**COURSE UNIT DESCRIPTION**

| Course unit title | Code |
|---|---|
| **Innovative technology in medicine** | |

| Annotation |
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| Students will be introduced to biologics technologies and their potential applications in the diagnosis and treatment of diseases, and will deepen their understanding of the importance of non-clinical (pre-clinical) research in the development of drugs/preparations. |

| Lecturer(s) | Department, Faculty |
|---|---|
| **Coordinating:** Asist. dr. Aušra Repečkienė | Faculty of Medicine, Institute of Biomedical Sciences, Centre for Pharmacy and Pharmacology M. K. Čiurlionio g. 21/27, LT-03101, Vilnius ausra.repeckiene@mf.vu.lt |

| Study cycle | Type of the course unit |
|---|---|
| Full-time study | Mandatory |

| Mode of delivery | Semester or period when it is delivered | Language of instruction |
|---|---|---|
| Blended learning(s) | Spring Semester | Lithuanian |

| Requisites | |
|---|---|
| **Prerequisites:**None | Co-requisites (if relevant): None |

| Number of ECTS credits allocated | Student's workload (total) | Contact hours | Individual work |
|---|---|---|---|
| 5 | 135 | 64 | 71 |

| Purpose of the course unit: programme competences to be developed | | | |
|---|---|---|---|
| **Learning outcomes of the study programme** | **Learning outcomes of the course unit** | **Teaching and learning methods** | **Assessment methods** |
| 1.1, 1.2, 1.4, 2.2, 2.3, 2.4, 4.3 | They will be able to understand how cells are isolated from different tissues, count their concentration and viability, grow them in vitro and apply cell cultures to the study of preparations. | Problem-based learning in lectures, discussions, problem-oriented and digital learning | Diagnostic, formative, in-class and final summative (exam) assessments. |
| 1.1, 1.2, 1.4, 2.2, 2.3, 2.4, 4.3 | Understand and explain various identification systems based on the principles of antibody-antigen interactions | Problem-based learning in lectures, discussions, problem-oriented and digital learning | Diagnostic, formative, in-class and final summative (exam) assessments. |
| 1.1, 1.2, 1.4, 2.2, 2.3, 2.4, 4.3 | Be able to demonstrate knowledge of the application of cells in biological therapies | Problem-based learning in lectures, discussions, problem-oriented and digital learning | Diagnostic, formative, in-class and final summative (exam) assessments. |

| 2.1, 4.3, 5.1, 6.1, 6.3 | They will be able to participate ethically and professionally in debates, listen to and consider other views, evaluate them and draw constructive conclusions. | Problem-based learning in lectures, discussions, problem-oriented and digital learning | Diagnostic, formative, in-class and final summative (exam) assessments. |
|---|---|---|---|
| 5.1, 6.1, 6.3 | Demonstrate the ability to work as part of a team and independently, and complete tasks on time. | Problem-based learning in lectures, discussions, problem-oriented and digital learning | Diagnostic, formative, in-class and final summative (exam) assessments. |

| Course content: breakdown of the topics | Contact hours | | | | | | | Individual work: time and assignments | |
|---|---|---|---|---|---|---|---|---|---|
| | Lectures | Tutorials | Seminars | Workshops | Laboratory work | Internship/work placement | Contact hours, total | Individual work | Assignments |
| 1. Biomedical technologies. Introduction. To explore topical themes with direct relevance to medicine and biotechnology and immunology. | 2 | | | 4 | | | **6** | **5** | Finding information, reading scientific literature |
| 2. Development of the immune system. Organs of the immune system. | 2 | | | | | | **2** | **3** | Finding information, reading scientific literature |
| 3. Cell isolation, concentration and viability determination | | | 2 | 4 | | | **6** | **6** | Finding information, reading scientific literature |
| 4. Antigens, B and T cell receptors, immune response | 2 | | | | | | **2** | **3** | Finding information, reading scientific literature |
| 5. Antibody-antigen interactions. Methods for the detection of antigens and antibodies. | 2 | | | | | | **2** | **3** | Finding information, reading scientific literature |
| 6. Isolation of specific cells using antibody-antigen interactions. | | | 2 | 4 | | | **6** | **6** | Finding information, reading scientific literature |
| 7. Immunoglobulins. Structure, function, antigens of immunoglobulins . | 2 | | | | | | **2** | **3** | Finding information, reading scientific literature |
| 8. Polyclonal, monoclonal, bispecific, chimeric, humanised antibodies and their production . | 2 | | | | | | **2** | **3** | Finding information, reading scientific literature |
| 9. Hybridoma's. Cell hybridisation, selection, cloning and recloning. Methods for determining antibody production. In vitro and in vivo cultivation of hybridoma. | | | 2 | 4 | | | **6** | **6** | Finding information, reading scientific literature |

