

Climate change impact on agriculture - current situation and prospects for the future		
Institute of Plant Genetics of the Polish Academy of Sciences	Prof. dr hab. Zbigniew W. Kundzewicz kundzewicz@yahoo.com Coordinator	Lecturers: research workers of the Institute of Agricultural and Forest Environment of the PAS, Institute of Plant Genetics PAS, Institute of Dendrology of the PAS, University of Life Sciences in Poznań, and Institute of Cultivation Fertilization and Soil Science - NRI

General informations:

Type of activities	Introductory video, lecture series: 16 x 45 minutes and written exam (90 minutes)
Didactic cycle	Autumn-winter 2019/2020
Language	English
ECTS score	2

Objective of the course: To expand knowledge of climate change and its impacts, as well as the possibilities of climate change mitigation and adaptation as well as the relationship between climate, vegetation and agriculture in the context of already observed changes and projections for the future.

Lecture list:

1. Lecture subject: Climate change and its impacts - observations and projections

Lecturer: prof. dr hab. Zbigniew Kundzewicz, Institute of Agricultural and Forest Environment of the PAS

Lecture day: **8 October 2019**

Lecture time: **9:00-10:30**

Course content:

- ✓ factors affecting the Earth's climate and radiative forcing,
- ✓ mechanism of current climate change,
- ✓ observations of temperature and precipitation changes,
- ✓ observations of climate change impacts in regions and sectors/systems,
- ✓ climate variability,
- ✓ climate projections for the future.

2. Lecture subject: Weather extremes in a changing climate

Lecturer: prof. dr hab. Zbigniew Kundzewicz, Institute of Agricultural and Forest Environment of the PAS

Lecture day: **8 October 2019**

Lecture time: **11:00-12:30**

Course content:

- ✓ types of weather extremes related to temperature (frost, heat), precipitation (deficit, excess, hail) and wind,
- ✓ heat waves,
- ✓ heavy rainfall and floods,
- ✓ meteorological, hydrological and agricultural drought,
- ✓ risk changes - hazard, exposure, sensitivity,
- ✓ weather extremes and extreme consequences of weather phenomena.

3. Lecture subject: Expanding knowledge on the impact of climate change on the characteristics of Scots pine

Lecturer: prof. dr hab. Jacek Oleksyn, Institute of Dendrology of the PAS

Lecture day: **29 October 2019**

Lecture time: **9:00-10:30**

Course content:

- ✓ changes under the influence of climatic conditions in the ecology of Scots pine (*Pinus silvestris* L.),
- ✓ potential scenarios for pine biology changes.

4. Lecture subject: Adaptation to climate change in agriculture: framework, priorities on the way from agronomy to agroecology

Lecturer: dr hab. Jerzy Kozyra, Institute of Cultivation Fertilization and Soil Science - NRI

Lecture day: **4 November 2019**

Lecture time: **12:30-14:00**

Course content:

- ✓ general schemes for the adaptation of agriculture to climate change
- ✓ history of activities, regulations and institutions supporting adaptation
- ✓ priorities for adaptation to climate change
- ✓ main currents of agroecology and adaptation to climate change
- ✓ water and carbon resources in soil
- ✓ sources of greenhouse gas emissions from agriculture
- ✓ selected adaptive practices in agriculture in the face of climate change

5. Lecture subject: Plant pathogens versus climate change

Lecturer: prof. dr hab. Małgorzata Mańka, University of Life Sciences in Poznań

Lecture day: **26 November 2019**

Lecture time: **9:00-10:30**

Course content:

- ✓ definition of food security,
- ✓ threat to plant yielding due to pathogens,
- ✓ threat to forest management due to forest pathogens,
- ✓ changes in the range of occurrence of the most dangerous pathogens of crops and trees,
- ✓ the impact of plant products trade on the spread of pathogens – examples,
- ✓ impact of agrotechnology on pathogens spread,
- ✓ forecasts related to the hazards caused by crop and tree pathogens.

6. Lecture subject: Climate change and agriculture and ecosystems

Lecturer: prof. dr hab. Zbigniew Kundzewicz, Institute of Agricultural and Forest Environment of the PAS

Lecture day: **10 December 2019**

Lecture time: **9:00-10:30**

Course content:

- ✓ impact of climatic conditions on agriculture - restrictions related to temperature and humidity,
- ✓ impact of current climate change in agriculture - observations and projections,
- ✓ climate threats in relation to agricultural production and rural development,
- ✓ climate change and terrestrial and aquatic ecosystems, biodiversity and ecosystem services,
- ✓ reasons for concern - polar ecosystems, small islands, coral reefs,
- ✓ climatic and non-climatic factors affecting agriculture and ecosystems.

7. Lecture subject: Climate change mitigation and adaptation

Lecturer: prof. dr hab. Zbigniew Kundzewicz, Institute of Agricultural and Forest Environment of the PAS

Lecture day: **10 December 2019**

Lecture time: **11:00-12:30**

Course content:

- ✓ earth's energy balance and possibility of controlling the greenhouse effect,
- ✓ reduction of atmospheric greenhouse gas concentrations for climate change mitigation,
- ✓ climate policy and sustainable and sustainable development,

- ✓ basic threats and risks,
- ✓ adaptation to climate change impacts in sectors and systems,
- ✓ climate change mitigation and adaptation – trade-offs and synergies.

8. Lecture subject: Strategies of resistance to abiotic stresses in plants

Lecturer: dr hab. Arkadiusz Kosmala, prof. IPG PAS, Institute of Plant Genetics PAS

Lecture day: **7 January 2020**

Lecture time: **9:00-10:30**

Course content:

- ✓ characteristics of forage grasses from the *Lolium-Festuca* complex as the models for the research on the selected mechanisms of stress resistance,
- ✓ drought – definition, main components,
- ✓ strategies of resistance to drought,
- ✓ plant physiological reaction to drought,
- ✓ methods used to analyze plant performance under drought conditions – plant reaction to drought with reference to breeding conditions,
- ✓ selected components of drought avoidance and tolerance in grasses (analysis of root system and leaves),
- ✓ photosynthetic apparatus and antioxidative system in the conditions of water deficit,
- ✓ stress signaling, plant metabolism in the conditions of water deficit,
- ✓ winter-hardiness – definition, main components,
- ✓ methods used to analyze plant performance under low temperature,
- ✓ plant physiological reaction to low temperature,
- ✓ photosynthetic apparatus and antioxidative system in the conditions of low temperature,
- ✓ plant metabolism in the conditions of low temperature (leaves, crown tissue).

9. Written exam:

Examiner: prof. dr hab. Zbigniew Kundzewicz, Institute of Agricultural and Forest Environment of the PAS

Member of the Commission:

- prof. dr hab. Małgorzata Jędrzycka, Institute of Plant Genetics PAS,
- dr hab. Lidia Błaszczuk, Institute of Plant Genetics PAS.

Exam day: **21 January 2020**

Exam time: **9:00-10:30**