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| Academic Year: | 2018/2019 | Group of courses: |  | | Catalogue number: | |  | |
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| Course title1): | | Basics of plant biochemistry and physiology | | | | | **ECTS** 2) | **4,0** |
| Polish Translation3): | | Podstawy biochemii i fizjologii roślin | | | | | | |
| Study programme4): | | **Organic Agriculture and Food Production** | | | | | | |
| Person responsible for the course5): | | **dr Anna Rybarczyk-Płońska** | | | | | | |
| Teachers6): | | **dr Anna Rybarczyk-Płońska, dr Marta Gietler, dr Krystyna Oracz, dr Katarzyna Ciąćka** | | | | | | |
| Units responsible for the course7): | | **Faculty of Agriculture and Biology, Department of Biochemistry and Department of Plant Physiology** | | | | | | |
| Faculty in charge8): | | **Faculty of Agriculture and Biology** | | | | | | |
| Course status9): | | a) course type: **basic** | b) stage …**I**…. year …**I**… | | | c) stationary | | |
| Teaching cycle10): | | **Summer semester** | Teaching language11): **English** | | |  | | |
| Objectives of the course12): | | To provide students with the knowledge of molecular structure of living organisms and of occurrence, characteristic and regulation of the general metabolic pathways, which is necessary to understand the main vital functions of plant and animal organisms. The knowledge will allow students to understand better the contents of such courses as: genetics and plant breeding, plant mineral nutrition, etc. The students will become familiar with the basic biochemical methods.  The aim of the physiological part of the course is to present the basic life processes and functioning of plants, regulatory mechanisms during plant growth and development and the influence of environmental factors on these processes. | | | | | | |
| Teaching forms and number of hours13): | | 1. Lecture…………………………………………………………………………… number of hours 15 2. Laboratory part..…………………………………………………………………. number of hours 30 | | | | | | |
| Teaching methods14): | | Lectures with the use of PowerPoint presentations, simple experiments during laboratory part of the course, consultations | | | | | | |
| Detailed course description15): | | **Biochemical Part**  **Lecture content:**  Structure and properties of amino acids, proteins, lipids and carbohydrates. Bioenergetics – principles. Enzymes – structure and mechanism of action. Catabolic and anabolic processes in living organisms (catabolic conversions of carbohydrates, biological oxidation, photosynthesis, photo-oxidation, metabolism of lipids and nitrogen containing compounds – chosen topics). Nucleic acids – structure, function and gene expression principles  **Laboratory part content:**  Properties of amino acids and proteins, Quantitative protein determination, Factors affecting enzyme activity, Nitrate and vitamin C contents determination  **Physiological Part**  **Lecture content:**  Plant water relations (long- and short-distance transport of water, plant water balance). Photosynthetic pigments and photosynthesis. Physiological aspects of respiration; Role of environmental and endogenous factors in biological rhythms and activities of plants and seeds.  **Laboratory part content:**  Observation of osmosis/plasmolysis. Measurement of plant transpiration rate affected by different environmental conditions. Determination of respiratory rate (of various plant tissues at different growth stage and analysis of an effect of temperature). Analysis of chemical properties of chlorophyll. Determination of chlorophyll content. Measurement of photosynthesis intensity of plant exposed to different light intensity. Analysis of an effect of environmental and endogenous factors on seed germination and seedlings development. | | | | | | |
| Formal prerequisites (introductory courses)16): | | Botany, Chemistry | | | | | | |
| **Initial requirements17):** | | Students should have a basic knowledge of structure and properties of organic compounds, plant cell and tissues structure, together with the ability of working in a chemical laboratory. | | | | | | |
| Learning outcomes18): | | 01 – Student has a basic knowledge of biochemical and physiological processes in plants  02 – Student knows the principle of mechanisms that regulate the general vital functions of plants and animals  03 – Student is able to evaluate and interpret the basic biological parameters of plants in order to diagnose the physiological and biochemical status of plants | | 04 – Student can assess the nutritional value, including the content of bioactive components and use it in the production of organic food  05 – Student is able to work individually and in a group, assuming different roles in it, aiming to achieve the assumed goal | | | | |
| Assessment methods19): | | Effects 01, 02, 03 – written tests during laboratory part, written exam  Effects 04, 05 – interpretation of the results of performed experiments during laboratory part | | | | | | |
| Formal documentation of the learning outcome 20): | | - Students’ grade cards, that include grades for written tests and for experiment performance  - Exam papers including questions and given grades | | | | | | |
| Elements and their measures comprising the final grade21): | | **- Grade for performance of experiments conducted during laboratory part – 25%**  **- Grade for written tests taken during laboratory part – 25%**  **- Grade for written exam from lecture content – 50%**  It is mandatory to collect minimum 51% of grade points for experiments performance and for written tests to be able to take written exam. | | | | | | |
| Teaching base22): | | lecture – lecture rooms, laboratory part – biochemical/ physiological laboratory | | | | | | |
| Elementary and supportive materials23):  1. Lehninger Principles of Biochemistry, Fourth Edition – David L. Nelson, Michael M. Cox, W.H. Freeman and Company, New York, 2005, 1216 pp., ISBN 0‐7167‐4339‐6  2. Plant Physiology and Development- Lincoln Taiz, Eduardo Zeiger, Ian M. Møller, Angus Murphy, 2018, ISBN: 9781605357454. | | | | | | | | |
| Annotations24): | | | | | | | | |

