

**Subject card**

|  |  |  |                       |                                     |  |            |     |
|--|--|--|-----------------------|-------------------------------------|--|------------|-----|
| <b>Subject name and code</b>                       | Multicellular organisms - Human body organisation and physiology Foundation (M04_B2), PG_00197627  |  |                       |                                     |  |            |     |
| <b>Field of study</b>                              | Biotechnology  |  |                       |                                     |  |            |     |
| <b>Date of commencement of studies</b>             | October 2025   | <b>Academic year of realisation of subject</b>           |                       |                                     | 2026/2027  |            |     |
| <b>Education level</b>                             | Bachelor's studies   | <b>Subject group</b>                                     |                       |                                     | Obligatory subject group in the field of study<br>Subject group related to scientific research in the field of study |            |     |
| <b>Mode of study</b>                               | full-time studies  | <b>Mode of delivery</b>                                  |                       |                                     | at the university  |            |     |
| <b>Year of study</b>                               | 2  | <b>Language of instruction</b>                           |                       |                                     | Polish   |            |     |
| <b>Semester of study</b>                           | 4  | <b>ECTS credits</b>                                      |                       |                                     | 4.0  |            |     |
| <b>Learning profile</b>                            | academic   | <b>Assessment form</b>                                   |                       |                                     | exam   |            |     |
| <b>Conducting unit</b>                             | Intercollegiate Faculty of Biotechnology UG-MUG -> Rector  |  |                       |                                     |  |            |     |
| <b>Name and surname of lecturer (lecturers)</b>    | <b>Subject supervisor</b>  |  | dr hab. Adam Iwanicki |                                     |  |            |     |
|  | <b>Teachers</b>  |  |                       |                                     |  |            |     |
| <b>Lesson types</b>                                | <b>Lesson type</b>   | Lecture  | Tutorial              | Laboratory                          | Project  | Seminar    | SUM |
|  | <b>Number of study hours</b>   | 68.0   | 0.0                   | 0.0                                 | 0.0  | 0.0        | 68  |
|  | E-learning hours included: 0.0   |  |                       |                                     |  |            |     |
| <b>Learning activity and number of study hours</b> | <b>Learning activity</b>   | Participation in didactic classes included in study plan |                       | Participation in consultation hours |  | Self-study | SUM |
|  | <b>Number of study hours</b>   | 68   |                       | 5.0                                 |  | 27.0       | 100 |
| <b>Subject objectives</b>                          | The subject provides detailed knowledge about the principles of cell organization into higher-order structures in the human body, biological processes related to cell functioning and the mechanisms of differentiation and specialization of human cells, tissues and organs in connection with their functions. The student will learn about human embryonic development and the proper features of the morphological structure and functioning of tissues, organs and human body systems. Basic techniques and research tools used in this field of science will be presented. |  |                       |                                     |  |            |     |

| Learning outcomes | Course outcome  | Subject outcome  | Method of verification            |
|-------------------|---|--|-----------------------------------|
|                   | [BIOTECHL3_W07] The graduate has advanced knowledge of the rules of operation and the possibilities of using research techniques and tools used in biotechnology.   | The student knows the basic techniques and research tools used in researching cellular processes, imaging the morphological structure of tissues and organs, culturing mammalian cells and their genetic modifications.  | [SW4] test/exam - oral or written |
|                   | [BIOTECHL3_W04] The graduate has advanced knowledge of the structure and functions of the human body in terms of anatomy, histology and physiology and understands their importance for medicine and medical biotechnology. | The student has knowledge about human embryonic development, as well as the proper features of the morphological structure and functioning of tissues and individual organs and systems of the human body, which is important from the point of view of medicine.                      | [SW4] test/exam - oral or written |
|                   | [BIOTECHL3_W02] The graduate knows and understands at an advanced level selected processes at the cell, tissue and organism level, important from the biological point of view  | The student knows the principles of cell organization into higher-order structures in the human body, biological processes related to cell functioning and the mechanisms of differentiation and specialization of human cells, tissues and organs in connection with their functions. | [SW4] test/exam - oral or written |
|                   | [BIOTECHL3_W09] The graduate possesses structured and advanced knowledge of the terminology and concepts used in biological and medical sciences and related disciplines.   | The student knows and is able to skillfully apply the concepts and terminology used in cell biology and used to describe the structure of cells, tissues and organs, their functioning and interactions.   | [SW4] test/exam - oral or written |

