspan="2">Other forms of classes:</td><td>Academic research:</td><td colspan="2">Other:</td></tr>
<tr><td>3</td><td>2</td><td colspan="2">0</td><td>0</td><td colspan="2">0</td></tr>
<tr><td colspan="2">Prerequisite courses:</td><td colspan="5">None</td></tr>
<tr><td colspan="7">1. Educational objectives:
Acquiring the necessary knowledge about the production processes that are used in the preparation (treatment) of the drinking water and the purification (treatment) of waste water.</td></tr>
<tr><td colspan="7">2. Educational outcomes (acquired knowledge):
Student should master the basic knowledge of:
· chemical reactions and reaction kinetics.
· nuclear engineering
· biological processes.
· processes used in water treatment and wastewater treatment.</td></tr>
</table>

3. Course content/structure:
Theoretical teaching: Basics of chemical reactions and reaction kinetics. Analysis of the reactor. Separation processes and mass transfer. Chemical oxidation and reduction. Coagulation and flocculation. The gravitational sedimentation. Flotation. Filtration through a granular medium. Membrane separation. Aeration and stripping gas. Adsorption. Ion exchange. Dry deposition. Disinfection. Basis of biological treatment (micro-organisms, microbial growth kinetics, suspended and immobilized by the growth of microorganisms, aerobic and anaerobic metabolism, biological nitrification and denitrification, the biological removal of phosphorus). Biological treatment processes. Practical classes: Computing practice (quantification process).

4. Teaching methods:
Classes are realized in the form of lectures, calculation exercises. There are two tests and two term papers, each of which contains a logical whole curriculum. In addition to lectures and exercises consultation are held regularly. Both, term papers and tests are taken in written form. Tests and term papers are held during the semester. Students who did not pass the perm papers must take the tests over the entire final exam.

Knowledge evaluation (maximum number of points 100)

Prerequisites	Compulsory	Points	Final examination	Compulsory	Points
Exercise attendance	Yes	5	Written exam	Yes	40
Lectures attendance	Yes	5	Oral exam	Yes	30
Test 1	Yes	10			
Test 2	Yes	10			
Colloquium exam I	No	20			
Colloquium exam II	No	20			

Literature

No.	Author	Title	Publisher	Year
1.	Spellman, F.R	Hadbook of Water and Wastewater Treatment Plant	SRC Press	2009
2.	J.C. Crittenden et all.,	Water Treatment: Principles and Design, 3rd Edition	John Wiley & Sons, Inc., Hoboken, New Jersey, USA	2012
3.	Metcalf & Eddy, Inc.	Wastewater Engineering: Treatment and Reuse, 4th Edition	McGraw-Hill, Inc.	2003

Table 5. Specification of course: Hydrometry

Course:		Hydrometry
Course code	MPK022	
ECTS credits:	5	
Lecturers:		PhD Milutin Darko, assistant professor
Course status:		E

Number of classes (per week)

Lectures:	Practice:	Other forms of classes:	Academic research:	Other:
2	2	0	0	0

Prerequisite courses:	None

1. Educational objectives: Enabling students in fundamental areas for the acquisition of professional knowledge and practical application.
2. Educational outcomes (acquired knowledge): Acquired knowledge is used as a basis for further development in professional courses
3. Course content/structure: Hydrological cycle, precipitation, evaporation and transpiration, infiltration, runoff, small river water, high river water, propagation of flood waves, water reservoirs, thermal regime of the river. Measuring water levels, falling water surface, depth of water, the rate of water flow, dissemination of sediment. Dependencies between the water level and flow, dissemination and sediment flow. Data processing.
4. Teaching methods: Teaching is done interactively through lectures, auditory and computer exercises. In lectures theoretical part is presented with characteristic examples for better understanding. For auditory exercises typical tasks are done which deepens on the exposed material. Lectures and exercises are regularly held. Part of the material, which makes a logical unit can be taken during the teaching process through colloquiums. Colloquia are written and in the form of the test. The final grade is based on: attendance at lectures and exercises (auditory and computer), success in examinations and written exam (combined tasks and theory).

