Sveučilište u Zagrebu Agronomski fakultet
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Urban agriculture (238581)

Nositelj predmeta

doc. dr. sc. Lana Filipović

Opis predmeta

The aim of the course is to introduce students with new trends in agricultural production regarding producing food in urban environment. Course is comprised in a way that knowledge about various segments of agricultural production is placed in urban context, therefore it is focused on urban ecosphere as the ecological frame for food production. The aim of the course is also to introduce students with the new technologies in growing food in urban environment used to mitigate certain limitations, such as e.g., space limitation. Students will be presented with new knowledge about specificities of urban agriculture (compared to food production in rural areas), advantages and disadvantages of such production, as well as the organization of such production in line with the principles of sustainable agriculture.

ECTS: **6.00**

Engleski jezik: **R1**

E-učenje: **R1**

Sati nastave: 60
Predavanja: 54
Seminar: 0
Terenske vježbe: 6

Izvođač predavanja

- doc. dr. sc. Lana Filipović
- izv. prof. dr. sc. Ana Gavrilović
- izv. prof. dr. sc. Igor Bogunović
- izv. prof. dr. sc. Tomislav Karažija
- doc. dr. sc. Saša Prđun
- izv. prof. dr. sc. Ivan Širić
- izv. prof. dr. sc. Dalibor Bedeković

Izvođač vježbi

- izv. prof. dr. sc. Sanja Fabek Uher

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, 2. semestar, 1. godina)

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Oblici nastave

- Lectures
- Exercises

Ishodi učenja i način provjere

Ishod učenja	Način provjere
To define and explain multiple role of soil and other natural resources in the sustainable agricultural management	
To identify and explain processes, natural and anthropogenic changes in the agroecosystem	
To distinguish and evaluate various elements of agricultural influence on biosphere, pedosphere, atmosphere, and hydrosphere, as well as the adjustment of agrosphere to the environmental conditions.	
To explain basic theoretical and practical principles in the field of agroecology, agroclimatology, pedology, plant and domestic animal ecology, environmental protection and agricultural production.	
To describe specifics of integrated approach in planning of natural resources use in agriculture, including the sustainability of agroecosystem.	
To apply holistic approach in solving simple problems in the area of environmental protection and agricultural production, and estimate acceptability of certain growing methods and practices in plant and animal production.	
To independently manage resources at agricultural farm.	
To suggest a plan for sustainable agricultural management in plant and animal production.	

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Tjedni plan nastave

1. Definition of urban agriculture in the general context of food production; understanding the role of urban agriculture in the lives of city inhabitants – social, health (physical and psychological), ecological and economical aspects of producing food in the cities, Urban agriculture worldwide – significance, classification, and statistical representation of urban farmers; urban ecology – definition of urban ecosphere as the ecological frame for producing food.
2. Classification of urban agriculture: for personal needs (private gardens), at the community level (community gardens), or for commercial purposes – classification according to the size and the purpose of production, as well the used approaches and technologies; hobby agriculture. Additionally: strictly urban agriculture (private and community gardens, horticultural production at the rooftops – green rooftops, balcony/terraces growing, innovative systems for mitigating spatial limitations – vertical growing, hydroponics, aquaponics); and production at the peri urban areas (for commercial purposes: for local needs – markets, local shops); local and global significance of urban and peri urban agriculture.
3. Growing crops in private and community gardens – in the open, in greenhouses and glasshouses (control over environmental conditions during production, effect on plant vegetation). Selection of crops for growing in urban environment – growing requirements for mesophilic and thermophilic horticultural crops and herbs, estimating compatibility between the crops and specific growing requirements for certain crops in order to maximize the use of available growing space, crop rotation. Horticultural crop propagation techniques, growing seedlings. Prerequisites, advantages and disadvantages of hydroponics, the possibilities of using hydroponics in urban environment. Exercises will be held at the Maksimir experimental station.
4. Aquaponics – the combination of hydroponics and aquaculture (fish and other aquatic organisms); basic characteristics of aquaponics systems, advantages and disadvantages. The possibilities of aquaponics in urban environment – is it only for aquarium enthusiasts or a realistic agricultural production?
5. Vertical farming – vertical towers (aero-farms): advantages and disadvantages of such production systems, prerequisites, self-sufficiency, and recycling; advantages and disadvantages of vertical animal farming, animal welfare and the impact on the environment.
6. Green rooftops – urban agriculture at the building rooftops, prerequisites and the possibilities, hobby and planned agriculture; extensive/intensive agriculture or daily recreational use; green walls and vertical forests; social and ecological benefits of green rooftops, and growing food on balconies and terraces.
7. How to maintain urban agricultural management sustainable on a long-term, i.e., keeping the production economically, socially, and ethically acceptable? Soil tillage and the use of soil conditioners. Main characteristics of intensive, sustainable, and organic agriculture, and their applicability for small-scale production. The possibilities for applying up-to-date management systems, and the advantages of low intensity farming systems in urban gardens.
8. Achieving the favorable water-air relation in soil, challenges in applying conventional ameliorations (small-scale production, lack of water of good quality, etc.). Applicability of certain agro-technical ameliorations in the scenarios where drainage is needed, and the use of drip irrigation systems; the use of rain collection systems in irrigation, the use of ashes as a form of chemical soil amelioration.
9. Basic urban soil physical and chemical characteristics (soil mechanical composition, pH, electrical conductivity, soil organic matter and carbonate content, soil elemental composition – total concentrations of nutrients and toxic elements in the soil), soil sampling