| Topic | | | | | | | | | Skills |
|---|---|---|---|---|---|---|---|---|---|
| 10. Types of cell cultures: short-term, long-term, suspension, monolayer. Interactions between cells. Obtaining stable cell lines . | 2 | | | | | | **2** | **3** | Finding information, reading scientific literature |
| 11. In vitro cell culturing. Variety of cell culture methods, their selection, modification and application. Cell research . | | | 2 | 4 | | | **6** | **6** | Finding information, reading scientific literature |
| 12. Application of cell and tissue imaging | | | 2 | 4 | | | **6** | **6** | Finding information, reading scientific literature |
| 13. Stem cells. Types of stem cells, location in the body, niches, functions | | | 2 | 4 | | | **6** | **6** | Finding information, reading scientific literature |
| 14. Application of cell secreted products. Cytokines. Cytokines-mediators of intercellular interactions. Role of cytokines in cell maturation. | | | 2 | 4 | | | **6** | **6** | Finding information, reading scientific literature |
| 15. Biological therapies. Advantages, disadvantages and perspectives. Immunoregeneration . | 2 | | | | | | **2** | **3** | Finding information, reading scientific literature |
| 16. Biological models in vivo Experimental animals and experimental models in vivo. Models that can be used in pre-clinical studies . | | | 2 | | | | **2** | **3** | Finding information, reading scientific literature |
| **Total:** | **16** | | **16** | **32** | | | **64** | **71** | |

| Assessment strategy | Weight % | Deadline | Assessment criteria |
|---|---|---|---|
| Work during the practical session | 20 | During the course of each session | 2 points (20%): participates actively in the discussions and completes all tasks.<br>1 point (10%): participates in the discussions, has not completed more than one task in the session<br>0 points (0%): has not completed two or more assignments. |
| Examination: tests | 40+40 | March & April | Each test consists of 50 closed-ended questions (varying in difficulty from comprehension to assessment), each weighted by one point. The scoring is as follows:<br>5: Excellent knowledge and skills. Assessment level. 45-50 correct answers.<br>4: Good knowledge and ability, with possible minor errors. Synthesis level. 35-44 correct answers.<br>3: Average knowledge and ability, some errors. Analysis level. 25-34 correct answers.<br>2: Knowledge and skills below average, with some fundamental errors. Application level. 15-24 correct answers.<br>1: Minimal knowledge and skills. Many errors. Level of knowledge and understanding. 5-14 correct answers.<br>0: Knowledge and ability |
| | 100 | | The sum of the estimates of all parts. |

| Author | Publishing year | Title | Issue of a periodical or volume of a publication; pages | Publishing house or internet site |
|---|---|---|---|---|
| **Required reading** | | | | |
| T.J. Kindt, B.A. Osborne R. A. Goldsby | 2012 | Kuby Immunology | 7 | W. H. Freeman and Company. New York, USA |
| V. Tamošiūnas, I. Pumputienė, R. Kvietkauskaitė | 2015 | Imunologijos technologijos pagrindai | | „Versus aureus" leidykla |