Knowledge evaluation (maximum number of points 100)

Prerequisites	Compulsory	Points	Final examination	Compulsory	Points
Exercise attendance	Yes	5	Written exam	Yes	50
Lectures attendance	Yes	5			
Graphical paperwork	Yes	20			
Test 1	Yes	10			
Test 2	Yes	10			

Literature

No.	Author	Title	Publisher	Year
1.	Zelenović Emir	Engineering Hydrology	Scientific Book Belgrade	1991
2.	Jovanović Slavoljub	Hydrometry	Faculty of Civil Engineering Belgrade	1980

Table 6. Specification of course: Fundamentals in hydrotechnics and hydromechanics

Course:					
Course code	MPK004	Fundamentals in hydrotechnics and hydromechanics			
ECTS credits:	5				
Lecturers:		PhD Đurić Duško, associate professor; PhD Milutin Darko, assistant professor			
Course status:		E			
Number of classes (per week)					
Lectures:	Practice:	Other forms of classes:	Academic research:	Other:	
2	2	0	0	0	
Prerequisite courses:	None				
1. Educational objectives:					

Enabling students in fundamental areas for the acquisition of professional knowledge and practical application.
2. Educational outcomes (acquired knowledge): Acquired knowledge is used as a basis for further development in professional courses
3. Course content/structure: Fundamentals of hydrology and hydrometry. Physical and chemical properties of liquids. Hydrostatics, monitoring well, gauge, absolute, atmospheric and hydrostatic pressure. The compressive force on the flat and the complex surface, the pressure of the fluid in the pipe and reservoir. Hydrokinetics, flow rate, flow, continuity equation, equation of steady flow of ideal and real fluids. Application of the Bernoulli equation to examples. Flow in water-pipes, line and local losses of mechanical energy. Steady flow in conductors with a free surface. Uniform flow with free surface, Reach-Manning equation, types of flow quiet, turbulent and critical regime. Non-uniform flow with free surface, transitional regimes. Short objects, dressings, highlighting and narrowing the bridge. Basic settings of groundwater flow. Darcy equation for speed.
4. Teaching methods: Teaching is done interactively through lectures. At lectures theoretical part is presented with characteristic examples for better understanding. In addition to lectures regular consultations are held. Presentations from the lectures are available in electronic form for students. Part of the material, which makes a logical unit, can be taken during the teaching process through colloquiums. Colloquia are written in the form of the test

Knowledge evaluation (maximum number of points 100)

Prerequisites	Compulsory	Points	Final examination	Compulsory	Points
Homework	Yes	5	Written exam	Yes	50
Homework	Yes	5			
Homework	Yes	5			
Homework	Yes	5			
Computational test	Yes	5			
Lectures attendance	Yes	5			
Test 1	Yes	10			
Test 2	Yes	10			

Literature

No.	Author	Title	Publisher	Year
1.	Georgije Hajdin	Basic Hydraulics	Faculty of Civil Engineering Belgrade	2002
2.	Batinić R., Radojković M.	Stationary flow in open channels with prismatic cross section	Faculty of Civil Engineering Belgrade	1973

Table 6. Specification of course: Groundwater hydraulics

Course:		
Course code	MPK029	Groundwater hydraulics
ECTS credits:	8	
Lecturers:		PhD Srđan Kolaković, Full professor; PhD Đurić Duško, associate professor
Course status:		E
Number of classes (per week)		

Lectures:	Practice:	Other forms of classes:	Academic research:	Other:
3	2	1	0	0

Prerequisite courses: None

1. Educational objectives:
Enabling students in fundamental areas for the acquisition of professional knowledge and practical application.