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and analyses – when and which analyses are required, adequate interpretation of the results and making decisions about management practices. Types of composts according to their origin – sewage sludge, green waste, wood chips, household waste, organic urban solid waste, animal farms waste; The use of household waste – what to use; The use of mulches – plastic mulches and the effect of microplastics on the organisms and environmental health; advantages and disadvantages of natural materials in mulching; mulch and drip irrigation in a combined use.

10. Fertilization and plant nutrition in a context of urban environment – positive effects (source of nutrients for plant growth), and possible negative effects (accumulation and leaching of pollutants – nutrients and toxic elements). Fertilizer selection: mineral (single and composed) and organic fertilizers, chemical and physiological-chemical effect of fertilizers in soil; ameliorative and basic fertilization; micronutrients; the effect on nutritional values of food.
11. Urban beekeeping worldwide and in Croatia; urban hives: in gardens, on balconies, and household and building rooftops – hobby or a small-scale honey and pollen production for personal and local needs; prerequisites and challenges of beekeeping in the cities; bee welfare in urban environment.
12. Growing mushrooms in urban environment as a potentially profitable source of income even when considering the spatial limitations in the cities; prerequisites and growing conditions necessary for growing mushrooms; edible and pharmaceutical mushrooms; growing mushrooms on urban waste – cardboards and coffee waste (used coffee grounds); urban mushrooms for urban gastronomy.
13. Growing sprouts and microgreens for their nutritional properties and gastronomical demands; vegetable, aromatic, and herb microgreens, and young cereals – in the physiological stage of cotyledon leaves and first true leaves; edible flowers – innovative décor in gastro-industry; growing insects for feed and food.
14. Characteristics of alternative poultry keeping, advantages and disadvantages, possibilities for such production in urban environment, animal welfare and environmental protection. Description of, so-called, hobby keeping of different poultry species, their feeding and productivity. Poultry breeds appropriate for urban and peri urban keeping.
15. Plant protection and nutrition in an urban environment – the impact of food production on urban ecosystem; nutrients, toxic elements, and pesticides transformations and transport through environmental compartments - soil, water, and air. Soil water flow, solute transport and leaching through urban soil; computer modeling and monitoring of urban soil-plant-atmosphere system; making decisions in management considering the specific characteristics of urban ecosphere; possibilities of holistic approach.

Obvezna literatura

1. Philips, A. (2013). Designing Urban Agriculture: A Complete Guide to the Planning, Design, Construction, Maintenance and Management of Edible Landscapes. John Wiley ans Sons, Inc., Hoboken, New Jersey.
2. Hodgson, K., AICP, Caton Campbell, M., Bailkey, M. (2011). Urban Agriculture: Growing Healthy, Sustainable Places. American Planning Association, Chicago.
3. Niemelä, J. (ed) (2011). Urban ecology: Patterns, processes, and applications. Oxford University Press, Oxford, New York.

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Preporučena literatura

1. Cockrall-King, J. (2012). Food and the City: Urban Agriculture and the New Food Revolution. Prometheus Books, New York.
2. Despommier, D. (2010). The Vertical Farm. St. Martin's Press, New York.
3. Waldin, M. (2016). Biodinamičko vrtlarstvo. Planetopija, Zagreb.
4. Fukuoka, M. (1995). Revolucija jedne slamke: Uvod u prirodno poljodjelstvo. Prirodoslovno društvo Ljekovita biljka, Zagreb.
5. Nordahl, D. (2009). Public produce: The New Urban Agriculture. Island Press, Washington DC.
6. Rich, S.C. (2012). Urban farms. Abrams, New York.
7. Levin, M.J., Kim, K.-H.J., Morel, J.L., Burghardt, W., Charzyński, P., Shaw, R.K (eds), edited on behalf of IUSS Working Group SUITMA (2017). Soils within Cities: Global approaches to their sustainable management - composition, properties, and functions of soils of the urban environment. Catena-Schweizerbart, Stuttgart.