Sveučilište u Zagrebu Agronomski fakultet
Svetošimunska cesta 25, 10000 Zagreb
Telefon: +385 (0)1 2393 777
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Use and conservation of water resources (157664)

Nositelj kolegija

izv. prof. dr. sc. Monika Zovko

Opis kolegija

The course aims are to provide students with up-to-date knowledge on the complex relationship between water and agriculture, with the emphasis on the environmental protection.

ECTS: **6.00**

Engleski jezik: **R1**

Sati nastave: 60
Predavanja: 40
Laboratorijske vježbe: 6
Vježbe u praktikumu: 12
Seminar: 2

Izvođač predavanja

- doc. dr. sc. Marina Bubalo Kovačić
- prof. dr. sc. Gabrijel Ondrašek
- izv. prof. dr. sc. Monika Zovko

Izvođač vježbi

- izv. prof. dr. sc. Monika Zovko
- doc. dr. sc. Marko Reljić
- doc. dr. sc. Jelena Horvatinec Isaković
- dr. sc. Jasmina Defterdarović Barabaš

Izvođač seminara

- izv. prof. dr. sc. Monika Zovko
- doc. dr. sc. Marko Reljić

Ocjenjivanje

Dovoljan (2): 60-70%
Dobar (3): 71-80%
Vrlo dobar (4): 81-90%
Izvrstan (5): 91-100%

Vrsta kolegija

- Graduate studies / Environment, agriculture and resource management (Obvezni kolegij, 2. semestar, 1. godina)

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Opće kompetencije

The ability to collect and process data related to water quality and to develop, implementation, monitor and evaluate good agricultural practice and agri-environmental measures for reducing negative impact of agriculture to surface and groundwater.

Oblici nastave

- Lectures
- Auditory Exercises
- Other forms of group or individual learning
  simulation using computer softwares
- Laboratory practice/exercises
  as part of the laboratory exercises analysis students will be able to carry out basic physical and chemical water analysis. Laboratory exercises are conducted in groups (10 students).
- Seminars
  related to evaluation of water quality data, statistic and method in water quality data description and interpretations.

Ishodi učenja i način provjere

Ishod učenja	Način provjere
define and describe the water balance and its components,	participation in discussion during the lecture, 1. partial exam, written exam
describe basic physical processes and chemical principals that control water and solute flow in the soil water system,	participation in discussion during the lecture, 1. partial exam, written exam
describe the factors influencing the quality of water,	participation in discussion during the lecture, 1. partial exam, written exam
apply geochemical modeling	participation in discussion during the lecture, 1. partial exam, written exam
understand the chemistry of water that governs the behavior of pollutants in aqueous systems,	participation in discussion during the lecture, 2. partial exam, written exam
describe problems in surface water and groundwater related to the agriculture and propose appropriate measures for water protection,	participation in discussion during the lecture, 2. partial exam, written exam
develop surface and groundwater monitoring programme for different purposes,	participation in discussion during the lecture, 2. partial exam, written exam
develop surface and groundwater monitoring programme for different purposes,	participation in discussion during the lecture, 2. partial exam, written exam

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Način rada

Obveze nastavnika

Preparation of teaching material and seminar themes. Preparation of individual tasks for exercises. Consultations and supervision of seminar and students' individual work. Regular teaching, seminar and exercises activities. Preparation of partial and final exam.

Obveze studenta

The student is required to attend all forms of teaching in accordance with the Regulations of studying at the Faculty of Agriculture University of Zagreb. Individual (practical) work within exercises. Partial or final exam.

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
1. partial exam	50%	0-59 60-70 71-80 81-90 91-100	Nedovoljan (1) Dovoljan (2) Dobar (3) Vrlo dobar (4) Izvrstan (5)	30	90	3
2. partial exam	50%	0-59 60-70 71-80 81-90 91-100	Nedovoljan (1) Dovoljan (2) Dobar (3) Vrlo dobar (4) Izvrstan (5)	30	90	3
Total	100%			60	180	6

Elementi praćenja	Maksimalno bodova ili udio u ocjeni	Bodovna skala ocjena	Ocjena	Broj sati izravne nastave	Ukupni broj sati rada prosječnog studenta	ECTS bodovi
Written exam	100%	0-59 60-70 71-80 81-90 91-100	Nedovoljan (1) Dovoljan (2) Dobar (3) Vrlo dobar (4) Izvrstan (5)	60	180	6
Total	100%			60	180	6

