Sveučilište u Zagrebu Agronomski fakultet
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Agricultural chemistry (152070)

Nositelj predmeta

prof. dr. sc. Marko Vinceković

Opis predmeta

Successful work in any field of agriculture today is almost impossible without understanding basics of natural sciences, chemistry and biochemistry in particular. Program of the module "Agricultural chemistry" enables students to acquire basic theoretical and practical knowledge necessary for successful continuation of the education and work in the field. Module consists of following program parts:
General and inorganic chemistry – topics necessary for understanding chemical reactions, energy changes in chemical reactions, as well as physical and chemical properties of biogenic elements will be presented.
Organic chemistry with basic biochemistry – structure and chemical reactivity organic compounds necessary for understanding of basic biochemical processes will be presented.
Laboratory practice – basic elements of qualitative and quantitative chemical analysis will be taught through practical work in laboratory.
Final grade will include marks of colloquium, seminar tasks and oral exam

ECTS: **6.00**

Engleski jezik: **R1**

E-učenje: **R1**

Sati nastave: 60
Predavanja: 40
Vježbe u praktikumu: 15
Seminar: 5

Izvođač predavanja

- prof. dr. sc. Marko Vinceković

Izvođač vježbi

- prof. dr. sc. Marko Vinceković

Ocjenjivanje

Dovoljan (2): 60 %
Dobar (3): 70 %
Vrlo dobar (4): 80 %
Izvrstan (5): 90 %

Vrsta predmeta

- Undergraduate studies / BS Courses taught in English (Izborni predmet, 1. semestar, 1. godina)

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Opće kompetencije

The course enables the understanding of basic chemical compounds, reactions and processes. Students receive the necessary theoretical and practical knowledge of basic chemical processes that are the basis for the understanding and application of the agronomic profession.

Oblici nastave

- Lectures
  forty hours of lectures (general and organic chemistry with basic biochemistry)
- Laboratory practice/exercises
  as part of the laboratory exercises five sets of qualitative and quantitative chemical analysis are performed
- Seminars
  linked to chemical Account (stoichiometry), redox processes and writing of chemical reactions

Ishodi učenja i način provjere

Ishod učenja	Način provjere
1.Students acquire the basic knowledge of inorganic, analytical, organic and biochemistry	Mid-term exams, final exams, and tests at the end of course units, seminars, student projects
2.Student is able to understand the molecular mechanisms that regulate the activity of Agroecosystem function	Mid-term exams, final exams
3.Accumulate skills for scientific research work and agricultural works in the future	Mid-term exams, final exams, and tests at the end of course units, seminars, student projects
4.Demonstrate a comprehensive understanding of the fundamental principles and multidisciplinary concepts in the field of agriculture.	Mid-term exams, final exams, and tests at the end of course units, presentation
5.Demonstrate skills in laboratory techniques and field work relevant to agriculture as well as the use of the instrumentation for analysis	Mid-term exams, final exams, and tests at the end of course units, presentation. Independent and group work in the laboratory
6. Demonstrate the ability to apply appropriate theoretical knowledge, access relevant information, understand the principles of project and experimental design, and utilise practical skills, technology and computational systems when addressing problems and challenges related to agriculture.	Mid-term exams, final exams, and tests at the end of course units, seminars, student projects. Independent and group work in the laboratory
7. Work independently and to cooperate and contribute as a team, and to serve the community and nation.	Independent and group work in the laboratory, student projects and presentation
8. Recognize and practice lifelong learning for continuous self-improvement.	Student projects and presentation
9. Explain and apply the basic laws of enzymatic reactions	Mid-term exams, final exams, and tests at the end of course units
10. Explain the structure and function of DNA and RNA, and transfer of genetic information.	Mid-term exams, final exams, and tests at the end of course units

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Način rada

Obveze nastavnika

All teaching materials are organized and available in Moodle system; forum for communication with students; calendar of major events for module; information related to the course; tasks for the establishment of knowledge at a particular lecture, instructions for the use of teaching materials, assessment of student assignments, written examinations, conducting oral examinations

Obveze studenta

Attending lectures, laboratory exercises and seminars is mandatory, and students participate in learning through the system for e-learning. Students during the first two weeks of classes should be sure to log into the system for e-learning Moodle within which they may use the presentation of lectures, examples of solved problems with seminars and other materials.
After each exercise the student must write a report, and submit it to the leader of the exercises within 7 days. Terms for the exam are regularly attend lectures and exercises, seminars, and regularly solve all tasks with lectures and laboratory exercises

