

## Subject card

|                                             |                                                                                            |                                                          |                                         |                                     |                                                                                                                      |            |     |
|---------------------------------------------|--------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------|-----|
| Subject name and code                       | Molecular plant physiology, PG_00147014                                                    |                                                          |                                         |                                     |                                                                                                                      |            |     |
| Field of study                              | Genetics and Experimental Biology                                                          |                                                          |                                         |                                     |                                                                                                                      |            |     |
| 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                           | 3                                                                                          |                                                          | ECTS credits                            |                                     | 2.0                                                                                                                  |            |     |
| Learning profile                            | academic                                                                                   |                                                          | Assessment form                         |                                     | credit                                                                                                               |            |     |
| Conducting unit                             | Department of Experimental Biology and Plant Biotechnology -> Faculty of Biology -> Rector |                                                          |                                         |                                     |                                                                                                                      |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor                                                                         |                                                          | dr hab. Wojciech Pokora                 |                                     |                                                                                                                      |            |     |
|                                             | Teachers                                                                                   |                                                          | dr hab. Wojciech Pokora                 |                                     |                                                                                                                      |            |     |
| Lesson types                                | Lesson type                                                                                | Lecture                                                  | Tutorial                                | Laboratory                          | Project                                                                                                              | Seminar    | SUM |
|                                             | Number of study hours                                                                      | 0.0                                                      | 0.0                                     | 30.0                                | 0.0                                                                                                                  | 0.0        | 30  |
|                                             | 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                                                                      | 30                                                       |                                         | 5.0                                 |                                                                                                                      | 15.0       | 50  |
| Subject objectives                          | Prepare students to conduct basic research in plant molecular physiology.                  |                                                          |                                         |                                     |                                                                                                                      |            |     |

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| Learning outcomes               | Course outcome                                                                                                                                                                                                                                                 | Subject outcome                                                                                                                                                                                                                        | Method of verification                                                                  |
|                                 | [GBEL3_U01] Independently perform practical tasks in the field of biological sciences and related disciplines, formulate research problems, analyze their results, and draw conclusions.                                                                       | Graduate can independently perform simple practical tasks in the field of physiology molecular physiology of plants.                                                                                                                   | [SU6] demonstration of practical skills                                                 |
|                                 | [GBEL3_U03] Proficient in using research equipment and tools, while following the correct sequence of procedures, to conduct basic physical, biological, or chemical observations and measurements in laboratory work within the field of biological sciences. | Graduate uses basic apparatus and research tools maintaining the correct sequence of operations, performs simple physical, biological or chemical observations and measurements in laboratory work in the field of biological sciences | [SU1] oral statement/conversation/discussion<br>[SU6] demonstration of practical skills |
|                                 | [GBEL3_K05] Responsibility for the safety of one's own work and others.                                                                                                                                                                                        | The graduate is responsible for the safety of his own work and that of others                                                                                                                                                          | [SK8] observation of student's independent or team work                                 |
|                                 | [GBEL3_K02] Critical assessment of one's own knowledge and methods in the field of molecular biology and related disciplines, as well as the commercialization of research.                                                                                    | The graduate is ready to critically evaluate methods in the field of molecular physiology plants                                                                                                                                       | [SK1] oral statement/conversation/discussion                                            |
|                                 | [GBEL3_K01] The utilization of theoretical knowledge in laboratory and production practice.                                                                                                                                                                    | The graduate is ready to apply theoretical knowledge in laboratory and production practice                                                                                                                                             | [SK6] demonstration of practical skills                                                 |
| Subject contents                | [GBEL3_U07] Work in a team and organize work while adhering to occupational health and safety principles and ergonomics.                                                                                                                                       | Graduate is able to work in a team and organize work                                                                                                                                                                                   | [SU8] observation of student's independent or team work                                 |
|                                 | Properties of chloroplast pigments, functioning of the photosynthetic apparatus under stress, Water management of plant cells and tissues, plant movements, hormonal regulation, assimilation and metabolism of nitrogenous compounds.                         |                                                                                                                                                                                                                                        |                                                                                         |
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| Prerequisites and co-requisites | lack                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                        |                                                                                         |
| Assessment methods and criteria | Subject passing criteria                                                                                                                                                                                                                                       | Passing threshold                                                                                                                                                                                                                      | Percentage of the final grade                                                           |
|                                 | written credit for a batch of material (entrance exam)                                                                                                                                                                                                         | 51.0%                                                                                                                                                                                                                                  | 25.0%                                                                                   |
|                                 | interpretation and discussion of results                                                                                                                                                                                                                       | 51.0%                                                                                                                                                                                                                                  | 25.0%                                                                                   |
|                                 | performance of practical work                                                                                                                                                                                                                                  | 51.0%                                                                                                                                                                                                                                  | 50.0%                                                                                   |
| Recommended reading             | Basic literature                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                        |                                                                                         |
|                                 | Buchanan, Gruissem, Jones (red.), 2015. Biochemistry and molecular biology of Plants, Willey Balacwell.                                                                                                                                                        |                                                                                                                                                                                                                                        |                                                                                         |
|                                 | Szmjdt-Jaworska, Kopcewicz J.(red.). 2020. Fizjologia roślin. Wyd. PWN, Warszawa                                                                                                                                                                               |                                                                                                                                                                                                                                        |                                                                                         |
|                                 | Taiz L., Zeiger E. (red.). 2010. Plant physiology. The Benjamin/ Cummings Publ. Comp. Inc.                                                                                                                                                                     |                                                                                                                                                                                                                                        |                                                                                         |
|                                 | Tukaj Z. (red.). 2012. Przewodnik do ćwiczeń z fizjologii roślin. Wyd. Uniwersytetu Gdańskiego                                                                                                                                                                 |                                                                                                                                                                                                                                        |                                                                                         |
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|                                                                | Supplementary literature | <p>Scientific publications in experimental biology and molecular physiology of plants</p> <p>Pokora, W., Aksmann, A., Baścik-Remisiewicz, A., Dettlaff-Pokora, A., Rykaczewski, M., Gappa, M., and Tukaj, Z. Changes in nitric oxide/ hydrogen peroxide content and cell cycle progression: Study with synchronized cultures of green alga <i>Chlamydomonas reinhardtii</i>. <i>Journal of Plant Physiology</i> (2017) 208, 8493. Renberg L., Johansson A. I., Shutova T., Stenlund H., Aksmann A., Raven J. A., Gardeström P., Moritz T. &amp; G. Samuelsson A Metabolomic Approach to Study Major Metabolite Changes during Acclimation to Limiting CO<sub>2</sub> in <i>Chlamydomonas reinhardtii</i>. <i>Plant Physiol.</i> 154(1): 187+196. Wilmowicz E., Kućko A., Pokora W., Kapusta M., Jasieniecka-Gazarkiewicz K., Tranbarger T.J., Wolska M., Panek K. EPIP-Evoked Modifications of Redox, Lipid, and Pectin Homeostasis in the Abscission Zone of Lupine Flowers. <i>Int. J. Mol. Sci.</i> 2021 (22), 3001.</p> |
|                                                                | eResources addresses     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Example issues/<br>example questions/<br>tasks being completed |                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Work placement                                                 | Not applicable           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

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