|  |  |
| --- | --- |
| Name of course: **Fundamentals of eco-physiology for more efficient plant production** | **Credit value: 3** |
| **Course** **classification**: optional | |
| **The proportion of the practical nature of the course, „educational character”: 100% lecture** | |
| **Type of course:** theoretical / practical, and the **total number: hours** in the given **semester.**  Further (unique) means and properties of knowledge transfer: 28 lectures per semester | |
| **Exam** type (colloquium / practical grade / **other** ):  Further (unique) means of knowledge verification**:** | |
| The curricular **place of the course** (which semester): preferable 2nd semester or later | |
| Prerequisites (if any): **-** | |

|  |
| --- |
| **Course description: a brief, but informative description of the knowledge to be acquired (14 weeks).** |
| Objective: to focus on how environmental impacts affect plant productivity and survival in natural associations and farming systems.   1. Grouping of environmental factors, their general characterization. What do plants need from their environment at all, how can they get it, what can they do to achieve it? Natural and anthropogenic changes in environmental factors and possibilities of plant responses. Interpretation of basic concepts: load, stress, adaptation, acclimatization, etc. 2. Light as an environmental factor I .: Light as the most important environmental factor for plants. Photoreceptors: structure and function relationship. Adaptation mechanisms of light as a limiting factor in shade-tolerant plants. 3. Light as an environmental factor II .: Interpretation of light as excess light, photoinhibition and photooxidation, description of adaptation and acclimatization processes against light damage. Physiological consequences of UV light. 4. Relationships between environmental factors and different photosynthetic pathways (C3, C4, CAM). Changes and consequences of the C-balance sheet. Effects of elevated CO2 levels on photosynthesis, growth, biological and economic yields. 5. Plant water circulation, water availability and different adaptation mechanisms in plants with different adaptations. Poikilohydric and homoiohydric plants. 6. Water as an environmental factor: water status of the plant, water stress. Stoma conductance and regulation. Relationships between transpiration and photosynthesis. 7. Physiological basis of drought tolerance. 8. The role of soil condition in plant growth. Possibility of plants on contaminated soils, saline soils, survival strategies of natural plant associations. 9. Temperature as an environmental factor: the effect of high and low temperature on plants. Opportunities for crop production in the tropics. Cold and frost damages. 10. Nutrient as an environmental factor I .: the issue of nutrient availability, the nutrient turnover of the soil-microorganism-plant-atmosphere. 11. Nutrient as an environmental factor II .: Nitrogen uptake and metabolism. Possibilities of organic/bio fertilization for different crops and soil types. 12. Nutrient as an environmental factor III .: mycorrhiza-plant relationship system. The role of microelements in crop production. 13. Possible effects of air, its composition, air pollutants on plants. Effects of acid rain, dust, soot and flue gases. 14. Field and laboratory methods to characterize the condition of plants. Principle of operation of diagnostic instruments for *in vivo* and *in situ* use by agricultural crop production. |
| **Required and recommended reading:** |
| **Required reading:**  Lambers, H., Chapin, F. S. and Pons, T. L. (2011) Plant Physiological Ecology. Springer, New York. ISBN 0-387-98326-0  **Recommended reading:**  Taiz, L., Zeiger, E. (2007) Plant Physiology. 4th ed. Sinauer Associates, Inc. ISBN 0-87893-823-0 or online version  The newest review scientific articles connected to the current sub-topics. |
| **Competencies to be acquired, related to the course:** |
| **a) Knowledge:**   * complex knowledge about processes of plant physiology * interaction between physiological processes and environment * how can the abiotic environment controll and influence these processes   **b) Ability:**   * critical thinking * problem solving   **c) Attitude:**   * to be motivated to work hard and always try to find connections between the individual and the environment   **d) Autonomy and responsibility:**   * in data discussion/presetation/evaluation |

|  |
| --- |
| **Course leader** (name, post, academic degree): **Dr. Szilvia Veres, professor, PhD** |
| **Other lecturer(s) involved in teaching the course, if any** (name, post, academic degree): **-** |