

**Formularz opisu przedmiotu (formularz sylabusu) na studiach wyższych,  
doktoranckich, podyplomowych i kursach doszkalających**

**A. Ogólny opis przedmiotu**

Nazwa pola	Komentarz
Name of the subject (in Polish and English)	<b>Chemia środowiska i ekologia Environmental chemistry &amp; ecology</b>
Unit offering the subject	Faculty of Chemistry
Unit for which the subject is offered	Faculty of Chemistry, course: chemistry
Subject code	0600-S1-O-CSRE
ERASMUS code	
Number of ECTS credits	7 ECTS
Method of assessment	lecture –examination seminar – graded credit laboratory – graded credit
Language of instruction	English
Designation whether a subject may be credited more than once	No
Allocation of the subject to subject groups	Obligatory course related to chemistry studies
Total student workload	Contact hours with teacher - <b>75</b> contact hrs: - participation in lectures - <b>15</b> hrs - seminar – <b>15</b> hrs - laboratory – <b>45</b> hr  Self-study hours: - preparation for lectures – 10 hrs - preparation for seminars - 20 hrs - writing laboratory reports – 25 hrs - preparation for the assessment - 45 hrs  Altogether: <b>175hrs : 25hrs/ECTS = 7 ECTS</b>
Learning outcomes - knowledge	Student: W1: Knows basic knowledge about the Earth, its origins and development of environmental protection-K_W12 W2: Can name and describe the elements of the natural environment and its ecosystems: the atmosphere, hydrosphere and lithosphere - K_W12 W3: Knows the laws in the field of the environment - K_W12 W4: Knows techniques for sampling, preparation and final analysis of environmental samples - K-W12. W5: Knows the theoretical basis of the analytical methods – K_W12 W6: Expands knowledge (through self-study) of the issues relating to environmental chemistry and on the impact of various pollutants on the human body and the environment - K_W12.
Learning outcomes - skills	Student: U1: Knows, understands and describes the pollution relating to every area of the ecosystem and the threats - K_U12 U2: Knows the principles of GLP, GMP, ISO - K_U12 U3: Can identify and describe the human impact on the natural

	<p>environment, so-called. socio-economic changes in the environment - K_U12</p> <p>U4: Is able to apply the techniques for the collection, preparation and final analysis of environmental samples in correct way - K_U12.</p> <p>U5: Properly uses a small laboratory equipment - K_U12.</p> <p>U6: Performs independent measurements; self prepare the preparations for analysis, can propose analytical procedures or conduct methods - K_U12.</p> <p>U7: Analyzes, interprets and calculates the results obtained in the laboratory tests - K_U12.</p> <p>U8: Draw up, prepares and presents a multimedia presentation on a selected topic concerning pollution and environmental protection – K_U12</p> <p>U9: Argues and defend the thesis – K_U12</p>
Learning outcomes - social competencies	<p>Student:</p> <p>K1: Improves analytical thinking - works with a large amount of information, sees the relationship between the properties of environmental matrices and analytes and the choice of an appropriate method for the determination - K_K01.</p> <p>K2: Is focused on acquiring new knowledge - K_K05</p> <p>K3: Knows how to define priorities necessary to carry out the actions to solve the task - K_K02.</p> <p>K4 is focused to the best execution of tasks - K_K03.</p> <p>K5: Can self perform the required tasks and if the problems arise is able to use the available literature - K_K07</p> <p>K6: Communicate to other students in a meaningful way selected environmental issues – K_K04.</p> <p>K7: Is focused on acquiring and presenting new solutions aimed at protecting the environment – K_K04, K_K07.</p>
Teaching methods	<p><b>Lecture:</b> Conventional lecture using multimedia presentations.</p> <p><b>Seminar</b> Multimedia presentations of students, discussion, consultation</p> <p><b>Laboratory</b> Student performs self exercises in the laboratory according to the available instructions, suggestions and guidance teacher. Consultation and discussion on the desirability of their operations</p>
Prerequisites	Analytical chemistry course
Brief description of the subject	Philosophical aspects of ecology, ecosystem (atmosphere, hydrosphere, lithosphere), local and global changes in the environment, wastewater, solid waste, noise, food and human health., bioindication, bioaccumulation
Complete description of the subject	<p>Lecture: 30 hrs; seminar 15 hrs; laboratory 45 hrs.</p> <p>Lecture: Outline knowledge of the Earth. Origins of environment protection and development. Issues concerning protection of the atmosphere (the origin, structure, composition). Issues concern hydrosphere. Sources and effects of water pollution. Wastewater. Cleanup - types and methods. Methods of analysis of water pollution. The organization of environmental monitoring. GLP, GMP and ISO. Soil protection. The balance of use of the soil. Solid waste (industrial, municipal, agricultural). Sewage, water pollution. Population vs. alimentation. Nuisance civilization. Noise, vibration - prevention. Legislation in the field of environmental protection. Socio-economic aspects of the ecology.</p>

