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| **Course code: FFS57** | **Course: TOXICOLOGICAL CHEMISTRY II** |
| **Level: Integrated study**  | **Year: IV (Fourth)**  | **Semester: VIII (eight)**  | **ECTS credits: 5 (five)**  |
| **Status: Obligatory** | **Hours per week:** **LECTURES (L): 2 (two) hours** **EXERCISES (E): 3 (three) hours** **SEMINARS (S): 1 (one) hour**  | **Total hours per semester : 90** **(L: 30; E: 45; S: 15)**  |
| **Academic staff:**  | Theoretical class: Prof. dr Miroslav Šober Prof. dr Aleksandra Marjanović Doc. dr Elma OmeragićPractical class: Prof. dr Aleksandra MarjanovićDoc. dr Elma OmeragićAss. Aida Lugušić |
| **1. Course aims**  | Acquiring teoretical and practical knowledge related to specialized areas of toxicological chemistry, more specific poisons from II, III and IV group, that involve industrial solvents, metals and compounds of natural and synhtetic origin, including drugs. Learning about mechanisms of action, symptoms and treatment of acute, subchronic and chronic poisoning caused by these compounds, ways of their biotransformation and elimination, and also methods for determination of biomarkers of exposure and effect for those compounds in biological material and environment. Aim of practical class is to acquire skills and competencies in preparation of different kind of samples for systematic and specific analysis of toxins from these groups, and also application of spectroscopic and separation methods for the analysis of most important representativs from the group of oraganic solvents, heavy metals, alkaloids and synthetic compounds, as well as their biomarkers in body fluids and environment.  |
| **1.1. Content of the course** |
| **a) Theoretical class** Volatile compounds, organic solvents and industrial chemicals: solvents and halogenated solvents, carbon disulphide; heavy metals and metalloids: arsenic, mercury, lead, cadmium, thallium, nickel and manganese; Corosive mineral compounds: strong mineral acids and bases, anions; Synthetic acid and neutral compounds: salycilates, barbiturates, paracetamol, cardiotonic glycosides; Basic compounds of natural and synthetic origin: alkaloid of opium, cocaine, atropine, hyosciamine, strychnine, ergot alkaloids, benzodiazepines; Drugs and illicit compounds: amphetamines, designers drugs, cannabinoids, meskaline, psilocybin; Pesticides: classification, organochlorine insecticides, inhibitors of cholinesterase, pyrethroids, juvenile hormons, herbicides, rodenticides; Chemical warfare agents: nerve, blister, pulmonary/choking, blood, incapacitating agents.  |
| **b) Practical class (exercises)** Determination of aniline in urine; Determination of acetone in urine; Exposition to carbon disulphide; Fugiwara reaction on halogenated solvents; Mineralization of blood sample for arsenic detection; Gutzeit probe; Determination of mercury in flour; Mineralization of urine sample for determination of lead, determination of lead with ditizone; Determination of nitrites in biological samples; Determination of p-aminophenol in urine; Spectrophotometric determination of salycilates in biological material; Qualitative probes for identification of alkaloids; determination of barbiturates in urine; Determination of p-nitrophenol in biological material; Demonstration of use DHM-11b kit for detection of chemical warfare agents in atmosphere.  |
| **1.2. Results**  | Knowing the posible sources and ways of exposure and poisoning with compounds that are classified as industrial organic solvents, metals, herbal or synthetic compounds, recognizing symptoms and signs of intoxication, first aid and treatment of poisoning, as well as methods for detecting poisoning based on determination of biomarkers of exposure and effect in biological material and samples from the environment.  |
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| **2. Organization of classes**  |
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| ***Description of activities (%)*** |
| **2.1. Way of performing classes**  | 1. lectures, all students in class 2. Laboratory exercises and case study, 3. Public defense of seminars, coments and disscusion in class  | 1. 33,3 % 2. 50,0 % 3. 16,7 %  |
| Components (%) of grades |
| **2.2. Grade description**  | 1. Active participation and presence at theoretical classes 2. Presence at practical classes 3. Seminars 4. Colloquia 5. Teoretical exam (organized in form of two separate test) | 1. 0-2,5 % 2. 0-2,5 % 3. 0-10 % 4. 0-10 % 5. 0-75 %  |
| 3. LITERATUREMandatory:* Toxicological chemistry-unpublished material
* Practical guide for exercises in toxicological chemistry, unpublished material

Additional:* Flanagan, R.J., Taylor, A., Watson, I.D., Whelpton, R. Fundamentals of Analytical Toxicology, John Wiley and Sons, 2007.
* Suzuki, O. and Watanabe, K. Drugs and Poisons in Humans – A Handbook of Practical Analysis. Springer-Verlag Berlin Heidelberg 2005
* Marrs, T.C., Maynard, R.L., Sidel, F,R, eds: Chemical Warefare Agents – Toxicology and Treatment, second edition. John Wiely and Sons, 2007
* Olive, F.M. Designer Drugs. Chelsea House Publishers, 2004

Web pages* Agency for Toxic Substances and Disease Registry http://www.atsdr.cdc.gov/toxprofiles/index.asp
* US Environmental Protection Agency <http://www.epa.gov/>
* US Drug Enforcement Administration – Publications http://www.justice.gov/dea/pubs/publications.html
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