

MB130P60E Global Change, Photosynthesis, and Sustainability

Spring semester, 2/0, Zk, 3 credits

Garantee: Assoc. Prof. doc. Jana Albrechtová

Lecturers: prof. Nátr, doc. Albrechtová

Guest Lecturers: prof. B. Moldan, prof. O. Prášil, doc. E. Cienciala



Instructions:

- For course organization contact dr. Albrechtova (albrecht@natur.cuni.cz) and prof. Natr (natr@natur.cuni.cz). You will be contacted by mail listed in SIS.
- Lecturer order can change during semester, particularly those of guest lecturers. webových stránkách předmětu. <http://kfrserver.natur.cuni.cz/global/>

Venue:

- Seminar room KFR, Viničná 5, 2nd floor, Mondays 9:00-10:30.

Classification :

- Student presentations (based on agreed upon paper or book – 1 short (5 min) presentation)
- 2 tests – 1 in mid-semester, 2nd – in the end of semester. 2 tests will be averaged on the base that the second will have double weight.
- Possibility to be classified based on oral exam.

Web:

http://kfrserver.natur.cuni.cz/global/index_EN.htm

- literature (pdf of papers), contacts to lecturers

28. 2. CO₂, plants, climate and sustainability – prof. Nátr

- Photosynthesis, flow of CO₂ into leaf,
- CO₂ and climate
- Sustainability : definition of the term

7. 3. – Sustainability: development of concepts – prof. Nátr

- Historical development of concepts of sustainability (A. Leopold, R. Carssonová, R. Costanza).
- Brundtland report, UNESCO,
- Definitions and their problems – changes in human priorities (J. Diamond, J. Lovelock)

14.3. Plant properties affecting whole ecosystems: CO₂ and climate– prof. Nátr

- Effect of CO₂ on plants, methods to determine that (FACE), C₃, C₄, CAM
- Changes of concentration of CO₂ in past, today and in future
- radiation and its parameters
- Sun radiation: spectrum, effects,
- natural factors determining temperature on Earth

21. 3. Greenhouse effect and greenhouse gases – prof. Nátr

- Physical principle of the greenhouse effect
- Greenhouse gases: CO₂, H₂O, CH₄, N₂O, CFC
- Historical changes of the GHG concentration: CO₂, Methane, Nitrous oxide
- Natural and anthropogenic sources

28. 3. Global cycles of Carbon and water, global climate change – prof. Nátr

- Carbon, nitrogen, P, cycles on Earth

- Quantitative determination of C, CO₂ and plant biomass (CH₂O) - calculations.
- Global water cycle
- Global cycles of plant nutrients - nitrogen, P, cycles on Earth
- Assumed changes in cycles, climate changes

4.4. Oceans – prof. Prášil

- physical-chemical conditions for plants in oceans
- characteristics of plants in oceans and their productivity
- participation of oceans in global Carbon cycle
- oceans and production of methane

11.4. Role of forests in and CO₂ concentration and climate change – doc. Albrechtová

- carbon in forest ecosystems
- changes in carbon concentration on Earth depending on forest ecosystems
- balance of emissions of greenhouse gases

TEST 1

18.4. Global climate changes: – doc. Albrechtová

- Intergovernmental Panel on Climate Change
- Assumed climate changes
- Direct and indirect consequences for human civilization
- Assumed changes in GHG concentrations during 21st century
- Possibilities of mitigation of increase in CO₂ concentration
- Possibilities of mitigation the climate changes

25. 4. National Holiday – Easter

2. 5. Ecosystem services – prof. Nátr / doc. Albrechtová

- quantitative assessment of dependence of humans on ecosystems and nature
- „Millennium Ecosystem Assessment“: content and context
- Selected methods of expressing the quantitative dependence of humans on nature (ecologic footprint, emergy, green HDP)

9.5. Economic, political and social consequences of global changes, relation to sustainability - doc. Albrechtová

- Political aspects: from Kjóto protocol, COP 15 FCCC
- Social aspects: climate change as catalyzator of changes in behaviour
- Economic aspects: current intensive discussion of actions leading to mitigation of climate change or what is the cost of "non-action"

16.5. Back from plants to sustainability - summary– doc. Albrechtová / prof. Nátr

Test 2,

Presentations