BIOTECH-04:	**STRUCTURAL BIOCHEMISTRY**
GENERAL INFORMATION	
Course Coordinator(s)	Ivica Strelec, PhD, full prof.
Associate(s)	Franje Čačić Kenjerić, PhD, assist. prof. Tihomir Kovač, PhD Vesna Rastija, PhD, assist. prof.
Study Programme	Interdisciplinary Graduate Study Programme in English: Biotechnology
Course Status	Obligatory
Year of Study, Semester	1st Year / 1st Semester
Credits (ECTS)	**5**
Teaching Method (number of classes)	Lectures 25; Seminars 10; Exercises 15
Expected Number of Students in the Course	25-30

COURSE DESCRIPTION

Course Aims

The aim of this course is to provide advanced knowledge on protein structure and function at molecular level, protein folding and stability, as well as to introduce students with molecular methods for protein structure determination. Understanding the molecular level underlying protein: ligand interactions, and development of practical skills in protein: ligand analysis.

Prerequisites for Enrolment and the Entry Competencies Required for the Course

Completed undergraduate university study programme of Natural sciences (chemistry, biology), Biotechnical sciences, Biomedicine or Health.

Learning Outcomes at the Programme Level Contributed by the Course

BIOTECH-4; INDBIOT-3; INDBIOT-5

Learning Outcomes at the Course Level

After successful completion of this course students should be to:

1. Explain protein structure-function relationship at molecular level
2. Compare the most common structural motifs in proteins
3. Define and explain factors affecting protein stability
4. Compare folding of various types of proteins
5. Recommend methods for protein structure determination
6. Predict protein: ligand interactions at molecular level
7. Know how to select adequate methods for studying protein: ligand interactions
8. Determine and calculate dissociation constant (K_d) and maximum ligand binding capacity

Course Content

Lectures. Introduction to structural biochemistry. Non-covalent molecular interactions. Structure, properties and physiological function of amino acids. Primary structure of proteins. Secondary and super-secondary structure. Tertiary and quaternary structure. Protein folding and stability. Structure-function relationship. Structural portraits of proteins and common structural motifs. Primary websites (bioinformatics databases) on protein structure and properties. Physiological functions of proteins and peptides. Molecular methods for protein structure determination. Protein homology and evolution. Protein: protein, protein: nucleic acid, and protein: ligand interactions. Interactions in signal transduction. Computational methods for prediction and visualisation of protein structure and protein: ligand interaction.

Seminars. Protein folding and stability of various proteins; Structure and properties of selected proteins; Protein: ligand interactions in enzyme reactions and cellular processes.

Laboratory exercises. Determination of protein: ligand interactions by equilibrium dialysis method, gel filtration method, and spectroscopic methods.

Computational exercises. Identification on unknown protein and data acquisition on its structure and properties, visualisation and understanding of 3D structure of protein of interest.

Teaching Methods

Lectures; seminars; laboratory and computational exercises

Students' Obligations

Attendance at all forms of classes is mandatory and the students are obligated to attend all knowledge tests. The students may be absent from 30% (full-time students) and 50% (part-time students) of each of the forms of classes, provided that the absence is justified. An exercise or a seminar which has not been completed must be made up.

Monitoring the Activity of the Students (Connecting Learning Outcomes, Teaching Methods, and Grading)

Class-related activity	ECTS	Learning outcome	Student activity	Evaluation method	Grade points	
					Min.	Max.
Classes	0.5	1-8	Attendance to classes	Keeping records	2	10
Seminars	1.0	1-8	Preparation of seminar presentation	Seminar presentation	10	24
Laboratory and computational exercises	0.5	6-8	Work in laboratory and computer classroom	Written report	8	16
Partial exams or final exam	3.0	1-8	Studying for the partial exams or final exam	Written exam	30	50
Total	**5**				**50**	**100**

Evaluation of the written part of the final exam

Percentage of correct answers (%)	Grade points
99.00 – 100.00	50
97.00 – 98.99	49
95.00 – 96.99	48
93.00 – 94.99	47
91.00 – 92.99	46
89.00 – 90.99	45
87.00 – 88.99	44
85.00 – 86.99	43
83.00 – 84.99	42
81.00 – 82.99	41
79.00 – 80.99	40
77.00 – 78.99	39
75.00 – 76.99	38
73.00 – 74.99	37
71.00 – 72.99	36
69.00 – 70.99	35
67.00 – 68.99	34
65.00 – 66.99	33
63.00 – 64.99	32

61.00 – 62.99	31
60.00 – 60.99	30

Forming the final grade:
The points granted for the final exam are added to the grade points awarded during class attendance. The grading process is conducted by absolute distribution, i.e. based on total achievements, and compared to the numerical system in the following manner:
A – Excellent (5): 90-100 grade points; B – Very Good (4): 80-89.99 grade points; C – Good (3): 65-79.99 grade points; D – sufficient (2): 50-64.99 grade points

Mandatory Literature (available in the library and via other media)

Title	Number of copies in the library	Availability via other media
Branden C, Tooze J: Introduction to Protein Structure, 2nd Ed., Garland Publishing Inc., New York, 1999	-	-
Kessel A, Ben-Tal N: Introduction to Proteins: Structure, Function, and Motion, 2nd Ed., CRC Press, Taylor & Francis Group, London, 2018	-	-

Additional Literature

1. Petsko GA, Ringe D: Protein Structure and Function, New Science Press Ltd, London, 2004
2. Buxbaum E: Fundamentals of Protein Structure and Function, Springer ScienceBusiness Media, LLC, 2007
3. Berg JM, Tymoczko JL, Gatto Jr. GJ, Stryer L: Biochemistry, 8th Ed., WH Freeman, New York, 2015
4. Scientific and professional papers related to the specific areas of the course

Quality Assurance Procedures Designed to Ensure the Acquisition of Outcomes and Competencies

Anonymous, quantitative, standardised student survey on the course and the teacher's work implemented by the Quality improvement office of the Faculty of Food Technology Osijek and/or the Faculty of Medicine Osijek.

Note

E-learning is not included in the class quota, but it is used in teaching and it contains links to various sites and video and audio materials available on websites.