

SYLLABUS
Fall semester 2022-2023 academic years
on the educational program 6B07202 “Food chemistry and technology (NKU)”

Discipline's code	Discipline's title	Independent work of students (IWS)	Number of credits			Number of credits	Independent work of student with teacher (IWST)
			Lectures (L)	Practical training (PT)	Laboratory (Lab)		
IA 2221	Instrumental analysis	5	15	0	60	5	6
Academic course information							
Form of education	Type of course	Types of lectures		Types of practical training	Form of final control		
Full-time	Applied	Offline		Offline	Test (Moodle)		
Lecturer	Madi Abilev, PhD						
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Telephone number	87016274902						
Aim of course	Expected Learning Outcomes (LO) As a result of studying the discipline the undergraduate will be able to:			Indicators of LO achievement (ID)			
The aim of the course is to familiarize and master the basic approaches, principles and patterns of instrumental methods of analysis	1. explain the basic principles of classifying the instrumental methods			1.1 ability to identify the instrumental method 1.2 ability to explain the basic principles of classification			
	2. use the instrumental methods			2.1 ability to use spectroscopic methods 2.2 ability to use electrochemical methods 2.3 ability to use mass-spectrometry 2.4 ability to use chromatographic methods			
	3. choose the optimal instrumental method			3.1 ability to choose the instrumental method 3.2 ability to substantiate the choice of the instrumental method			
	4. use the instrumental methods in the analysis of environmental objects			4.1 ability to describe the underlying processes of the instrumental methods 4.2 ability to consider the instrumental method as a part of uncertainty			
Prerequisites	Fundamentals of analytical chemistry, physical chemistry, metrology						
Post requisites	Food chemistry and analysis						
Information resources	<p>Literature:</p> <ol style="list-style-type: none"> 1. D. Muralidhara Rao, A. V. N. Swamy, D. Dharaneeswara Reddy. Instrumental Methods of Analysis. - CBS Publishers & Distributors, 2020. - 384 p. 2. Ishchenko A.A. (ed.) Analytical chemistry. Instrumental methods of analysis. In 3 volumes. – M.: Fizmatlit, 2019. – 472 p. 3. Kocherov V.I., Darienko N.E., Alyamovskaya I.S., Saraeva S.Yu., Svalova T.S., Matern A.I. - Yekaterinburg: Ural Publishing House. un-ta, 2015. - 96 p. 4. Savinov S.S., Drobyshev A.I., Zverkov N.A., Titova A.D. Highly sensitive instrumental methods of analysis. Teaching aid. - St. Petersburg: VVM, 2016. - 85 p. 5. Farus O.A., Yakusheva G.I. Instrumental methods of analysis. - FGBOU VO "Orenburg State Pedagogical University", 2021. - 114 p. <p>Internet resources</p> <ol style="list-style-type: none"> 1. http://elibrary.kaznu.kz/ru 2. https://www.twirpx.com 3. https://www.sciencedirect.com 						
Academic policy of the course in the context of university moral and ethical values	<p>Academic Behavior Rules: Students must comply with the deadlines for performing independent work and observe safety precautions in laboratories. ATTENTION! Failure to meet deadlines results in loss of points! The deadline for each task is indicated in the calendar (schedule) for the implementation of the content of the course. Academic values:</p>						

	<ul style="list-style-type: none"> - Laboratories, IWS should be independent, creative. - Plagiarism, forgery, cheating at all stages of control are unacceptable. - Students with disabilities can receive counseling at m.abilev@mail.ru.
Evaluation and attestation policy	<p>Criteria-based evaluation: assessment of learning outcomes in relation to descriptors (verification of the formation of competencies in midterm control and exams).</p> <p>Summative evaluation: assessment of work activity in an audience; assessment of the completed task.</p>

CALENDAR (SCHEDULE) THE IMPLEMENTATION OF THE COURSE CONTENT:

Week	Topic name	Number of hours	Max. score
Module 1. Spectroscopic methods of analysis			
1	Lec 1. Introduction. Classification of instrumental methods of analysis	1	
	Lab 1. Introduction to the laboratory	4	7
2	Lec 2. Spectroscopic methods. Atomic spectroscopy	1	
	Lab 2. Photometric determination of iron (III)	4	8
	IWST 1. Consultation on the implementation of IWS1 on the topic: "The phenomenon of interference in atomic spectroscopy"	1	
3	Lec 3. Atomic fluorescence spectroscopy	1	
	Lab 3. Determination of large amounts of iron as a sulfosalicylate complex	4	7
	IWS 1. The phenomenon of interference in atomic spectroscopy (essay)		15
4	Lec 4. Lec 4. X-ray spectroscopy. Electronic spectroscopy	1	
	Lab 4. Determination of MnO_4^- и $Cr_2O_7^{2-}$ in the joint presence	4	8
5	Lec 5. Molecular spectroscopy. Molecular absorption spectroscopy in the ultraviolet and visible regions	1	
	Lab 5. Comparative study of the spectral characteristics of two different systems on devices of different types	4	7
	IWST 2. Consultation on the implementation of IWS2 on the topic: "Nephelometry and turbidimetry"	1	
6	Lec 6. Infrared and Raman spectroscopy	1	
	Lab 6. Turbidimetric determination of sulfate ions	4	8
	IWS 2. Nephelometry and turbidimetry (essay)		15
7	Lec 7. Radioscopic methods of analysis	1	
	Lab 7. Colloquium (written)	4	25
Level control 1			100
Module 2. Chromatographic and hybrid methods			
8	Lec 8. Chromatographic methods of analysis	1	
	Lab 8. Chromatographic analysis of food products	4	5
	IWST 3. Consultation on the implementation of the IWS3 on the topic: "Sensors"	1	
9	Lec 9. Mass spectrometry	1	
	Lab 9. Potentiometric titration of a mixture of sodium carbonate and alkali	4	5
	IWS 3. Sensors (essay)		10
Module 3. Electrochemical methods			
10	Lec 10. Potentiometry	1	
	Lab 10. Determination of nitrates in technical samples	4	6
	IWST 4. Consultation on the implementation of the IWS4 on the topic: "Electrochemical methods in modern research"	1	
11	Lec 11. Ammetry, voltammetry	1	
	Lab 11. Determination of zinc by ampermetric titration	4	6
	IWS 4. Electrochemical methods in modern research (essay)		10
12	Lec 12. Coulometry	1	
	Lab 12. Determination of copper by ampermetric titration	4	6
	IWST 5. Consultation on the implementation of the IWS5 on the topic: "Miniaturization and automation of chemical analysis"	1	
13	Lec 13. Conductometry	1	
	Lab 13. Determination of sulfuric acid and copper sulfate in their joint presence	4	6
	IWS 5. Miniaturization and automation of chemical analysis (essay)		15
14	Lec 14. Hybrid methods of analysis	1	
	Lab 14. Conductometric titration of a mixture of hydrochloric and acetic acids	4	6

15	Lec 15. Modern trends in the development of instrumental analysis	1	
15	Lab 15. Colloquium (written)	4	25
15	IWST 6. Consultation on preparation for the exam	1	
Level control 2			100

Dean _____ **L. Kudreyeva**

Head of Department _____ **A. Galeyeva**

Lecturer _____ **M. Ablev**