Sveučilište u Zagrebu Agronomski fakultet
Svetošimunska cesta 25, 10000 Zagreb
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Waste management in agriculture (296603)

Nositelj kolegija

prof. dr. sc. Neven Voća

Opis kolegija

Introduction to waste management and its relevance to agriculture, natural sources, animals and humans. Type of agricultural waste, amount and volume. Agricultural waste associated with animals: manure, bedding and litter, wasted feed and wastewater from buildings. Impact of nitrates which are commonly associated with fertilizers and agricultural waste runoff. Impact on groundwater's. Legislation and regulations of EU and Republic of Croatia for waste management in agriculture. Reduce, reuse and recycle, the three R's, for waste management, like effective measures that serve as alternatives to disposing waste in landfills. Best management practices (BMPs) such rotational grazing and pasture renovation. Description of modern landfill. Incineration. Mechanical biological treatment of agricultural waste. Composting. Handling of manure, food-processing waste, sewage sludge. Waste water and disposal of waste water by irrigation. Hazardous waste in agriculture: pesticides, herbicides and different agrochemicals. Packaging waste and its management. Environmental impact of traditional agriculture and farming on water, soil and air. Sustainable development and agriculture.

ECTS: **6.00**

E-učenje: **R1**

Sati nastave: 60
Predavanja: 32
Laboratorijske vježbe: 16
Seminar: 12

Izvođač predavanja

- prof. dr. sc. Neven Voća

Izvođač vježbi

- dr. sc. Anamarija Peter
- dr. sc. Jona Šurić

Ocjenjivanje

Dovoljan (2): 60%
Dobar (3): 75%
Vrlo dobar (4): 85%
Izvrstan (5): 95%

Vrsta kolegija

- Graduate studies / Environment, agriculture and resource management (Izborni kolegij, 4. semestar, 2. godina)

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Opće kompetencije

Understanding of basic processes in the production of biomass and biofuels in agriculture.Understand the concept of waste production in agriculture

Oblici nastave

- Lectures
- Field work
  Field trip- Visiting facility for incineration pesticide packaging waste, Herbos Sisak. Visiting facility for waste management in Croatia. Visiting of composting facility and landfill in Zagreb.
- Seminars
  Seminars- acquisition of skills - group (3 students) independently develop and present a lecture related to agricultural waste management.

Ishodi učenja i način provjere

Ishod učenja	Način provjere
Definition of waste management and basic principles like RRR.	Participating in the discussions, assignments during class - seminar paper, written exam, oral exam
Introduction with agricultural wastes and their utilization.	Participating in the discussions, assignments during class - seminar paper, written exam, oral exam
Introduction with best management practices in agriculture.	Participating in the discussions, assignments during class - seminar paper, written exam, oral exam
Definition of different waste management methods like MBO, landfilling, composting and incineration.	Participating in the discussions, assignments during class - seminar paper, written exam, oral exam
Investigate the benefits of waste management in farms.	Participating in the discussions, assignments during class - seminar paper, written exam, oral exam
Investigate environmental impacts of traditional farming and agriculture.	Participating in the discussions, assignments during class - seminar paper, written exam, oral exam
Analize and discuss Sustainable development and agriculture	Participating in the discussions, assignments during class - seminar paper, written exam, oral exam

Način rada

Obveze nastavnika

The teacher teaches the material provided by course content, checks learned material and evaluate the acquired knowledge and acquired skills through seminars, laboratory exercises, written and oral exam.

Obveze studenta

The student is required to attend all forms of teaching, lectures, laboratory exercises, seminars work according to the Regulation of Studies at the Faculty of Agriculture.

Polaganje ispita

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Elementi praćenja	Maksimalno bodova ili udio u ocjeni	Bodovna skala ocjena	Ocjena	Broj sati izravne nastave	Ukupni broj sati rada prosječnog studenta	ECTS bodovi
Attendance (lectures and exercises)				56	54	0.5
Active participation in class	5%				7	0.5
Seminar paper (S) (preparation + presentation)	10 %			4	20	1
Partial exam 1 (PE1)	25 %	60-70 % 71-80 % 81-90 % 91-100 %	Dovoljan (2) Dobar (3) Vrlo dobar (4) Izvrstan (5)		25	1
Partial exam 2 (PE2)	25 %	60-70 % 71-80 % 81-90 % 91-100 %	Dovoljan (2) Dobar (3) Vrlo dobar (4) Izvrstan (5)		25	1
Partial exam 3 (PE3)	25 %	60-70 % 71-80 % 81-90 % 91-100 %	Dovoljan (2) Dobar (3) Vrlo dobar (4) Izvrstan (5)		25	1
Oral exam (OE)	10 %	60-70 % 71-80 % 81-90 % 91-100 %	Dovoljan (2) Dobar (3) Vrlo dobar (4) Izvrstan (5)		25	1
UKUPNO	100	(S+PI1+PI2+UI/4)		60	181	6

