Sveučilište u Zagrebu Agronomski fakultet
Svetošimunska cesta 25, 10000 Zagreb
Telefon: +385 (0)1 2393 777
E-mail: dekanat@agr.hr
Web: www.agr.unizg.hr

Agroclimatology and climate change (146027)

Nositelj predmeta

izv. prof. dr. sc. Ivana Šestak

Opis predmeta

Provides comprehensive basic knowledge about the impact of atmospheric processes on crop and animal production, ecology and ecosystem functions in terms of the matter and energy cycling that affect the climate, chemical processes in the atmosphere, water resources, biodiversity and geographical distribution of vegetation, which consequently influences functioning of the biosphere and maintaining the ecosystems of the world; on natural and human-induced changes and their impact on the climate, water resources and biogeochemical cycles; on the variation of ecological functions with regard to climate, hydrology, soil and biological conditions; on the impact of resource exploitation and land cover changes on climate, hydrology and biogeochemical cycles in different areas.
Gives background information on national, European and global environmental policy and potential impacts of global climate change on agricultural and natural ecosystems.
Qualifies students to think critically and to make decisions based on comprehensive knowledge in domain of agroecology and climatology; to apply acquired knowledge in practice, and to be capable to cooperate in interdisciplinary projects in Croatia and abroad through improvement of English language and research skills.

ECTS: **3.00**

Sati nastave: 30
Predavanja: 12
Auditorne vježbe: 2
Vježbe u praktikumu: 4
Seminar: 12

Izvođač predavanja

- izv. prof. dr. sc. Ivana Šestak
- prof. dr. sc. Željka Zgorelec

Izvođač vježbi

- dr. sc. Marija Galić

Izvođač seminara

- prof. dr. sc. Željka Zgorelec
- dr. sc. Marija Galić

Ocjenjivanje

Dovoljan (2): 50-65%
Dobar (3): 66-80%
Vrlo dobar (4): 81-90%
Izvrstan (5): 91-100%

Sveučilište u Zagrebu Agronomski fakultet
Svetošimunska cesta 25, 10000 Zagreb
Telefon: +385 (0)1 2393 777
E-mail: dekanat@agr.hr
Web: www.agr.unizg.hr

Vrsta predmeta

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

Opće kompetencije

Besides fundamental knowledge in physics of the atmosphere, agroclimatology and variations in ecological functions, the course qualifies for holistic approach to current issues in ecological climatology and agricultural management with ability of comprehensive analysis and synthesis.

Oblici nastave

- Lectures
- Auditory Exercises
  climatologic data analysis
- Seminars
  related to current issues in field of agroclimatology, climate change and agricultural management planning, climate-agroecosystem models; Assessment criteria: content/form; interaction with listeners; creativity; flexibility; time management skills; quality of presentation/seminar; quality of interpretation; the appropriateness of the literature cited; application of theory to specific; problems or in specific situations; ability to define key terms; appropriateness of the data presentations; quality of student expressions; students comprehension (ability to understand)
- Design exercises
  GHG emission calculation (IPCC), field spectroscopy and GIS – computer sessions

Ishodi učenja i način provjere

Ishod učenja	Način provjere
demonstrate basic knowledge and understanding of fundamental theoretical and practical principles of ecology in terms of matter and energy cycling in the agroecosystem, physical and chemical processes in the atmosphere, global climatology, agroclimatology and agrometeorology	
critically consider causes and consequences of global climate change through understanding processes and access to current information	
identify and explain atmospheric and climatic conditions, their changes and effects on agrosphere	
collect, process, interpret and evaluate relevant climatologic data	
apply acquired knowledge in practice - agrosphere adaptation to climate change and sustainable land management	

Sveučilište u Zagrebu Agronomski fakultet
Svetošimunska cesta 25, 10000 Zagreb
Telefon: +385 (0)1 2393 777
E-mail: dekanat@agr.hr
Web: www.agr.unizg.hr