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| Estimated number of work hours per student (contact and self-study) essential to achieve presumed learning outcomes  of the course18) - base for quantifying ECTS2: | **107 h** |
| Total ECTS points, accumulated by students during contact learning: | **2 ECTS** |
| Total ECTS points, accumulated by student during practical classes (laboratories, projects, seminars, etc.): | **2 ECTS** |

Quantitative summary of the course25)

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| Estimated number of work hours per student (contact and self-study) essential to achieve presumed learning outcomes  of the course18)  Lecture  Laboratory part  Preparation of reports from conducted experiments during laboratory part  Preparation to written tests  Taking part in consultations  Preparation to written exam  Exam participation  Total | 15 h  30 h  10 h  20 h  10 h  20 h  2 h  **107 h**  **4,0 ECTS** |
| Total ECTS points, accumulated by students during contact learning:  Lecture  Laboratory part  Taking part in consultations  Exam participation  Total | 15 h  30 h  10 h  2 h  **57 h**  **2,0 ECTS** |
| Total ECTS points, accumulated by student during practical classes (laboratories, projects, seminars, etc.):  Laboratory part  Preparation of reports from conducted experiments during laboratory part  Taking part in consultations  Total | 30 h  10 h  10 h  **50 h**  **2,0 ECTS** |

Learning outcomes of the module relative to the learning outcomes of the study programme26):

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| No/symbol of outcome | Learning outcomes: | Relative to learning outcomes of the study programme |
| 01 | Student has a basic knowledge of biochemical and physiological processes in plants | **K\_W05** / P6S\_WG, P6S\_WG(R1), P6S\_WG(R4) |
| 02 | Student knows the principle of mechanisms that regulate the general vital functions of plants and animals | **K\_W07** / P6S\_WG, P6S\_WG(R2), |
| 03 | Student is able to evaluate and interpret the basic biological parameters of plants in order to diagnose the physiological and biochemical status of plants | **K\_U11** / P6S\_UW, P6S\_UW(R2), P6S\_UO, |
| 04 | Student can assess the nutritional value, including the content of bioactive components and use it in the production of organic food | **K\_U16** / P6S\_UW, P6S\_UW(R2), P6S\_UW(R3), P6S\_UO, |
| 05 | Student is able to work individually and in a group, assuming different roles in it, aiming to achieve the assumed goal | **K\_S02** / P6S\_KO |