2. Educational outcomes (acquired knowledge):
Acquired knowledge is used as a basis for further development in professional courses

3. Course content/structure:
Flow underneath buildings, square grid. Hydraulic instability of porous media. Unsteady flow towards a single well. Specific yield of aquifers. Operating range of the well. The impact of the limits and conditions on the borders of the effects of water abstraction. Data processing for pumping test. Problems of designing and exploitation wells. Phenomena and processes that reduce the generosity of wells. The choice of filter characteristics and the filling openings of the filter. Lowering of groundwater for the purpose of construction of buildings (construction pit). Problems with the construction of facilities in groundwater.

4. Teaching methods:
Teaching is done interactively through lectures, auditory, laboratory and computer exercises. Theoretical part is presented with characteristic examples for better understanding. Auditory exercises are done with typical tasks which depend on the exposed material. In addition to lectures and exercises consultation are regularly held. Part of the material, which makes a logical unit, can be taken during the teaching process through colloquiums. Colloquia are written and in the form of the test. The final grade is based on: attendance at lectures and exercises (auditory and computer), success in examinations and written exam (combined tasks and theory).

Knowledge evaluation (maximum number of points 100)

Prerequisites	Compulsory	Points	Final examination	Compulsory	Points
Graphical work	Yes	20	Written exam	Yes	70
Lectures attendance	Yes	5			
Exercise attendance	Yes	5			

Literature

No.	Author	Title	Publisher	Year
1.	Georgije Hajdin	Selected topics in groundwater hydraulic	Faculty of Civil Engineering Belgrade	2008
2.	Vuković M., Soro A.	Groundwater dynamics	Institute of Water Management "Jaroslav Černi"	1984

Table 7. Specification of course: Hydrotechnical objects and systems

Course:					
Course code	MPK028	Hydrotechnical objects and systems			
ECTS credits:	6				
Lecturers:		PhD Srđan Kolaković, Full professor; PhD Stipić Matija, associate professor			
Course status:		O			
Number of classes (per week)					
Lectures:	Practice:	Other forms of classes:	Academic research:	Other:	
2	2	1	0	0	
Prerequisite courses:	None				

1. Educational objectives:
Introducing students to the practical problems and the acquisition of professional knowledge for practical application in the field of planning and water management.

2. Educational outcomes (acquired knowledge):
Acquired knowledge is directly applicable in engineering practice, as well as for upgrading knowledge and understanding of other engineering subjects.

3. Course content/structure:
Hydraulic structures, division and specificity, activity of water in hydraulic structures. Materials for the construction, static and dynamic water pressure and seismic action, waves, ice operation, safety slip, rummage, resurfacing.
Instability of the object due to distortion of the structure of land under the building, lift, measures to reduce buoyancy. Actions on objects in the zone of surface water and groundwater. Hydro system, their specificity and manage them.

4. Teaching methods:
Teaching is done interactively through lectures, auditory, laboratory and computer exercises. Theoretical part is presented with characteristic examples for better understanding. Auditory exercises are done with typical tasks which depend on the exposed material. In addition to lectures and exercises consultation are regularly held. Part of the material, which makes a logical unit can be taken during the teaching process through colloquiums. Colloquia are written and in the form of the test. The final grade is based on: attendance at lectures and exercises (auditory and computer), success in examinations and written exam (combined tasks and theory).

Knowledge evaluation (maximum number of points 100)

Prerequisites	Compulsory	Points	Final examination	Compulsory	Points
Graphical work	Yes	20	Written exam	Yes	50
Lectures attendance	Yes	5			
Exercise attendance	Yes	5			
Test 1	Yes	10			
Test 2	Yes	10			

Literature

No.	Author	Title	Publisher	Year
1.	Kolaković Srđan	Hydrotechnical objects and systems	Faculty of Technical Sciences Novi Sad	2006
2.	Savić Ljubomir	Introduction to hydraulic structures	Faculty of Civil Engineering Belgrade	2003

Table 8. Specification of course: Design of drinking water treatment processes

Course:					
Course code	MPK028	Design of drinking water treatment processes			
ECTS credits:	6				
Lecturers:		PhD Klašnja Mile, Full professor; PhD Milan Dimkić, Full professor			
Course status:		O			
Number of classes (per week)					
Lectures:	Practice:	Other forms of classes:	Academic research:	Other:	
3	2	0	0	0	
Prerequisite courses:	None				

1. Educational objectives:
Acquiring the necessary skills and knowledge to resolve the problems of design of the preparation process (treatment) of drinking water, and the plant for preparation of drinking water (industrial water).