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Elementi praćenja	Opis	Rok	Nadoknada
1. partial exam	Written exam for the first part of the course.	During semester	Exam period
2. partial exam	Written exam for the second part of the course. Only students who have passed the first partial exam, can take second partial exam.	During semester	Exam period
Written exam		Exam period	

Tjedni plan nastave

1. Water in the environment, Water balance L - An introduction to water use and water quality as a global issue within the framework of sustainability. Water balance at the field and watershed scale and its components: The students will be acquainted with the field water budget, precipitation, infiltration, redistribution, surface runoff, evaporation and deep percolation.
2. Water balance L - Water balance at the field and watershed scale and its components: The students will be acquainted with the field water budget, precipitation, infiltration, redistribution, surface runoff, evaporation and deep percolation.
3. Practical training P - Computation of the water balance and use of computer models for the computation of the water balance.
4. Soil water L - Physical and chemical properties of soil water; water retention in the soil and solute transport- transport of chemicals in soils and water protection.
5. Soil water – Practicum E - Practicum: introduction in geochemical modeling - the students will be introduced with the speciation models and their importance within agriculture and environmental research.
6. Soil water – Practicum, Water geochemistry - chemical processes in aquatic environments E+L - Practicum: introduction in geochemical modeling - the students will be introduced with the speciation models and their importance within agriculture and environmental research.Processes controlling chemical composition of natural and polluted water and basic theoretical aspects of physical chemistry are being interpreted; chapters: pH and carbonate solubility, clay minerals and cation exchange capacity, adsorption, kinetic reactions, dissolved substance transport.
7. Water geochemistry - chemical processes in aquatic environments, Water chemistry project L+E - Processes controlling chemical composition of natural and polluted water and basic theoretical aspects of physical chemistry are being interpreted; chapters: pH and carbonate solubility, clay minerals and cation exchange capacity, adsorption, kinetic reactions, dissolved substance transport. Theoretical: Solubility product, colloids, agglomerates, pH-value, ion strength, element speciation, and metal speciation.
8. Water chemistry project Lab - Practical: Determination of heavy metal 1) Increase in salt concentration; 2) Reduction of pH-value; 3) Input of natural and synthetic chelating agents.
9. Concept of water quality and quality standards L- Concept of water quality, physical-chemical characteristics. Quality for agricultural purposes. Agriculture is the largest global water consumer and it consumes more than 70% of used water. Subsequently, students are introduced to water use in agriculture and its ecological consequences with emphasis on irrigation in crop production and fish farming.
10. Concept of water quality and quality standards L - Concept of water quality, physical-chemical characteristics. Quality for agricultural purposes. Agriculture is the largest global water consumer and it consumes more than 70% of used water. Subsequently, students are introduced to water use in agriculture and its ecological consequences with emphasis on

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irrigation in crop production and fish farming.

11. Concept of water pollution and sources of contamination L- Concept of surface and groundwater contamination. Point and non-point (diffuse) sources of water contamination. Identification and analysis of the causes of water pollution from agriculture: diffuse pollution of nitrate, inorganic and organic fertilizers, pesticides and sediments from soil erosion, irrigation and runoff of salts leading to salinization.
12. Identification and control of contamination, Practicum / Identification and control of contamination L+E - Set up of surface and ground water monitoring programme with description of indicators that can be used for evaluation of water protection. Representative sampling and interpretation of surface and groundwater chemical data.
13. Water protection L - Prevention and protection of water surface and groundwater. Water protection under national and EU legislation (Water Framework Directive). Good agricultural practices and pollution mitigation measures such as fertilizer management, manure storage and other water - related actions.
14. Water protection, Exam L
15. -

Obvezna literatura

1. Water protection L - Prevention and protection of water surface and groundwater. Water protection under national and EU legislation (Water Framework Directive). Good agricultural practices and pollution mitigation measures such as fertilizer management, manure storage and other water - related actions.
2. Boulding J.R., Ginn J.S. (2003): Soil, Vadose Zone and Groundwater Contamination, Assessment, Prevention and Remediation. Lewis Publishers, Washington, D.C.
3. Hillel D. (2003): Introduction to Environmental Soil Physics. Elsevier.

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