Study Program: PhD in Biology

Course Title: Structural Biology of Proteins

Course Instructor: Dr. Edward Petri

Type and Level of Study: Doctoral degree

Status: Elective

ESPB number: 15

Requirements:

Learning Objectives

Structural Biology is essential for understanding the role of proteins in biological processes, as well as the relationship between protein structure and function. The aim of this course is to introduce methods for structure determination, molecular modeling and analysis of proteins. Students will learn how to use online structural biology databases and how to apply structural biology methods in their own biological research.

Learning Outcomes

Upon successful completion of this course, students will be able to:

- Understand the structural basis of biological processes
- Differentiate between methods of protein structure determination, modeling and analysis
- Assess the need for structural biology for resolving specific biological problems
- Apply computer programs for visualization, modeling, and analysis of protein structure
- Critically read primary scientific literature dealing with protein structure and function
- Use online structural biology databases (PDB, Swiss-Prot, NCBI, BLAST, EBI...)
- Create high resolution images of protein structures for analysis and publication

Syllabus

Theoretical Instruction

Students will learn how to apply methods of protein structural biology in their own research, including: a) methods for protein visualization, b) structure determination, protein modeling, and protein structure analysis, c) protein structure prediction, d) structural bioinformatics, e) analysis of protein-protein interactions, f) relationship between protein structure and function and the structural basis of genetic conservation.

Practical Instruction

Practical instruction will include computer exercises designed to follow the theoretical topics covered in this course. Students will learn to use programs for three-dimensional macromolecular structure visualization and analysis. Students will also write a term paper in which they will apply the theoretical and practical aspects of this course to analyze in depth a topic in protein structural biology related to their own doctoral research.

Literature

1. Niketic, V., *Principi structure i aktivnosti*. Faculty of Chemistry, Belgrade, 1995.
2. Serdyuk, I., Zaccai, N., Zaccai, J., *Methods in molecular biophysics: structure, dynamics, function*, 2010
3. Branden, C. & Tooze, J. *Introduction to Protein Structure*, 2nd Edition, Garland Publishing, New York.
4. Lucky, M. *Membrane Structural Biology*, Cambridge, 2010
5. Primary scientific literature

Weekly Teaching Load				
Lectures: 5	Exercises:	Other forms of teaching:	Student Research: 5	Other:

Teaching Methodology

Theoretical instruction will include lectures and consultations, and practical instruction will be organized around computer exercises.

Grading Method (Out of maximum 100 points)

Term Paper with oral presentation 70

Course Activities 30