<table>
<tr><td>Course code</td><td></td></tr>
<tr><td>Type and description</td><td>Elective Course</td></tr>
<tr><td>ECTS credit</td><td>1</td></tr>
<tr><td>Course name</td><td>Advanced Techniques in Molecular Biology</td></tr>
<tr><td>Course name in Polish</td><td>Zaawansowane techniki w biologii molekularnej</td></tr>
<tr><td>Language of instruction</td><td>English</td></tr>
<tr><td>Course level</td><td>8 PRK</td></tr>
<tr><td>Course coordinator</td><td>Dr inż. Agnieszka Pietrzyk-Brzezińska (0000-0003-1565-7307)</td></tr>
<tr><td>Course instructors</td><td>Dr inż. Agnieszka Pietrzyk-Brzezińska (0000-0003-1565-7307)</td></tr>
<tr><td>Delivery methods and course duration</td><td>
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<tr><th></th><th>Lecture</th><th>Tutorials</th><th>Laboratory</th><th>Project</th><th>Seminar</th><th>Other</th><th>Total of teaching hours during semester</th></tr>
<tr><td>Contact hours</td><td>0</td><td>0</td><td>0</td><td>15</td><td>0</td><td>0</td><td>15</td></tr>
<tr><td>E-learning</td><td>No</td><td>No</td><td>No</td><td>No</td><td>No</td><td>No</td><td></td></tr>
<tr><td>Assessment criteria (weightage)</td><td></td><td></td><td></td><td>1,00</td><td></td><td>0,00</td><td></td></tr>
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<tr><td>Course objective</td><td>The aim of the course is to gain knowledge about new advanced techniques in molecular biology that are used worldwide in modern laboratories. The PhD students will learn about the alternative cloning techniques, broad range of expression systems and the advanced techniques used for analysis of the interactions (including affinities) between protein and other protein, ligand or nucleic acid.</td></tr>
<tr><td>Learning outcomes</td><td>1. PhD student is able to find the description of the advanced techniques and the corresponding experimental protocols in the literature. W4
2. PhD student is able to plan new experiments and is able evaluate which techniques can be useful in his/hers project. U4
3. PhD student is able to present the advanced techniques in molecular biology, U4
4. PhD student is ready to evaluate the articles describing the advanced methods in molecular biology. K1
Effects: W4, U4, K1.</td></tr>
<tr><td>Assessment methods</td><td>Learning outcomes 1-4 – a presentation about a new technique in molecular biology and its potential application in individual PhD project.</td></tr>
<tr><td>Prerequisites</td><td>Basic knowledge of biochemistry, molecular biology and genetic engineering</td></tr>
<tr><td>Course content with delivery methods</td><td>The beginning of the course will be dedicated to a presentation of course completion conditions, tips for a good presentation will be given and a short summary of the new techniques in molecular biology, including new techniques in molecular cloning (sequence and ligation independent cloning), new expression systems, new techniques aiming at studying the protein-protein interactions (ITC, SPR, FRET, Y2H, Co-IP), protein-ligand interactions (ITC, MST, FRET), and protein-nucleic acid interactions (FP, FRET) will be presented. Then, the PhD student will search the literature and choose a publication describing a new technique in molecular biology which can be useful for his/her PhD project. PhD student will prepare a project including: 1) a short description of the selected technique, 2) the list of materials, including materials specific to the PhD project like labelled protein, etc., and the information on where these materials can be purchased, 3) a description of the experiment, 4) the information on how to interpret the obtained results. Finally, the PhD students will present their projects to the group and after each presentation, there will be a discussion aiming at listing the pros and cons of the selected technique.</td></tr>
<tr><td>Basic reference materials</td><td>1. Ashwini M., et al., 2016. Advances in Molecular Cloning. Mol. Biol. 50, 1–6.
2. Lerner E., et al. 2018. Toward dynamic structural biology: Two decades of single-molecule Förster resonance energy. Science 19, 359.
3. Miura, 2018. An Overview of Current Methods to Confirm Protein-Protein Interactions.
4. Rosano G.L. & Ceccarelli E.A., 2014. Recombinant protein expression in Escherichia coli: advances and challenges. Frontiers in Microbiology, 5, 172.</td></tr>
<tr><td>Other reference materials</td><td>1. Valla S. & Lale R., 2014. DNA Cloning and Assembly Methods, Springer.</td></tr>
<tr><td>Average student workload outside classroom</td><td>15 h</td></tr>
<tr><td>Comments</td><td>-</td></tr>
<tr><td>Last update</td><td>03.03.2023</td></tr>
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