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| Name of the study programme: Master academic studies in Chemistry                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 |                              |                  |         |
| Course title: ANALYTICS OF ORGANIC POLLUTANTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                 |                              | Code:            | IHA-511 |
| Professor: Daniela Šojić                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                 |                              |                  |         |
| Status: Elective                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                 |                              |                  |         |
| ESPB: 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                 |                              |                  |         |
| Requirements: -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                 |                              |                  |         |
| <b>Learning objectives</b><br>The goal of the course is expansion of theoretical and practical knowledge and understanding in the field of analytical chemistry of organic pollutants of air, water and soil. Students will be trained in modern and adequate procedure for the removal and degradation of persistent organic pollutants and formed intermediates from the environment. They will be trained for using appropriate analytical technique                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                 |                              |                  |         |
| <b>Learning outcomes</b><br>Upon successful completion of this course the student is able to: <ul style="list-style-type: none"><li>➤ explain the influence of persistent organic pollutants on the environment,</li><li>➤ suggest a modern and adequate procedure for the removal of persistent organic pollutants (pesticides, pharmaceuticals, dyes, phenols, polycyclic aromatic hydrocarbons) from the environment,</li><li>➤ apply acquired knowledge about chromatographic techniques and technique of total organic carbon assessment in solving unknown analytical problems during the decomposition process of organic pollutants,</li><li>➤ apply acquired knowledge in qualitative and quantitative analysis of a variety of organic pollutants and products that arise during the process of their decomposition, and</li><li>➤ clearly and accurately analyze and interpret the experimental results obtained by using appropriate analytical technique.</li></ul> |                 |                              |                  |         |
| <b>Syllabus</b><br><i>Theoretical instruction</i><br>Organic pollutants in general: types of organic pollutants. Sources of pollution. Persistent organic pollutants. Structures, sources, properties, stability, solubility, toxicity, resistance to degradation, evaporation, bioaccumulation of persistent organic pollutants. Advanced oxidation processes in removal of persistent organic pollutants.<br><i>Practical instruction</i><br>The application of liquid chromatography and gas chromatography for the qualitative and quantitative analysis of different organic pollutants.                                                                                                                                                                                                                                                                                                                                                                                    |                 |                              |                  |         |
| <b>Literature</b> <ol style="list-style-type: none"><li>1. Stanley E. Manahan, Fundamentals of Environmental Chemistry, 8th Ed, CRC, 2004</li><li>2. W. G. Landis, M.-H. Yu, Introduction to Environmental Toxicology: Impacts of Chemicals Upon Ecological Systems, 3rd Ed. CRC, 2003</li><li>3. D. A. Crowl, J. F. Louva, Chemical Process Safety: Fundamentals with Applications, 2nd Ed, Prentice Hall, 2001</li><li>4. A series of electronic teaching materials developed within the ERASMUS + "NETCHEM" project: Heterogeneous photocatalysis: fundamentals and applications to the removal of herbicide mesotrione from water (D. Šojić Merkulov), <a href="http://mdl.netchem.ac.rs/course/view.php?id=20-">http://mdl.netchem.ac.rs/course/view.php?id=20-</a></li></ol> <i>Auxiliary literature</i> <ol style="list-style-type: none"><li>1. D. V. Šojić Merkulov, Presentation of lectures</li><li>2. Electronic databases</li></ol>                                 |                 |                              |                  |         |
| Weakly teaching load                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 |                              |                  | Other   |
| Lectures<br>2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Excercises<br>2 | Other forms of teaching<br>1 | Student research |         |
| <b>Teaching methodology</b><br>Lectures, lab work, video/PDF files ( <a href="http://mdl.netchem.ac.rs/course/view.php?id=20-">http://mdl.netchem.ac.rs/course/view.php?id=20-</a> ), remote access of selected demonstration exercises ( <a href="http://netchem.ac.rs/remote-access">http://netchem.ac.rs/remote-access</a> ), searching the appropriate electronic databases, seminar work and consultations.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                 |                              |                  |         |
| Assessment of knowledge (maximum of 100 points)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                 |                              |                  |         |
| Pre-exam obligations                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Points          | Final exam                   |                  | Points  |
| activity during lecture classes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 5               | written exam                 |                  | 20      |
| practical teaching                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 25              | oral exam                    |                  | 20      |
| seminars                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 30              |                              |                  |         |