| Subject contents                | <p><b>F1. Mechanisms of differentiation and specialization of human cells/tissues/organs in connection with their functions:</b></p> <ul style="list-style-type: none"> <li>- Principles of organizing cells into higher-level structures (introductory lecture).</li> <li>- Principles of the hierarchy of human structure (cells, cell connections, extracellular matrix, tissues, organs, body).</li> <li>- Cellular processes of division/proliferation, cell cycle and their regulation, types and structure of intercellular connections, differentiation and cell specialization, mechanisms of aging and cell death, transmembrane transport, intracellular transport.</li> <li>- Mechanisms of embryogenesis and morphogenesis of animal tissues and organs, reproductive cells and gametogenesis, stem cells, reprogramming somatic cells, cell replacement therapies.</li> </ul> <p><b>F2. Types of human cells, tissues and organs overview:</b></p> <ul style="list-style-type: none"> <li>- Microscopic techniques.</li> <li>- Epithelial tissue.</li> <li>- Connective tissue.</li> <li>- Skeletal connective tissue. Ossification.</li> <li>- Muscle tissue.</li> <li>- Nervous tissue.</li> <li>- Peripheral blood. Marrow blood.</li> <li>- Lymphatic system.</li> </ul> <p><b>F3. Basics of human immunology at the cell and organism level:</b></p> <ul style="list-style-type: none"> <li>- Evolution of the immune system.</li> <li>- Self-non-self recognition as the basis of the immune system, PAMPs, DAMPs, PRRs.</li> <li>- Mechanisms of non-specific immunity.</li> <li>- Mechanisms of specific immunity: B and T lymphocytes, histocompatibility complex, cytokines.</li> </ul> <p><b>F4. The structure of the human body, including:</b></p> <ul style="list-style-type: none"> <li>- Skeletal system.</li> <li>- Peripheral nervous system.</li> <li>- Circulatory system.</li> </ul> |  |  |                          |                   |                               |                  |       |       |          |      |      |          |      |       |          |      |       |          |      |       |
|---------------------------------|---|--|--|--------------------------|-------------------|-------------------------------|------------------|-------|-------|----------|------|------|----------|------|-------|----------|------|-------|----------|------|-------|
| Prerequisites and co-requisites |   |  |  |                          |                   |                               |                  |       |       |          |      |      |          |      |       |          |      |       |          |      |       |
| Assessment methods and criteria | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">Subject passing criteria</th> <th style="width: 33%;">Passing threshold</th> <th style="width: 33%;">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td>Integration exam</td> <td>50.0%</td> <td>40.0%</td> </tr> <tr> <td>F3: test</td> <td>0.0%</td> <td>5.0%</td> </tr> <tr> <td>F2: test</td> <td>0.0%</td> <td>15.0%</td> </tr> <tr> <td>F1: test</td> <td>0.0%</td> <td>15.0%</td> </tr> <tr> <td>F4: test</td> <td>0.0%</td> <td>25.0%</td> </tr> </tbody> </table>  |  |  | Subject passing criteria | Passing threshold | Percentage of the final grade | Integration exam | 50.0% | 40.0% | F3: test | 0.0% | 5.0% | F2: test | 0.0% | 15.0% | F1: test | 0.0% | 15.0% | F4: test | 0.0% | 25.0% |
| Subject passing criteria        | Passing threshold   | Percentage of the final grade  |  |                          |                   |                               |                  |       |       |          |      |      |          |      |       |          |      |       |          |      |       |
| Integration exam                | 50.0%   | 40.0%  |  |                          |                   |                               |                  |       |       |          |      |      |          |      |       |          |      |       |          |      |       |
| F3: test                        | 0.0%  | 5.0%   |  |                          |                   |                               |                  |       |       |          |      |      |          |      |       |          |      |       |          |      |       |
| F2: test                        | 0.0%  | 15.0%  |  |                          |                   |                               |                  |       |       |          |      |      |          |      |       |          |      |       |          |      |       |
| F1: test                        | 0.0%  | 15.0%  |  |                          |                   |                               |                  |       |       |          |      |      |          |      |       |          |      |       |          |      |       |
| F4: test                        | 0.0%  | 25.0%  |  |                          |                   |                               |                  |       |       |          |      |      |          |      |       |          |      |       |          |      |       |
| Recommended reading             | Basic literature  | Literature sources provided in the lecture materials. Anatomy teaching materials placed on the MUG's electronic educational platform<br>Histologia, W. Sawicki, PZWL, 2012 Atlas histologiczny pod red. A. Myśliwskiego, OPERON, 2002 Gołąb J. i wsp. Immunologia, 2007, PWN, Warszawa Alberts i wsp. Podstawy biologii komórki. PWN 2009 lub nowsze wydanie Moore Keith L., Persaud T.V.N., Torchia Mark G. Embriologia i wady wrodzone. Elsevier Urban & Partner 2013. S. F. Gilbert. Developmental Biology Ed 7 or newer (online access). |  |                          |                   |                               |                  |       |       |          |      |      |          |      |       |          |      |       |          |      |       |