2. Educational outcomes (acquired knowledge):
Understanding the importance and role of obtaining hygienic and quality of drinking water in the context of the overall problem of water supply. Understanding and knowledge of the process of drinking water treatment, and ways to design an appropriate process water treatment plants and water treatment plants achieve the required quality of drinking water.

3. Course content/structure:
Theoretical teaching: Characteristics and water quality standards for drinking water quality. Selection of unit preparation process water, alternative process line (technology) water treatment. Conceptual design of the preparation process and plant for preparation of drinking water. Elements of the project processes and systems. The design phase of the process of preparing water: aeration and stripping with air; stirring, the coagulation and flocculation; clarification; filtration (filter with a granular infill); membrane separation; oxidation and disinfection; lime softening; ion exchange; processes on activated carbon; handling of chemicals; instrumentation and process control. The aspect of environmental protection: the waste streams of the process of preparation, their processing and disposal. Operator training and the start of operation of the plant. Safe operation of the plant. Practical exercises: Demonstration of the process of design: design of process water treatment; conceptual design process line (technology) and water treatment plants for treatment of water; technological development project plants for water treatment.

4. Teaching methods:
Lectures and exercises (interactive work in the simulation process design process and treatment plant for preparation of drinking water).

Knowledge evaluation (maximum number of points 100)

Prerequisites	Compulsory	Points	Final examination	Compulsory	Points
Lectures attendance	Yes	5	Colloquium	No	20
Exercise attendance	Yes	5	Colloquium	No	20
Test 1	Yes	10	Written exam	Yes	40
Test 2	Yes	10	Oral exam	Yes	30

Literature

No.	Author	Title	Publisher	Year
1.	J.C. Crittenden et all.,	Water Treatment: Principles and Design, 3rd Edition	Faculty of Technical Sciences Novi Sad	2012

2.	AWWA, ASCE	Water Treatment Plant Design. 6th Edition	McGraw-Hill. Inc.	2012

Table 9. Specification of course: River basin management

Course:					
Course code	MPK018	River basin management			
ECTS credits:	5				
Lecturers:		PhD Milan Dimkić, Full professor; PhD Duško Đurić, Associate professor;			
Course status:		O			
Number of classes (per week)					
Lectures:	Practice:	Other forms of classes:	Academic research:	Other:	
3	2	0	0	0	
Prerequisite courses:	None				

1. Educational objectives:
Introduction to the basic elements of natural, socio - economic and legal environment and the way they impact on the
mechanisms of river basin management.

2. Educational outcomes (acquired knowledge):
After completing the course content student should have developed the ability to solve scientific, research and professional tasks and problems in the field of river basins management.

3. Course content/structure:
Pressures on water quality. Legislation in the field of water quality and aquatic sediment quality. Theoretical basis and methods for water quality analysis and immobilization of organic and inorganic components. The application of techniques and methods for monitoring of water quality. Status of surface water, groundwater. Monitoring of water quality and aquatic sediment. Methods for sediment remediation. Measures and actions for improvement of water quality. Analysis of the main activities and objectives of water quality management plans and studies of sediment remediation.

4. Teaching methods:
Classes will be realized in the form of lectures, exercises and seminar work. In addition to lectures and exercises consultation are held regularly. Term papers are made by groups designated by the subject teacher, while research papers are auditory in terms of exercise. Each term paper consists of a theoretical and computational work that can be put down in writing during the semester. Students who did not pass both term papers must take the tests over the entire final exam. The oral exam is taken after passing the written exam and all examination prerequisites realized.

