

SYLLABUS

CRISPR-Cas9 technology: Prospects and Challenges

(Lectures will be held Thursdays starting on 3 February 2022 online)

Lecture title	CRISPR-Cas9 technology: Prospects and Challenges
Venue	Institute of Bioorganic Chemistry PAS, Poznan (zoom platform)
Language	English
Learning objectives	Ph.D. Student: <ol style="list-style-type: none">1. gains advanced subject and methodological knowledge regarding genome editing technology,2. learns the history of CRISPR/Cas9 technology development,3. knows different genome editing strategies and examples of their applications4. Upon finishing the course the student should: (i) design sgRNA and predict its specificity (ii) know the experimental methods to evaluate the CRISPR/Cas efficiency and specificity (iii) determine cognitive and applicative goals for the application of selected genome engineering methods (iv) critically evaluate safety and ethical issues of genome editing technology
Course type	Facultative
Term/Year	summer semester 2021/2022
Lecturer's name	dr hab. Marta Olejniczak
Examiner's name	dr hab. Marta Olejniczak
Teaching methods	Lectures/Seminars with audiovisual techniques
Attendance requirements	Working knowledge of English language and molecular biology at the university level.
Number of ECTS points	2
Number of lectures	12 h
Didactic methods	Lectures and discussions.
Methods of verification and assessment of learning outcomes	Written exam
Conditions of a positive evaluation	Positive score at the exam
Course content	<ol style="list-style-type: none">1. The history of CRISPR-Cas9 technology development2. DNA repair mechanisms3. Methods used in genome editing technology4. Cas9 protein modifications and orthologs5. Examples of CRISPR-Cas9 technology applications6. Paving the way towards precise and safe CRISPR genome editing
Literature constituting the course materials	<ul style="list-style-type: none">• A programmable dual-RNA-guided DNA endonuclease in adaptive bacterial immunity. Jinek M, Chylinski K, Fonfara I,

	<p>Hauer M, Doudna JA, Charpentier E. Science. 2012;337(6096):816-21.</p> <ul style="list-style-type: none">• The Heroes of CRISPR. Eric S. Lander, Cell Volume 164, Issues 1-2, p18–28, 2016.• Genome engineering using the CRISPR-Cas9 system. Ran FA, Hsu PD, Wright J, Agarwala V, Scott DA, Zhang F. Nat Protoc. 2013;8(11):2281-2308• CRISPR interference (CRISPRi) for sequence-specific control of gene expression. Larson, M. H.; Gilbert, L. A.; Wang, X; Lim, W. A.; Weissman, J. S.; Qi, L. S. (2013) Nature Protocols. 8 (11): 2180–96• Correction of a pathogenic gene mutation in human embryos. Hong Ma, et al., Nature (2017) doi:10.1038/nature23305• Paving the way towards precise and safe CRISPR genome editing. Sledzinski P.; Dabrowska M.; Nowaczyk M., Olejniczak M. (2021) Biotechnology Advances 49:107737
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