	<p><b>Laboratory:</b> The study of pollution of surface waters. Determination of anion active in water and wastewater. Determination of nitrates and chlorides in the plant material by means of ion-selective electrodes. Chemical contamination of soils. Determination of volatile air pollutants - nitrogen oxides. Removal from water iron and manganese compounds using physico-chemical method. The effect of acid rain on soil and groundwater. Toxicity test. Removing of color treatment. Physico-chemical control of wastewater treatment in rotary beds.</p> <p><b>Seminar:</b> The course is a discussion on various pollution and dangers, such as. Greenhouse effect, ozone depletion and its consequences, acid rain, alternative energy sources (solar energy, wind power, water) – their advantages and disadvantages.</p>
Literature	<p><b>Literature:</b> G. W. vanLoon, S.J. Duffy, <i>Environmental chemistry. A global perspective</i>, Oxford University Press, 2005 R. Kellner, J.-M. Mermet, M. Otto, H. M. Widmer, <i>Analytical chemistry</i>, Wiley-VCH, Weinheim, 1998 S.R. Mikkelsen, E. Corton, <i>Bioanalytical chemistry</i>, Wiley-Interscience, Hoboken, 2004 R. L. Bertholf, R. E. Winecker, <i>Chromatographic methods in clinical chemistry &amp; toxicology</i>, John Wiley &amp; Sons, Ltd, West Sussex, 2007</p>
Assessment methods & criteria	<p><b>Lecture:</b> oral exam, <b>Seminar:</b> graded credit; <b>Laboratory:</b> graded credit <b>W08, U05,U17, K01,K02,K05</b> <b>Assessment criteria:</b> Thresholds evaluate compatibles with the rules of UMK <b>Lecture:</b> exam <b>Laboratory:</b> To prerequisite course is participation in laboratories, knowledge of analytical procedures needed to properly execute the exercise-laboratory analysis, to obtain a positive assessment of credit lab <b>Seminar:</b> Presentation of a seminar on a chosen topic for the risk of contamination of the environment and based on the English-language paper published (scientific / popular) dealing with environmental pollution and human health risks satisfactory - 50-60%, satisfactory plus - 61-65%, good - 66-75%, good plus - 76-81%, very good - 82-100%</p>
Work placement	not applicable

### B) Opis przedmiotu cyklu

Nazwa pola	Komentarz
Didactic cycle	2014/2015
Method of assessment of the subject in the cycle	lecture- exam seminar – graded credit laboratory – graded credit
Type of classes, number of hours of classes and methods of assessment	<b>Lecture</b> - 15 hrs; examination <b>Seminar</b> – 15 hrs; graded credit <b>Laboratory</b> – 45 hrs; graded credit
Subject coordinator	<i>Prof. dr hab. Bogusław Buszewski</i>

Subject teachers	<i>Lecture: Prof. dr hab. Bogusław Buszewski</i> <i>Seminar: Dr hab. inż. M. Sprynskyy</i> <i>Laboratory: Dr S. Studzińska, Mgr M. Szultka</i>
Nature of the subject	Obligatory course Obligatory for all specialties
	Lecture group - all students Seminar groups – up to 24 students Laboratory groups – up to 18 students
Time and place	Faculty of Chemistry, date will be specified later
Learning outcomes	As in part A
Assessment methods & criteria	As in part A
List of topics	Lecture: 30 hrs; seminar 15 hrs; laboratory 45 hrs.  Lecture: Outline knowledge of the Earth. Origins of environment protection and development. Issues of atmosphere protection (the origin, structure, composition). Issues concern hydrosphere. Sources and effects of water pollution. Wastewater. Cleanup - types and methods. Methods of analysis of water pollution. The organization of environmental monitoring. GLP, GMP and ISO. Soil protection. The balance of use of the soil. Solid waste (industrial, municipal, agricultural). Sewage, water pollution. Population and alimentation. Nuisance civilization. Noise, vibration - prevention. Legislation in the field of environmental protection. Socio-economic aspects of the ecology  Laboratory experiments  Indicators of the surface water quality (surface water, sewage, spectrophotometry, titration methods). Determination of detergents in sewage and surface waters. Spectrophotometry. Sample preparation technique - liquid-liquid extraction, SPE, Soxhlet apparatus, distillation. Determination of nitrate in carrots. Electrochemistry. Ion selective electrodes. Determination of the degree of salinity, chloride and soil acidity. Conductometry. Ph-metry. Immission measurement of nitrogen oxides in the air. Dynamic and passive method of air intake. Sample preparation technique - the absorption of gases in liquids. Physico-chemical control of wastewater treatment in deposits assets. Wastewater treatment - biological, sum parameters, organic matter. Toxicity test (xenobiotics, bioassays, Ecotoxicology, LD50, Vibrio fisheri). Removing the color treatment (coagulation, flocculation, wastewater treatment - physical and chemical methods). Removal of water iron and manganese compounds physico-chemical method. Water treatment, iron removal, mangano removing, water quality. The effect of acid rain on soil and groundwater. The acidity of soils, soil fertility  Seminar:  The greenhouse effect. The ozone hole and its consequences. Acid rain. Ecological disasters. Toxicity of pesticides. Heavy metals - toxicity, effects. Polycyclic aromatic hydrocarbons (origin, effects on living organisms and methods of their determination). Origin and consequences of lead poisoning,

	<p>cadmium and mercury. Good laboratory practice. The occurrence and effects of nitrosamines (the problem of adding nitrate to food). Alternative energy sources (solar energy, wind power, water) - advantages and disadvantages. The harmfulness of electromagnetic radiation. Main sources and consequences of the occurrence of sulfur compounds in the atmosphere. Types of waste and methods of disposal. The processes of soil depletion of nutrients. Classification of morphological and soil. Reclamation and management of areas devastated Basics phosphorus removal process, nitrification, denitrification. Water pollution and purification methods. Environmental contamination radioactive waste. The nitrogen content in the atmosphere, meaning and possible consequences of the changes. Transport by rail or car. The harmfulness of electromagnetic radiation. Environmental problems of the city of Torun - Current state.</p>
Teaching methods	As in part A
Literature	As in part A