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|--|--------------------------|---|
|  | Supplementary literature | <p>Immunologia (wyd. 2006) pod redakcją I.M. Roitt, Atlas histologii, Sobotta i Hammersen, Urban &amp; Partner, 2002 Postępy biochemii, kwartalnik Postępy biologii komórki, kwartalnik Rosenberger CM, Finlay BB, Nat. Rev. Mol. Cell. Biol. 2003, 4:385-396 Gruenberg J, van der Goot FG, Nat. Rev. Mol. Cell. Biol. 2006, 7:495-504 Turk BE, Biochem J. 2007, 402:405-417 Haraga A, Ohlson MB, Miller SI, Nat. Rev. Microbiol. 2008, 6:53-66 Cornelis GR, Nat. Mol. Cell. Biol. 2002, 3:742-752 Hamon M, Biere H, Cossart P, Nat. Rev. Microbiol. 2006, 4:423-434 Baldari CT, Lanzavecchia A, Telford JL, TRENDS Immunol. 2005, 26:199-207 Mueller P, Pieters J, Immunobiol. 2006, 211:549-556 Abramovitch RB, Anderson JC, Martin GB, Nat. Rev. Mol. Cell. Biol. 2006, 7:601-611 World Health Organization. Laboratory biosafety manual. 3rd ed. (2004). Z. Grodziński. Embriologia dla studentów biologii. PWN 1970. J. Poulos. The limited application of stem cells in medicine: a review. Stem Cell Research and Therapy (2018):9:1 Trounson A., McDonald C.. Stem Cell Therapies in Clinical Trials: Progress and Challenges. Cell Stem Cell 17 (2015). J.Z. Kubiak, M.A. Ciemerych. Od Gurdon do Yamanaki, czyli krótka historia reprogramowania komórek. Postępy Biochemii 59 (2) (2013). K. Filimonow, M. Krupa, A. Suwińska. Pierwsze decyzje rozwojowe różnicowanie komórek w przedimplantacyjnym zarodku myszy. Postępy biochemii 59 (2) (2013).</p> |
|  | eResources addresses     |   |
| Example issues/<br>example questions/<br>tasks being completed |                          |   |
| Work placement   | Not applicable           |   |

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