

Identification	Subject	Fundamentals of veterinary biomedical sciences
	Department	Veterinary Medicine
	Program (Undergraduate, Graduate)	Undergraduate
	Term	Autumn semester of 2026–2027
	Instructor	Narmin Mirzamammadli
	Email:	narmin.mirzamammadli@khazar.org
	Classroom/hours	At times agreed upon with students
Prerequisites	——	
Language	English	
Compulsory/Elective		
Textbooks and course materials	Urry, L. A., Cain, M. L., Wasserman, S. A., Minorsky, P. V., & Orr, R. B. <i>Campbell Biology</i>, 12th Edition. Pearson. Alberts, B., Heald, R., Hopkin, K., Johnson, A., Morgan, D., Raff, M., Roberts, K., & Walter, P. <i>Essential Cell Biology</i>. 6th Edition. W. W. Norton & Company, 2023. Alberts, B., Johnson, A., Lewis, J., Morgan, D., Raff, M., Roberts, K., & Walter, P. <i>Molecular Biology of the Cell</i>. 7th Edition. W. W. Norton & Company, 2022.	
Course description	The course “Introduction to Biomedical Sciences” introduces students to the fundamental principles that underlie modern biomedical sciences and veterinary medicine. The course examines biological processes that play an important role in the maintenance of normal physiological functions and the development of diseases at the molecular, cellular and physiological levels. Key topics include biomolecules, cell structure and function, cell signaling, genetics, DNA and genomes, gene expression, metabolism, homeostasis, microorganisms, immune mechanisms and the molecular basis of diseases. The course also provides students with initial knowledge of modern biomedical and diagnostic approaches that are important in veterinary medicine. Students are introduced to PCR, qPCR, ELISA, molecular diagnostics, genomics, biotechnology and other modern technologies used in disease detection, monitoring, prevention and scientific research. Throughout the course, fundamental biomedical concepts are linked to applications in veterinary medicine and real disease cases. Special attention is paid to the One Health approach, explaining the interrelationships between animal, human and environmental health. Selected veterinary clinical cases allow students to apply their theoretical knowledge in practical clinical and diagnostic situations.	
Course objectives	The aim of the subject is to form fundamental knowledge in students about the basic concepts and principles of biomedical sciences and to teach the molecular and cellular basis of normal physiological processes and diseases in living organisms. The course aims to develop students' initial knowledge of cell biology, genetics, molecular biology, microbiology, immunology and metabolism, as well as to understand the	

	application of modern biomedical methods and technologies in research and practical fields.		
Learning Outcomes	Demonstrate fundamental knowledge of academic/professional subject areas Develop analytical and critical thinking skills to interpret information and solve structured tasks Perform practical and observational activities safely and responsibly using established procedures Communicate clearly using appropriate academic and professional formats Demonstrate independent learning, critical thinking, and reflective practice Apply understanding and knowledge of biomedical systems and situations to new or existing biomedical problems Critically evaluate the scientific principles underlying diagnostic, therapeutic, and monitoring strategies used in clinical and laboratory practice Explain the cellular and molecular processes that lead to the development of animal diseases Apply knowledge of biomedical sciences to current problems Understand how One Health approaches can identify future solutions to biomedical problems Discuss the field of biomedical research based on current, cutting-edge research in the field of biomedical sciences Collect and apply competing biomedical scientific theories and evidence to problems within a variety of scientific contexts evaluate Formulate hypotheses to address biomedical questions Critically consider the ethical, legal, and social implications of biomedical research and clinical practice Apply basic laboratory techniques safely, ethically, accurately, and reproducibly Operate standard biomedical equipment and solve problems Integrate theoretical knowledge of biomedical sciences with practical application Appreciate the interdisciplinary nature of science and the validity of different perspectives		
Teaching methods	Case analysis		x
	Group discussion		x
	Lecture		x
	Simulation		x
Evaluation Criteria	Methods	Date/deadlines	Percentage (%)
	Midterm Exam	TBA	30

		Quizzes		10
		Practical Assignments		10
		Activity		5
		Attendance		5
		Final Exam	TBA	40
		Total		100
Class Policy				
Tentative Schedule				
Week	Date/Day (tentative)	Topics	Textbook/Assignments	
1		Introduction to biomedical sciences	Ch. 1 — Evolution, the Themes of Biology, and Scientific Inquiry Urry, L. A., Cain, M. L., Wasserman, S. A., Minorsky, P. V., & Orr, R. B. <i>Campbell Biology</i> , 12th Edition. Pearson.	
2		Biomolecules	Ch. 2 — The Chemical Context of Life , Ch. 3 — Water and Life , Ch. 4 — Carbon and the Molecular Diversity of Life , Ch. 5 — The Structure and Function of Large Biological Molecules	
3		The Cell: Basic Unit of Life	Ch. 6 — A Tour of the Cell	
4		Cell Communication & Signaling	Ch. 11 — Cell Communication	
5		DNA, Genes & Genomes	Ch. 16 — The Molecular Basis of Inheritance	
6		Gene Expression: DNA → RNA → Protein	Ch. 17 — From Gene to Protein	
7		Genetics, Mutation & Genetic Disease	Ch. 13 — Meiosis and Sexual Life Cycles , Ch. 14 — Mendel and the Gene Idea , Ch. 15 — The Chromosomal Basis of Inheritance	
		Midterm exam		
8		Metabolism, Energy & Homeostasis	Ch. 6–7 , Ch. 8 — An Introduction to Metabolism , Ch. 9 — Cellular Respiration and Fermentation	
9		Microbiology & Infectious Diseases	Ch. 27 — Bacteria and Archaea , Ch. 19 — Viruses	

10		Immunology	Ch. 43 — The Immune System
11		Pathogenesis & Cellular Basis of Disease	Ch. 12 — The Cell Cycle Ch. 18 — Regulation of Gene Expression
12		Biomedical Laboratory Diagnostics	Ch. 6, 20, 21
13		Molecular Diagnostics & Biotechnology	Ch. 20 — DNA Tools and Biotechnology , Ch. 21 — Genomes and Their Evolution
14		Modern Biomedical Technologies	Ch. 20–21
15		Biomedical Sciences in Veterinary Medicine	Case-based lecture, presentation
		Final exam	