Elementi praćenja	Opis	Rok	Nadoknada
Active participation in class	Active participation in class corrected grade		
Seminar paper (S) (preparation + presentation)	The structure and content of written work 50% The persuasiveness of the presentation 50%		
Oral exam (OE)	Oral exam is composed of five questions. The acquisition of theory and fact, analytical skills, critical thinking, creativity and social responsibility is tested.	Examination periods	

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Tjedni plan nastave

1. Introduction to waste management and basic principles like RRR L - Introduction with students' background knowledge on waste management in agriculture. Course description and goals. Presentation of the learning outcomes. Description of basic ptinciples ina waste management RRR
2. Waste management in agriculture L - Introduction to Legislation of EU and Republic of Croatia regarding waste management. Discussion abouth seminars which will give an overview of the current situation in agricultural waste management in Croatia and European Union
3. Non point source pollution. Point source pollution. L - Definition of point source pollutant -laguns, waste waters, waste air, old silage wraps. Definition of non point source pollutant - agrotehnics and methods (spraying).
4. Non point source pollution. Agricultural waste. L - Definition of non point source pollutant - agrotehnics and methods (spraying). Pollution of soils and watercourses by wastes from livestock production systems. Impact on water quality. Properties and quantities wastes (chemical package, rest of silage, old tires, old machineries and equipment, surplus milk and etc.)
5. Agricultural waste L - Pollution of soils and watercourses by wastes from livestock production systems. Impact on water quality. Properties and quantities wastes (chemical package, rest of silage, old tires, old machineries and equipment, surplus milk and etc.)
6. Waste management in water and soil. Waste management methods for agriculture. L - Contamination of soil and groundwater. Impact on water quality. Reducing nitrate leaching. Recycling livestock waste.
7. Waste management methods for agriculture. Management of agricultural produce. L - Storage and preservation. Transporting and processing. Recycling livestock waste.
8. Landfilling of agricultural waste. Composting. L - Description of modern landfill. Construction of landfillDefinition of composting methods, agricultural materials for composting. Design of composting facility for agricultural waste.
9. Composting. Waste incineration. L - Type of incinerators, liquid and solid hazardous waste.Technological process for pesticide packaging waste. Definition of composting methods, agricultural materials for composting. Design of composting facility for agricultural waste.
10. Mechanical biological treatment. Best management practice in agriculture. L - Introduction to methodology of mechanical and biological treatment for agricultural waste. Pyrolysis, charcoal from biomass "biochar".
11. Best management practice in agriculture. Benefits from good waste management. L - Pyrolysis, charcoal from biomass "biochar". Benefits classification of waste management in farms.
12. Waste control. Sustainable development. L - Understanding different aspects of waste control – ethical, economic, technological and social. Concept and definition of sustainable development.
13. Sustainable agriculture. Sustainable development. L - Concept and definition of sustainable development. Definition of sustainable agriculture and connection with increasing demand for food because population growth.
14. Field work F - Visiting facility for incineration pesticide packaging waste, Herbos Sisak. Visiting facility for waste management in Croatia. Visiting of composting facility and landfill in Zagreb.
15. Seminar S - Seminar themes in agreement with every student

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Obvezna literatura

1. Williams, P.T.; Waste treatment and disposal, 2005, John Wiley and Sons, England
2. Vaughn J., Waste management handbook, 2009, AbcClio, Oxford, England
3. Davis, M.L.; Cornwell, D.A. (1998): Introduction to environmental engineering, McGraw-Hill, Inc., New York, USA

Preporučena literatura

1. Metcalf, E., Wastewater and engineering: Treatment and reuse, McGraw-Hill, 1991, New York, USA
2. ISWA: Energy from waste - State of the art; 2002, ISWA, USA

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