University of Gdańsk

Subject card

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|---|---|---|---|
| Subject name and code | Multicellular organisms - Organization of plant structure, growth and physiology Methodology (M04_B3), PG_00197630 | | |
| Field of study | Biotechnology | | |
| Date of commencement of studies | October 2025 | Academic year of realisation of subject | 2026/2027 |
| Education level | Bachelor's studies | Subject group | Obligatory subject group in the field of study<br>Subject group related to scientific research in the field of study |
| Mode of study | full-time studies | Mode of delivery | at the university |
| Year of study | 2 | Language of instruction | Polish |
| Semester of study | 4 | ECTS credits | 3.0 |
| Learning profile | academic | Assessment form | credit |
| Conducting unit | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr hab. Katarzyna Jasieniecka-Gazarkiewicz | |
| | Teachers | | |

**Lesson types**

| Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|
| Number of study hours | 0.0 | 0.0 | 45.0 | 0.0 | 0.0 | 45 |

E-learning hours included: 0.0

**Learning activity and number of study hours**

| Learning activity | Participation in didactic classes included in study plan | Participation in consultation hours | Self-study | SUM |
|---|---|---|---|---|
| Number of study hours | 45 | 10.0 | 20.0 | 75 |

**Subject objectives**

The program block allows students to exclude and perform biochemical and physiological-cytological analysis of plant material during laboratory work . The student became familiar with the experience, safety rules and basic information found in appropriate laboratories, as well as documenting the experience and interpreting the results.

**Learning outcomes**

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| [BIOTECHL3_U02] The graduate is able to plan and organise work effectively, independently or as part of a team, in particular work in a laboratory | The student effectively plans work in the laboratory and is able to cooperate in a team. | [SU2] presentation/project/paper/ report<br>[SU8] observation of student's independent or team work |
| [BIOTECHL3_U01] The graduate possesses practical skills in performing laboratory procedures, documenting results, and applying techniques necessary in biotechnology, including methods of isolation, modification, selection, and analysis of organisms, tissues, cells, and molecules; has the ability to operate advanced laboratory. | The student conducts experiments, applying safety rules and correctly using selected laboratory equipment, documents the experiments and interprets the results. | [SU2] presentation/project/paper/ report<br>[SU4] test/exam - oral or written<br>[SU5] implementation of a problem task |
| [BIOTECHL3_K04] The graduate is aware of the importance of occupational safety rules, is able to apply them and react in hazardous situations, ensuring their own safety and the safety of others. | The student knows and applies health and safety regulations applicable in the laboratory | [SK8] observation of student's independent or team work |

<table>
<tr><td>Subject contents</td><td>

- Anatomy and morphology of the root, stem and leaves and cell components (preparation of preparations and microscopic observation of cross-sections of stems, roots, leaves and selected cell organelles)
- Plant growth and development (photoperiodism, vernalization, the influence of light on plant growth, seed structure and types of germination, energy and strength of seed germination, biochemical methods for determining seed viability)
- Water management (factors influencing seed swelling, Traube cell, plasmolysis and deplasmolysis, measurement of osmotic potential, demonstration of the mechanism of active and passive water uptake by plants, structure and movement of stomata, intensity of stomatal and cuticular transpiration)
- Respiration (determination of the respiratory coefficient of germinating seeds, the influence of external factors on the intensity of respiration, mobilization of reserve materials in germinating seeds)
- Photosynthesis (extraction of photosynthetic pigments, chemical and physical properties of photosynthetic pigments, measurement of pigment content using the spectrophotometric method, detection of photosynthetic products, necessity of $CO_2$ for the photosynthesis process, activity of malate dehydrogenase in C3 and C4 plants, isolation of chloroplasts, Hill reaction)
- Mineral management (elements found in plants, detection of nitrates and ammonium salts in fresh plant material, nitrate reductase activity)
- Growth regulators (tests demonstrating the impact of individual groups of plant regulators on plants)
- Plant movements (observations of plant movements; collection of data regarding growth regulators)
- Summary exercise (student presentations of results; discussion)

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<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>activity</td><td>0.0%</td><td>20.0%</td></tr>
<tr><td>safety rules</td><td>0.0%</td><td>10.0%</td></tr>
<tr><td>reports/presentation</td><td>0.0%</td><td>10.0%</td></tr>
<tr><td>laboratory reports</td><td>0.0%</td><td>10.0%</td></tr>
<tr><td>short tests</td><td>0.0%</td><td>50.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>Przewodnik do ćwiczeń z biochemiczno-biofizycznych podstaw rozwoju roślin. A. Banaś, K. Jasieniecka-Gazarkiewicz, K. Demski. 2017. Wydawnictwo Uniwersytetu Gdańskiego. ISBN: 978-83-7865-558-9<br><br>Fizjologia roślin. J. Kopcewicz i S. Lewak,edytorzy. Wydanie 3, 2012 lub nowsze. Wydawnictwo Naukowe PWN Warszawa</td></tr>
<tr><td>Supplementary literature</td><td>• Fizjologia Roślin. A. Szwejkowska. 2004. Wydawnictwo Naukowe Uniwersytetu im. Adama Mickiewicza w Poznaniu<br>• Plant Physiology. L.Taiz, E. Zeiger, Eds. Wydanie 5, 2010 lub nowsze. Sinauer Associates, Inc.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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