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| Module name | **Invertebrate Immunology** |
| Module code | B-BE.231 |
| ISCED code | 0511: Biology  0512: Biochemistry |
| Study cycle | IIo |
| Semester | Summer semester |
| Responsible for this module | dr hab. Małgorzata Cytryńska (cytryna@poczta.umcs.lublin.pl) |
| Language of instruction | English |
| Website |  |
| Prerequisites | knowledge in biochemistry and microbiology |
| ECTS | 3.5 |
| ECTS points hour equivalents | Contact hours (work with an academic teacher) – lecture (15 hrs), laboratory (25 hrs), consultations (10hrs)  Total number of hours with an academic teacher– 50 hrs  Number of ECTS points with an academic teacher– 2.1  Non-contact hours (students' own work) – preparing to classes, including study of recommended scientific papers (17 hrs), preparing to exam (25 hrs)  Total number of non-contact hours– 43 hrs  Number of ECTS points for non-contact hours– 1.4  **Total number of ECTS points for the module** – **3.5** |
| Educational outcomes verification methods | written or oral exam (lecture), continuous evaluation of the laboratory classes |
| Description | The module covers the knowledge in the area of invertebrate immunity.  The following issues are covered:  Essential features of invertebrate immunity on the example of insect innate immunity. Recognition of non-self (pathogen/microbial associated molecular patterns, pattern recognition receptors). Mechanisms of invertebrate immunity: anatomical and physiological barriers; cellular response (types of hemocytes, phagocytosis, nodulation, encapsulation); humoral response (hemolymph coagulation, phenoloxidase system, defense peptides and proteins). Regulation of gene expression of defense peptides in *Drosophila*. The role of proteins containing immunoglobulin domains in invertebrate immunity (hemolin, Dscam, FREPs). Entomopathogenic organisms. |
| Reading list | recommended review papers of the current scientific literature. |
| Educational outcomes | **KNOWLEDGE**  The student has knowledge of the essential mechanisms of invertebrate immunity, understands the differences between invertebrate and vertebrate immune response, can explain the complex mechanisms leading to activation of the immune response in invertebrates and the mechanisms of overcoming the insect immunity by entomopathogenic organisms.  **SKILLS**  The student can use an integrated knowledge of the various fields of biology (biochemistry, microbiology, immunology), knows and applies the techniques and methods used in research on invertebrate immunity, is able to use basic laboratory equipment, properly interprets the empirical data.  **ATTITUDES**  The student understands the need for continuous updating of knowledge. |
| Practice |  |

**Information about classes in the cycle**

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| Website |  |
| Educational outcomes verification methods | continuous evaluation of the laboratory classes |
| Comments |  |
| Reading list | recommended papers of the current scientific literature |
| Educational outcomes | **KNOWLEDGE**  The student knows and understands the techniques and methods used in research on invertebrate immunity.  **SKILLS**  The student applies the techniques and methods used in research on invertebrate immunity, properly uses laboratory equipment and properly interprets the empirical data.  **ATTITUDES**  The student follows ethical principles. |
| A list of topics | *Galleria mellonella* (Lepidoptera) as a model organism (isolation of fat body; microscopic observation of hemocytes). Analysis of phenoloxidase activity in hemolymph of naive and immune-challenged insects. Detection of antimicrobial activity (lysozyme, defense peptides) in *G. mellonella* hemolymph. The role of proteases of entomopathogenic bacteria in overcoming the insect immune response. |
| Teaching methods | practical laboratory, presentation, discussion |
| Assessment methods | continuous evaluation |