Al-Farabi Kazakh National University
Biology and Biotechnology faculty
Biotechnology department
Syllabus
6M070100 — Biotechnology
Fall semester 2018-2019 academic year

Code of discipline	Title of discipline	Type	No. of hours per week			Credits	ECTS
			Lecture	Pract. work	Lab. work		
Pro6307	Proteomics	elective	1	1	-	2	3

Lecturer	Raigul Niyazova, PhD, professor	**Office-hours**	by time-table
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Phone	377-32-02	**Office**	405

Academic presentation of the course	**Type of course** (theoretical; elective); purpose - to generate a complete system of knowledge about the principles of proteomics. **The aim of the course:** to form a system of competences in the context of qualification requirements of Biotechnology speciality А) cognitive: be able to - demonstrate acquired knowledge in the field of proteomics and it's understanding: - demonstrate an understanding of the overall structure of the proteome and the relations between its elements; Б) functional: be able to include new knowledge in the context of basic knowledge, interpret its contents; analyze educational situation and offer direction to solve it; use methods (research, calculation, analysis, etc.) inherent to the field of proteomics individually or in a group teaching and research activities; ☐☐ В) systemic: be able to - synthesize, interpret and evaluate the learning outcomes of discipline, modules, midterm exam content in the field of proteomics; - analyze dynamics of scientific problems decision of the course (scientific reviews of specific issues researches); - make an analysis of learning outcomes of the course, generalize them through scientific essays, presentations, reviews, scientific review, etc.); Г) Social: be able to - constructive educational and social interaction and cooperation in the group; - propose to consider a problem, to reason its importance; - accept criticism and to criticize; - work in a team; Д) metacompetences: be able to - recognize the role of taken course in the implementation of individual learning paths.
Pre-requisites	Bh 2209 Biochemistry, Gen 3212 Genetics
References and Resources	Structural Proteomics. High-throughput methods / Edited by Kobe B., Guss M., Huber T. - Humana Press. - 2008. - 596p. Ham B. Proteomics of biological systems. - Wiley. - 2012. - 376p. Bioinformatics for Comparative proteomics/ Editied by Wu C. - Humana Press. - 2011. - 384p.

	Post-translational Modifications of Proteins /Edited by Kannicht C. - Humana Press. - 2008. - 401p.
	Proteomics and Protein-Protein Interactions / Edited by Fischer W. - Springer. - 2005. - 325p.
	Wilkins M., et al. Proteome Research: Concepts, Technology and Application. - Springer. - 2007. - 252p.
	Hamdan M., Righetti P. PROTEOMICS TODAY. - Wiley-Interscience. - 2005. - 449p.
	Conformational Proteomics of Macromolecular Architecture. - 2004. - 433p.
	Walker J. Mass Spectrometry Data Analysis in Proteomics. - Humana Press. - 2007. - 331p.
	Proteome Bioinformatics / Edited by Hubbard S. - Humana Press. - 2010. - 397p.
	Informatics in Proteomics / Edited by Srivastava S. - 2005. - 473p.
	BIOINFORMATICS AND THE CELL. Modern Computational Approaches in Genomics, Proteomics and Transcriptomics / Edited by Xia X. - Springer. - 2007. - 363p.
	Internet resources:
	www.ncbi.nlm.nih.gov/PubMed
	www.molbiol.ru
	http://isir.ras.ru
	www.chem.qmul.ac.uk/iubmb
	www.swissprot.com
	http://journal.issep.rssi.ru
Academic policy of the course in the context of university moral and ethical values	**Academic Behaviour Rules:** Compulsory attendance in the classroom, the impermissibility of late attendance. Without advance notice of absence and undue tardiness to the teacher is estimated at 0 points. Submission of assignments (Independent work of students, midterm control, laboratory tasks, projects and etc.) prior to the deadlines. The violation of submission deadlines leads to the deduction of penalty points. **Academic values:** Academic honesty and integrity: independent performance of assignments; inadmissibility of plagiarism, forgery, cheating at all stages of the knowledge control, and disrespectful attitude towards teachers. (The code of KazNU Student's honor) Students with disabilities may receive advice via E-mail, phone.
Evaluation and attestation policy	Criteria-based evaluation: assessment of learning outcomes in correlation with descriptors (verification of competence formation during midterm control and examinations). Summative evaluation: evaluation of the presence and activity of the work in the classroom; assessment of the assignment, independent work of students, (project / case study/program/) The formula for calculating the final grade. FINAL GRADE= ((KC#1+KC#2)/2) x 0.6 +MT x 0.1+Exam x 0.3 = 100 points
Calendar (schedule) the implementation of the course content (Appendix 1)	Weekly description of lecture topics, practical / seminar / laboratory / project work , assignments for independent work of students; an indication of the topic scope and grading scheme, including an assessment of the control task. Summary and analysis of the curriculum content after the first half of the semester (midterm control 1) in the form of a scientific essay / system-oriented analysis of scientific issues of studied topics / presentation of individual case studies / evaluation of personal contribution to the development of a group project assignment, and others.