Knowledge evaluation (maximum number of points 100)

Prerequisites	Compulsory	Points	Final examination	Compulsory	Points
Lectures attendance	Yes	5	Colloquium	No	20
Exercise attendance	Yes	5	Colloquium	No	20
Seminar work	Yes	20	Written exam	Yes	40
Test 1	Yes	10	Oral exam	Yes	10
Test 2	Yes	10			

Literature

No.	Author	Title	Publisher	Year
1.	Dimkic A.Milan., Brauch	Groundwater Management in Large	IWA	2008

	Heinz-Jürgen, Kavanaugh Michael	River Basins	Publishing,London	
2.	Dante A., Caponera, Marcella Nanni	Principles of Water Law and Administration	Taylor & Frances	2007
3.	Daniel P. Loucks, Eelco van Beek	Water Resources Systems Planning and Management - an introduction to methods, models and applications	UNESCO Publishing	2005

Table 10. Specification of course: Advanced sanitary engineering

Course:				
Course code	MPK003	Advanced sanitary engineering		
ECTS credits:	4			
Lecturers:		PhD Stipić Matija, Assistant professor;		
Course status:		E		
Number of classes (per week)				
Lectures:	Practice:	Other forms of classes:	Academic research:	Other:
2	2	0	0	0
Prerequisite courses:	None			
1. Educational objectives: Education objective is to familiarize students with advanced techniques that are applied in the field of sanitary engineering primarily with techniques of designing water supply and sewage systems for settlements and cities as well as mastering for independent work in application given techniques using modern standards and methods.				
2. Educational outcomes (acquired knowledge): After mastering lectures and exercises, students gain the ability to work independently in the application of advanced techniques for water supply and sewerage of settlements as necessary for the needs of environmental protection in the framework of which they acquire education.				
3. Course content/structure: Detailed description and illustration of solutions in the field of water, sewage and environmental protection. Waterworks design refers to the needs and requirements for water, for various purposes of human life, water sources that are distributes, quantity and quality of water, treatment and distribution of water and others. The design of sewage systems is related on the quality and quantity of municipal wastewater, construction and design of sewage systems, treatment methods, and more. A typical design of a treatment plant for municipal wastewater treatment using active sludge and SBR technology.				
4. Teaching methods: Teaching will be performed by lectures, using appropriate presentation techniques, presentation current issues in the European environment and the country, preparation and development of exercises in which students will master the presented lecture and auditory exercises.				
Knowledge evaluation (maximum number of points 100)				

Prerequisites	Compulsory	Points	Final examination	Compulsory	Points
Lectures attendance	Yes	5	Written exam	Yes	40
Exercise attendance	Yes	5	Oral exam	Yes	30
Seminar work	Yes	20			

Literature

No.	Author	Title	Publisher	Year
1.	Dimkic A.Milan., Brauch Heinz-Jürgen, Kavanaugh Michael	Groundwater Management in Large River Basins	IWA Publishing,London	2008
2.	Dante A., Caponera, Marcella Nanni	Principles of Water Law and Administration	Taylor & Frances	2007
3.	Daniel P. Loucks, Eelco van Beek	Water Resources Systems Planning and Management - an introduction to methods, models and applications	UNESCO Publishing	2005

Table 11. Specification of course: River basin management

Course:					
Course code	MPK018	Design of wastewater treatment processes			
ECTS credits:	5				
Lecturers:		PhD Dalmacija Božo, Full professor; PhD Budinski Ljubomir, Associate professor;			
Course status:		O			
Number of classes (per week)					
Lectures:	Practice:	Other forms of classes:	Academic research:	Other:	
3	2	0	0	0	
Prerequisite courses:	None				

1. Educational objectives:
Acquiring the necessary knowledge and skills in the problems of designing the process of purification (treatment) of wastewater and wastewater treatment plants (refiners).