Tjedni plan nastave

1. Introduction into the module structure, Introduction to the global climatology and agroclimatology L - Agroclimatology and ecological climatology concepts and applications, module relevance for human society, review of module objectives and structure and student obligations. Introduction to global climatology – annual global mean energy budget, atmospheric general circulation, seasons, climate zones, climate and vegetation.
2. Introduction to the global climatology and agroclimatology, Climate variability L - Introduction to global climatology – annual global mean energy budget, atmospheric general circulation, seasons, climate zones, climate and vegetation; Climate variability – air masses, floods, droughts and heatwaves, mechanisms of seasonal-to-interannual variability, climatic extremes.
3. Climate variability, Climatologic data analysis L+E- Climate variability – air masses, floods, droughts and heatwaves, mechanisms of seasonal-to-interannual variability, climatic extremes. Trends, extremes, GDD, soil temperature, soil water balance.
4. Climatologic data analysis, Seminar topic distribution E+S - Trends, extremes, GDD, soil temperature, soil water balance. Seminar topic distribution, introduction to basic and additional literature and to useful links relevant to seminar establishment, demonstration of use and search online database for research and academic community.
5. Seminar topic distribution, Climate change S+L - Seminar topic distribution, introduction to basic and additional literature and to useful links relevant to seminar establishment, demonstration of use and search online database for research and academic community. Climate change – climate history, mechanisms of climate change, human induced climate change, climate feedbacks.
6. Climate change, Greenhouse gases (GHG) emissions L+E - Climate change – climate history, mechanisms of climate change, human induced climate change, climate feedbacks. GHG emission calculation (IPCC)
7. Greenhouse gases (GHG) emissions E - GHG emission calculation (IPCC)
8. 8. Greenhouse gases (GHG) emissions, Macroclimates, mesoclimates and microclimates; Surface energy fluxes E+L - GHG emission calculation (IPCC). Macroclimates, mesoclimates and microclimates – hillslopes and mountains, lakes and oceans, land cover, hydrology, land use and agricultural management planning Leaf temperature and fluxes, surface temperature and fluxes, vegetated canopies, surface climate.
9. Field class F - Visit to Meteorological and Hydrological Service of Croatia and to Department of Geophysics on Faculty of Science University of Zagreb.
10. Field class F - Visit to Meteorological and Hydrological Service of Croatia and to Department of Geophysics on Faculty of Science University of Zagreb.
11. Remote sensing E - Introduction to remote sensing in agriculture – application in agroclimatology.
12. Remote sensing, Ecological units and their dynamics E+L - Introduction to remote sensing in agriculture – application in agroclimatology. Populations, communities, and ecosystems – ecological niche and biodiversity, ecosystem and biogeochemical cycles, landscapes, global vegetation: global carbon cycle, net primary production, vegetation dynamics and succession, population dynamics.
13. Modeling in agronomy L - Climate - ecosystem dynamics - phenology, coupled climate-agroecosystem model: DSSAT
14. Seminar presentation S - Oral seminar presentation in power point (maximal 15 minutes) + written seminar as text in word document (10-20 pages)
15. Exam FE - Exam: written 10 questions (2 question from each outcome)

Sveučilište u Zagrebu Agronomski fakultet
Svetošimunska cesta 25, 10000 Zagreb
Telefon: +385 (0)1 2393 777
E-mail: dekanat@agr.hr
Web: www.agr.unizg.hr

Obvezna literatura

1. Bonan, G. (2002). Ecological Climatology - Concepts and applications, Cambridge University Press, UK
2. Griffiths, J.F. (1994) Handbook of Agricultural Meteorology, Oxford University Press, USA
3. Mavi and Tupper (2004) Agrometeorology: principles and applications of climate studies in agriculture, Food Products Press, USA

Preporučena literatura

1. Chiras, D. D. (2006) Environmental science, 7th Ed., Jones and Bartlett Publishers Gurevitch, J., Scheiner, S.M., Fox, G.A. (2002) The ecology of plants, Sinauer Associates, Inc., Publishers, Massachusetts, USA
2. Holden, N.M. (2001) Agro-Meteorological Modelling: Principles, Data and Applications, The Joint Working Group on Applied Agricultural Meteorology (Agmet), Ireland
3. IPCC (2006) Guidelines for National Greenhouse Gas Inventories, www.ipcc.ch Jasobson Z.M. (2002) Atmospheric pollution: history, science, and regulation, Cambridge University Press
4. Lutgens and Tarbuck (2004) The atmosphere: an introduction to meteorology, 9th Ed., Pearson Education Inc., USA
5. Metz, B. (2010) Controlling Climate Change, Cambridge University Press, Edinburgh, UK
6. Odum, E. P. and Barrett, G. W. (2005) Fundamentals of Ecology, 5th Ed., Thomson Brooks/Cole, Canada
7. Schlesinger W. H. (1997) Biogeochemistry, an analysis of global change, Academic Press