Calendar (schedule) the implementation of the course content:

Week / date	Topic title (lectures, practical classes, Independent work of students)	Number of hours	Maximum score
1	**Lecture 1.** Introduction to proteomics	1	
	Practical class 1. Development of proteomics	1	7
2	**Lecture 2.** Functional proteomics	1	
	Practical class 2. Functional proteomics of individual proteins	1	7
3	**Lecture 3.** Structural proteomics	1	
	Practical class 3. Structural Proteomics of Membrane Proteins	1	7
	Independent work of student with teacher: Assignment submission 1 /individual researches/ «Structural Proteomics by NMR»	1	17
4	**Lecture 4.** Principles and methods of proteome analysis. Two-dimensional electrophoresis. HPLC	1	
	Practical class 4. Protein Identification in Proteomics	1	7
5	**Lecture 5.** Principles and methods of proteome analysis. Mass spectrometry	1	
	Practical class 5. Quantitation in Proteomics	1	7
	Independent work of student with teacher: Assignment submission 2 /individual researches/ «Isotope Coded affinity tags»	1	17
6	**Lecture 6.** Principles and methods of proteome analysis. Peptide mass fingerprinting	1	
	Practical class 6. Proteome Imaging	1	7
7	**Lecture 7.** Protein-based microarrays	1	
	Independent work of student with teacher: Assignment submission 3 /individual researches/ «Microfluidics-Based Proteome Analysis»	1	17
	Practical class 7 Shotgun Proteomics		7
	Lecture 8. Perspectives on Proteins	1	
	Midterm		100
9	**Lecture 9.** Protein Structure	1	
	Practical class 8. Protein family databases. Universal and specialized databases	1	7
	Independent work of student with teacher: Assignment submission 4 /group projects/ «Single Cell Proteomics»	1	13

10	**Lecture 10.** Classification of protein families. Enzymes and polyenzyme systems	1	
	Practical class 9. Databases devoted to the structure of protein molecules	1	7
11	**Lecture 11.** Molecular graphics. Methods for comparing the spatial structures of biological macromolecules	1	
	Pract. Work 10. Databases devoted to protein interactions	1	7
	Independent work of student with teacher: Assignment submission 5 /group projects/ «Automation in Proteomics»	1	13
12	**Lecture 12.** Methods for modeling interactions between macromolecular complexes	1	
	Practical class 11. Protein-protein interactions	1	7
13	**Lecture 13.** Posttranslational Modification of Proteins	1	
	Practical class 12. Comparison of procaryotic and eukaryotic posttranslational modification of proteins	1	7
	Independent work of student with teacher: Assignment submission 6 /individual researches/ «Mass Spectrometric Characterization of Post-translational Modifications»	1	13
14	**Lecture 14.** Proteome bioinformatics	1	
	Pract. Work 13. Protein Ontology Resources for Proteomic Studies	1	7
15	**Lecture 15.** Proteomics in medicine and biotechnology	1	
	Pract. Work 14. Proteomics in medicine and biotechnology	1	7
	Independent work of student with teacher: Assignment submission 7 /individual researches/ «Biomarkers»		12
	Exam		100

Dean of the Faculty _____ Zayadan B.K.

Head of the Chair_____ Kistaubaeva A.S.

Chairman of the Faculty Methodical Bureau_____ Kulbayeva M.S.

Lecturer_____ Niyazova R.Ye.