2. Educational outcomes (acquired knowledge):
Knowing the characteristics of wastewater. Understanding and knowledge of wastewater treatment processes, and ways to by designing an appropriate wastewater treatment and purification plant, the required level purification (emission standard) of wastewater.

3. Course content/structure:
Theoretical teaching: Origin of wastewater. Characterization of wastewater. Emission standards for wastewater. analysis and selection of wastewater flow and load elements. Selection of unit wastewater treatment processes, alternative process lines (technologies) for wastewater treatment. Conceptual solution of the purification process and plant for wastewater treatment. Designing stages of the wastewater treatment process: mechanical purification procedures; chemical purification processes; biological purification (processes with suspended micro flora; processes with immobilized micro flora; anaerobic processes); improved purification processes; disinfection. Waste Process Flows

wastewater treatment, treatment and disposal. Aspects of operation of the plant (control and management of the process; control smell; energetic efficiency). Practical classes Demonstration of the design process: designing the purification process wastewater; development of the conceptual solution of the process line (technology) of wastewater treatment and plant for wastewater treatment; development of a technological project for a wastewater treatment plant.

4. Teaching methods:
Lectures and exercises (interactive work in the simulation of the process design process and analysis for the treatment of waste water).

Knowledge evaluation (maximum number of points 100)

Prerequisites	Compulsory	Points	Final examination	Compulsory	Points
Lectures attendance	Yes	5	Colloquium	No	20
Exercise attendance	Yes	5	Colloquium	No	20
Test 1	Yes	10	Written exam	Yes	40
Test 2	Yes	10	Oral exam	Yes	30

Literature

No.	Author	Title	Publisher	Year
1.	Metcalf & Eddy, Inc.	Wastewater Engineering: Treatment and Reuse, 4th Edition	McGraw-Hill, Inc.	2003
2.	Eckenfelder, W.W. Jr., Ford, D.L., Englande, A.J. Jr.	Industrial Water Quality, 4th Edition	McGraw-Hill, Inc.	2009

RESOURCES AND FACILITES

Teaching staff with necessary professional and academic qualifications is appointed for the realization of the curriculum of Water Treatment and Protection Engineering. The number of teachers engaged in the realization of the curriculum meets the requirements of the study program itself and depends on the number of courses and on the number of hours of these courses. The total number of teachers is sufficient to cover the total number of hours of the study program, so that a teacher realizes about 180 hours per year (lectures, consultations, exercises, practical work, ...) or 6 times a week. Out of the total number of necessary teachers, one teacher is employed for 5% of working time, five teachers are from other faculties within the University of Novi Sad, one teacher from master and doctoral studies has been retired. Other teachers are full-time employed.

The number of collaborators meets the requirements of the study program. The total number of collaborators on the study program is sufficient to cover the total number of hours on exercises. The collaborators perform an average of 300 hours of exercises per year, or 10 hours per week. Scientific and professional qualifications of the teaching staff match the educational and scientific field and the level of their assignments. Each teacher has at least five references in specific scientific or technical fields, which are related to his teaching activities.

The group size for the lectures is up to 180 students, the group for exercises up to 60 students and groups for labs up to 20 students.

Registrar's office with twenty employees is located in the newly adapted space at the ground floor of the Educational block. It continuously manages students' academic activities during their studies and occasionally even later. The office is organized around twelve separate counters with employees working with students from different curricula. In addition to this, there is a front desk in

the entrance hall which is open all day to provide the necessary information, certificates and documentation to the students. The organization depends on the level of study. Some employees handle the first and second cycles, other are in charge of the third cycle. Registrar's office can be contacted through the Faculty web site: http://ftn.uns.ac.rs/. Registrar's office is available to students at any time and makes every effort to minimize the time required by the students to complete the administrative procedures. For that purpose it also introduced Students' Web Service.

Adequate, technical and technological libraries and other resources suitable to the features of the curriculum are available, according to the predicted student number and such that at least 2 m2 of space are provided per student. Lectures are held in amphitheatres, classrooms, computer rooms or measurement laboratories.

