ÓBUDA UNIVERSITY							
Rejtő Sándor Faculty of Light Industry and Environmental Engineering	*Faculty*	**Institute of Environmental Engineering**	*Institute*				
Title of the course (inc. Neptun code):	**Analytical Chemistry (RMKAK1ETNC)**			*Credit*	4		
Type (compulsory/optional):	Compulsory	*Education Type::*	Full time	*Semester:*	3		
Study field where the course is taught:	Environmental Engineering						
Course leader:	**Dr. Ágnes Bálint-Mészáros**	*Lecturer:*	**Dr. Ágnes Bálint-Mészáros**				
Required preliminary knowledge (incl. Neptun code):	Technical Chemistry II. RMTMK2ETNC						
Weekly teaching hours:	*Lecture*	1	*Classroom work:*	0	*Laboratory work:*	2	
Exam type (ce; e; tm):	ce	*Language of course:*	English	*Course placement in class schedule:*	Thursday Lecture: 13:30-15:10/ every second week (D.2.201.) Laboratory practice Thursday: 15:20-18:50/every second week (D.4.405.)		

CURRICULUM

Course description

Subject of the analytical chemistry and its role in environmental protection. Qualitative analysis (cations, anions). Basics of volumetric analysis (titrimetric methods) and areas of application (acid-base, precipitation titrating, oxydo-reduction titration, conductometry etc). The enrichment and separation of trace substances principles various environmental media (liquid-liquid extraction, solid phase, microwave digestion, absorption pipes, evaporation, centrifugation, etc.). Fundamentals and types of chromatography (gas chromatography, liquid chromatography, ion chromatography, capillary electrophoresis ash etc). The principle and types of Molecular spectroscopy (UV-visible, infrared, fluorescence-, mass spectroscopy, etc.). Principle and types of Atomic spectroscopy (atomic absorption-, ICP, X-ray fluorescence spectroscopy etc). Confidence of different analytical methods, validation, standardization.

Curriculum description

Lectures:

Week of semester	Date (day, month)	Topic
1.	10.09.2016.	Introduction, requirements. Classical qualitative chemical analysis, analysis of cations
3.	24.09.2016.	Analysis of anions

5.	08.10.2016.	Sample preparation, classic analysis
7.	22.10.2016.	Classic quantitative analysis (gravimetry, titrimetry)
9.	05.11.2016..	AAS, ICP, X ray ,UV, IR
11.	19.11.2016.	Rector's holiday: on an other day will be the lecture according to appointment
13.	26.10.2016.	Chromatography; Written test in moodle system

Laboratory work:		
Week of semester	Date (day,month)	Topic
1.	10.09.2016.	Basics of laboratory work (safety rules). Calculations. **C**lassical qualitative chemical analysis, analysis of cations (2 points).
3.	24.09.2016.	First test (calculation of concentration and theory). (5 point) **C**lassical qualitative chemical analysis, analysis of anions (2 points)
5.	08.10.2016.	Second test (theory of laboratory practice and calculations). (5 points) Measuring water alkalinity (2 points) Measurement of Chemical Oxygen Demand (2 points)
7.	22.10.2016.	Third test (theory of laboratory practice and calculations). (5 points) Complexometric titration (Ca, Mg, Zn) (2 points)
9.	05.11.2016.	Fourth test (theory of laboratory practice and calculations). (5 points) Determination of nitrate-N and nitrite-N concentration (2 points)
11.	19.11.2016.	Rector's holiday on and other day will be the practice according to appointment
13.	26.10.2016.	Chromatography practice (2 points). Calculations and possibility for corrections (measurements and calculations)
Mid-semester requirements		
Attendance:		
Compulsory		
Test papers, measurement records, reports, etc. (number, date)		
	Written test, week 14 (lectures + laboratory work). The date you can see above.	

Methods of qualification:	
1) During the laboratory practice will be 4 short calculation test will be written (it is worth up to 5 points) (total 20 points) 2) Laboratory measurements are worth up to 2 points each (total 14 points). The written exercises and submitted laboratory protocols must fulfill a minimum of 18 points. If you can not get the minimum points, than your semester is unsacsesfull. 3) The theoretical classroom test will be on the 14th week. (up to 66 points can be achieved - minimum.: 34 points) Weekly schedule is shown above, practice and lecture times: according to schedule. In case of mid-semester mark fail (1), correction opportunities are available according to 17§(6) of Education and Examination Regulations (TVSZ).	
LITERATURE	
Compulsory:	e-book: David Harvey: Modern Analytical Chemistry, McGraw Hill, Boston Burr Ridge, IL Dubuque, IA Madison, WI New York, San Francisco, St. Louis, Bangkok, Bogotá Caracas, Lisbon, London, Madrid, Mexico City, Milan, New Delhi, Seoul, Singapore, Sydney, Taipei, Toronto, 2000 (selected chapters) lecture presentation in the system e-learning
Recommended	Gary D. Christian: Analytical Chemistry, John Wiley and Sons Inc., 2004
Methods of quality assurance:	
Course lecturers are reviewed yearly, where effectiveness of knowledge transfer as well as results of student and graduate survey are taken into consideration. Based on these assessments course development actions can be initiated in the following areas: *- method of knowledge transfer,* *- content of curriculum,* *- relationship of lectures and practical work.* *Changes and result of changes are assessed yearly, documented in written report and the elements accepted are incorporated into the course program according to the timing set by the course leader.*	

Date: 02.09.2016. Budapest

Compiled by: Dr. Ágnes Bálint-Mészáros
lecturer

Approved by: Dr. Ágnes Bálint-Mészáros
Director of Institute