Polaganje ispita

Elementi praćenja	Maksimalno bodova ili udio u ocjeni	Bodovna skala ocjena	Ocjena	Broj sati izravne nastave	Ukupni broj sati rada prosječnog studenta	ECTS bodovi
I Colloquium	25	0-60 61-70 71-80 81-90 90-100	Nedovoljan (1) Dovoljan (2) Dobar (3) Vrlo dobar (4) Izvrstan (5)	20, 5 seminars, 15 laboratory practice	95	2
II Colloquium	25	0-60 61-70 71-80 81-90 90-100	Nedovoljan (1) Dovoljan (2) Dobar (3) Vrlo dobar (4) Izvrstan (5)	20	80	2
Oral exam	50	0-60 61-70 71-80 81-90 90-100	Nedovoljan (1) Dovoljan (2) Dobar (3) Vrlo dobar (4) Izvrstan (5)	5	5	2
Total	100			60	180	6

Elementi praćenja	Opis	Rok	Nadoknada
Activity in class (Seminars and lectures)	Students can participate in discussions at seminars, actively participate in the work of small groups / teams and be active in the exercises in the classroom and laboratory. Special activity in the discussions at the lecture also is scored		

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Tjedni plan nastave

1. General chemistry L, Lab - L: Basic Chemical Laws. Avogadro's law and constant. Relative atomic and molecular mass. L: the amount of matter (mole), Ideal Gas Law, Gay-Lussac's Law, Boyle's Law. Lab: systematic of cations.
2. General chemistry S, Lab, L - S: stoichiometric. Lab: systematic of cations. L: quantum theory structure of atom. Periodic system of elements.
3. General chemistry L, Lab, S - L: chemical bond and structure of molecule. molecular-orbital theory of chemical bond. Lab: systematic of anions. L: intermolecular forces and hydrogen bond. S: stoichiometric. L: systematic of anions.
4. General chemistry L, Lab - L: properties of solutions. electrolyte solutions. L: acids, bases. proteolytic reactions. Lab: qualitative analysis of salts.
5. General chemistry L, Lab, S - L: degree of electrolytic dissociation. redox reactions. S: stoichiometric. Lab qualitative analysis of salts. L: chemical kinetics and chemical equilibrium. The law of chemical equilibrium.
6. General chemistry L, Lab, S - L: dissociation degree of acids and bases. pH and pOH. Lab: acidimetric and alkalimetric. L: pH and pOH. salt hydrolysis and buffer solutions. Lab: acidimetric and alkalimetric. S: stoichiometric.
7. General chemistry L, Lab - L: The change of entropy and enthalpy. Lab: The Hesse's law. Lab: The Kjeldahl method of nitrogen determination , quantitative determination of sugar and celluloses.
8. General chemistry. Inorganic chemistry. L, Lab, S - L: . Gibbs's free energy. The equilibrium eonstant. Lab: The Kjeldahl method of nitrogen determination. S: stoichiometric. L: biogenic elements and their compounds in nature.
9. Inorganic chemistry L - L: carbon, hydrogen, oxygen, nitrogen, phosphor sulphur, potassium. L: calcium, magnesium. microelements: iron, boron, manganese, copper, zinc, molybdenum.
10. Organic chemistry with basic biochemistry L - L: the structure and reactivity of organic compounds. hydrocarbons and their derivatives. L: the structure and reactivity of organic compounds. hydrocarbons and their derivatives.
11. Organic chemistry with basic biochemistry - L: alkans, alkens and alkins. L: alkans, alkens and alkins.
12. Organic chemistry with basic biochemistry L - L: alcohols, aldehydes, ketone. L: alcohols, aldehydes, ketone.
13. Organic chemistry with basic biochemistry L - L: carboxylic acid and their derivatives. L: carboxylic acid and their derivatives.
14. Organic chemistry with basic biochemistry L - L: aliphatic compounds of nitrogen, derivatives of carbonic acid. Carbohydrates. L: aliphatic compounds of nitrogen, derivatives of carbonic acid. Carbohydrates.
15. Organic chemistry with basic biochemistry L - L: lipids. proteins. Heterocyclic compounds. L: lipids. proteins. Heterocyclic compounds.

Obvezna literatura

1. N. N. Greenwood, A. Earnshaw, Chemistry of the elements, 1998
2. J.M. Chesworth, T. Stuchbury, J.R.Scaife: An introduction to agricultural biochemistry, 1997
3. D.A. Skoog, D. M. West, F. J. Holler; Fundamentals of analytical chemistry 8 e, 2004
4. J. McMurry, Organic Chemistry 2e, Cornell University,2011

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Sličan predmet na srodnim sveučilištima

- General and Inorganic Chemistry for LW, BOKU
- Introduction into General and Analytical Chemistry, BOKU
- Principles of Chemistry (1301-030), University of Hohenheim