The library has more than 150 bibliographic units which are relevant for this curriculum Water Treatment and Protection Engineering. All the courses within the curriculum of Water Treatment and Protection Engineering are accompanied by adequate textbook literature, software licenses, multimedia presentations and other modern tools that are available in sufficient amount for the teaching process.

The Laboratory of Applied Chemistry consists of a cabinet equipped with computers (16 m2 surface) and experimental part (34 m2 surface), where a complete laboratory equipment is located. It includes utensils, chemicals and apparatus used for internships during several courses.

During laboratory exercises, students usually perform the following activities: synthesis and analysis of various disperse systems and the real solution, determination of the degree of purity of chemical substances, formation of colloidal systems and analysis of physical-chemical characteristics of the given systems, synthesis of compounds with different chemical bonds; conduction of different types of oxidation-reduction reactions and detection of visual changes in their progress, investigation of the effects of various catalysts on the dynamics of the chemical reactions; formation and dynamics of chemical equilibrium in homogeneous and heterogeneous systems, monitoring and analysis of corrosion processes, electrochemical processes, electroplating and metal deposition in electro-chemical mode, analysis and behavior of the strong and weak electrolytes in solutions, electrolysis, water hardness determination. Furthermore, the students do the following experimental determinations and practical exercises: neutralization method, determination pH values of solutions of acids and bases, cation exchange reactions -exhibited reaction; anion reaction – exhibited reaction; qualitative and quantitative chemical analysis - gravimetric determination; precipitate reactions; volumetric determination, establishment of complex compounds, determining the concentration of dissolved oxygen, conductivity and pH values of different types of drinking, municipal and industrial wastewater; effects of various exothermic and endothermic chemical reactions - the determination of heat; determination of the absorption curve of colored substance in solution and testing the applicability of Lambert - Beer law; spectrophotometric determination, sampling and analysis of waste water; water treatment, activated carbon, analysis and detection of air pollution by mobile gas chromatograph - Perkin-Elmer Photovac, Voyager.

During the laboratory exercises within the classes in the course Analysis of the System of Environmental Protection, the students do the following experimental activity: practical determination of Multi parameter Water Samplers - Multi 340i, determination of basic categories of data and necessary information for risk management against disasters, identification and analysis of equilibrium processes in heterogeneous systems, determination of thermal phase transitions, viscosity and vapor pressure of different systems, spectroscopic determination, qualitative and

quantitative analysis of the material system; chromatographic quantitative analysis, qualitative chromatographic analysis, analysis and detection of air pollution by mobile gas chromatograph - Perkin-Elmer Photovac, Voyager; operation of separation regarding heterogeneous systems - adsorption, coagulation and flocculation; demonstration, Jar test, adsorption determination of surfactants at the interface phase air / water, testing methods of benzene and paraffin diffusing on the surface of pure water.

The Centre for Computer Science at Faculty of Technical Sciences in Novi Sad was established in order to provide support to the process of modernization of the education activity and research work. The centre is located on the third floor of the teaching block in the Faculty building. It comprises seven laboratories:

L1 - General purpose computer laboratory (32 working positions)

L2 - Computer laboratory for design and computer graphics (16 working positions)

L3 - Special purpose computer laboratory (21 working positions)

L4 - Computer laboratory for construction and computer graphics (16 working positions)

L5 - Computer laboratory for design and computer graphics (21 working positions)

L6 - Multimedia laboratory (16 working positions)

L7 - Internet Laboratory (16 working positions).

In addition to the computer centre there are other 18 computer laboratories equipped to perform computer laboratory exercises. They provide between 12 to 32 places.

Since the academic year 2008/09, a computer classroom with 16 places, which is not used in regular teaching process, is available to students 24 hours. The Faculty of Technical Sciences has 79 state-of-the art equipped laboratories that are designed for: students education, research activity and providing services to third parties.