|  |
| --- |
| **Study program** Applied chemistry with the management basics |
| **Course title** Agricultural chemistry (H248C) |
| **Name of lecturer/lecturers** Tatjana D. Anđelković, Nikola D. Nikolić |
| **Type of course** Elective |
| **Number of ECTS allocated** 4 |
| **Course objectives**The goal of the course is to enable the student to acquire knowledge about: chemical composition and processes of solid, liquid and gaseous phases of soil; chemical, physico-chemical and biological processes taking place in the soil; soil study methods; origin and the total content of nutrients in the soil; accessibility of nutrients and their chemical behavior in the soil; distribution, properties and effects of fertilizers; divisions, properties and effects of pesticides; the origin and behavior of macro and microelements in the added soil fertilizers. |
| **Course outcomes**The student should be able to: describe chemical and physical characteristics of soil; explain how salinization, acidification, change of redox status and soil contamination with metals affects the ecological status of the soil; understand the role and behavior of inorganic compounds in the environment (fertilizers, additives, pesticides, fungicides, etc.); understand the processes that affect the accessibility of certain nutrients in soil; know the properties of fertilizers and their influence on soil fertility, height yield and product quality; know different ways of fertilization and is familiar with measures in which the application of fertilizers will satisfy ecological requirements. |
| **SYLLABUS***Lectures*Chemical composition of the soil. The solid phase of the soil - inorganic components. Solid soil phase - organic components. Balance between soil solution and solid soil phases. Sorption phenomena on the soil. Ion exchange processes in the soil. Redox and pH status of the soil. Macro (N, P, K, Mg, Ca, S) and microelements (Fe, B, Cu, Zn, Mn, Mo, Cl, Ni): origin and their total content in the soil, their accessibility, and their chemical behavior in soil. Fertilizers (plant food and soil science, standard fertilizers, special fertilizers). Nitrogen fertilizers: basic components of increased food, seed, and fiber production. Yield, nature, and factors handling that affect nitrogen use efficiency. New technologies for augmentation efficiency of using nitrogen fertilizers. Phosphate fertilizers (composition, superphosphates, ammonium phosphates, heavy metals in phosphate fertilizers). Fungicides. Insecticides. Fertilizers and leaching of nitrates. Impact of agricultural pesticides on water quality. Nitrogen in agriculture and in the atmosphere. Medicines and dietary additives, their use in animal husbandry and potential consequences for the environment. Heavy metals in soil and agricultural products.*Laboratory work*Exercises: Artificial fertilizers. Systematization of fertilizers. Qualitative and quantitative examinations. Legal regulations on the production, storage, and application of artificial fertilizers. Availability and soil chemical behavior of heavy metals.Experimental exercises: Qualitative and quantitative analysis of elements and compounds in the natural environment. Qualitative and quantitative analysis of elements and compounds in artificial fertilizers. Qualitative and quantitative analysis of heavy metals in soil and agricultural products. |
| **References**1. M. Jakovljević, M. Pantović, Hemija zemljišta i voda, Naučna knjiga, Beograd, 1991.2. Јohn R. Freney, Arvin Mosier, J. Kieth Syers, Agriculture and the Nitrogen Cycle: Assessing the Impacts of Fertilizer Use on Food Production and the Environment (Scope Series), Island Press, 2004.3. Fraz Muler, Agrochemicals: Composition, Production, Toxicology, Applications, Wiley-VCH; 20004. Hester, R.E., Environment (Issues in Environmental Science and Technology, 5), Royal Society of Chemistry, 1996. |
| **Active teaching classes** | **Lectures** 30 | **Laboratory work** 15 |
| **Teaching mode**Lectures, interactive teaching, theoretical exercises, laboratory exercises, seminars, consultations. |
| **ASSESSMENT METHODS AND CRITERIA (Max 100 points)** |
| **Pre exam duties** | **Points** | **Final exam**  | **Points** |
| Activity during lectures | 5 | Written examination | 30 |
| Practical teaching | 25 | Oral examination |  |
| Teaching colloquia | 30 |  |  |
| Seminar | 10 |  |  |