Research topics for undergraduate students in the Biological Research Centre Szeged for the academic year of 2022-2023

Characterization of protein posttranslational modifications using mass spectrometry
Zsuzsanna Darula (Laboratory of Proteomics Research)

Mass spectrometry aided protein analysis
Éva Hunyadi-Gulyás (Laboratory of Proteomics Research)

Protein-protein interaction analysis by mass spectrometry
Aladár Pettkó-Szandtner (Laboratory of Proteomics Research)

Biological application of differential-polarization laser scanning microscopy. Hierarchically ordered structures.
Gábor Steinbach (Cellular Imaging Laboratory)

Studying structure-function relationship of ion-pumping rotational membrane proteins using state-of-the-art molecular biophysical methods
Krisztina Sebők-Nagy and Tibor Páli (Institute of Biophysics)

Molecular biophysical investigation of drug delivery processes using spectroscopic methods
Krisztina Sebők-Nagy and Tibor Páli (Institute of Biophysics)

Determining the structure of membrane proteins using combined machine learning (artificial intelligence) and molecular mechanics methods
Teruaki Koto and Páli Tibor (Institute of Biophysics)

Biophysics of biological and model membranes: a spectroscopic approach
Tibor Páli (Institute of Biophysics)

Examination of free radicals and free radical reactions in biological samples and food products
Tibor Páli (Institute of Biophysics)

Integrated optical devices in biology: biosensors, protein based optoelectronical devices
Sándor Valkai and András Dér (Institute of Biophysics)

Construction of microfluidic devices and their utilization in biophysical applications
Sándor Valkai and András Dér (Institute of Biophysics)

Investigation of the permeability and transport mechanisms at the blood-brain barrier under physiological and pathological conditions
Mária Deli and Fruzsina Walter (Institute of Biophysics)

Molecular bases of neurovascular functions
István Krizbai and Imola Wilhelm (Institute of Biophysics)

Role of the blood-brain barrier in the formation of brain metastases
Imola Wilhelm and Kinga Molnár (Institute of Biophysics)

Role of pattern recognition receptors in pathologies related to cerebral endothelial cells and pericytes
István Krizbai and Imola Wilhelm (Institute of Biophysics)

Studying the neurovascular unit with two-photon microscopy
Attila Elek Farkas (Institute of Biophysics)

Restoration of cerebrovascular functions during aging
István Krizbai and Attila Elek Farkas (Institute of Biophysics)

Studying bacterial communication by microfluidic techniques
Péter Galajda, Krisztina Nagy (Institute of Biophysics)

Assembly and development of microbial communities in microfluidic chips
Péter Galajda, Krisztina Nagy (Institute of Biophysics)

Studying bacterial cells by optical tweezers
Péter Galajda, Krisztina Nagy (Institute of Biophysics)

Using photosynthetic reaction centres in biohybrid solar cells
Petar Lambrev and Melinda Magyar (Institute of Plant Biology)

Structure and function of photosynthetic reaction centre complexes
Petar Lambrev and Parveen Akhtar (Institute of Plant Biology)

Photochemistry and protein dynamics in Photosystem II
Petar Lambrev and Gábor Sipka (Institute of Plant Biology)

Mechanisms and dynamics of the ultrafast processes in photosynthesis
Petar Lambrev (Institute of Plant Biology)

Examination of mutant plants defective in symbiosis
Gabriella Endre (Institute of Plant Biology)

Functional study of symbiotic genes and proteins
Gabriella Endre (Institute of Plant Biology)

Investigation of the effect of new plant antimicrobial peptides on different bacteria
Gabriella Endre (Institute of Plant Biology)

Antibiotic resistance in microbes
Csaba Pál (Institute of Biochemistry)

Evolution of human immune system in response to pathogens
Csaba Pál (Institute of Biochemistry)

Systematic investigation of bacterial resistance to biocides
Réka Spohn and Csaba Pál (Institute of Biochemistry)

Laboratory evolution of antibiotic-producing bacteria in the presence of antibiotic-resistant pathogens
Ana Martins (Institute of Biochemistry)

Microbial evolutionary experiments in the lab
Zoltán Farkas (Institute of Biochemistry)

Investigating the side-effects of compensatory evolution in baker's yeast: do deleterious mutations contribute to phenotypic novelties?
Zoltán Farkas (Institute of Biochemistry)

High-throughput laboratory experiments using baker's yeast as a model organism
Zoltán Farkas (Institute of Biochemistry)

Lipid-protein interactions during autophagy
Hajnalka Laczkó-Dobos (Institute of Genetics)

Investigation of intracellular mechanisms affecting somatic LINE1 retrotransposition
Lajos Mátés (Institute of Genetics)

Autophagy in the nervous system
Áron Szabó (Institute of Genetics0

The mechanism of LC3-associated phagocytosis in *Drosophila* glia
Áron Szabó (Institute of Genetics)

Glial activation pathways in *Drosophila melanogaster*
Áron Szabó (Institute of Genetics)

Modelling neuroinflammation in *Drosophila melanogaster*
Áron Szabó (Institute of Genetics)

Production of organoid cultures from human pluripotent stem cells
Melinda Pirity (Institute of Genetics)

Generation of fluorescently labelled mouse stem cell lines for cell fate tracking
Melinda Pirity (Institute of Genetics)

Analysis of cell death signalling pathways in mouse and human stem cells
Melinda Pirity (Institute of Genetics)

Analysis of blood cell transdifferentiation in *Drosophila melanogaster*
Viktor Honti (Institute of Genetics)

Analysis of the regulation of blood cell niche maintenance in *Drosophila melanogaster*
Viktor Honti (Institute of Genetics)

Analysis of blood cell originated tumor formation in *Drosophila melanogaster*
Erika Gábor (Institute of Genetics)

Investigation of piRNA/PIWI mediated transposon silencing
Melinda Bence (Institute of Genetics)

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