

**AL-FARABI KAZAKH NATIONAL UNIVERSITY**  
**Faculty of chemistry and chemical technology**  
**Department of Analytical, colloid chemistry and technology of rare**  
**elements**

**Final exam program for the discipline**  
**IA 2222 Instrumental analysis**

Educational program:  
6B07202 “Food Chemistry and Technology”

**Almaty 2021**

Final exam program the discipline is compiled by Madi Abilev, PhD, senior lecturer of the department of analytical, colloid chemistry and technology of rare elements

Reviewed and recommended at the meeting of the department of analytical, colloid chemistry and technology of rare elements

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Head of the department

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(signature)

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## Introduction

**Exam formats:** synchronous format.

**Exam form** – Test.

**Exam platform:** Moodle LMS.

**Exam type** — online

**Exam control** – Video recording.

**The exam lasts:** 60 minutes for 25 questions, 1 attempt.

**On the exam in this discipline, the following types of questions are encountered**

**Multiple choice** – the student chooses an answer to a question from several options offered to him, and the questions can assume one or several correct answers;

**True/False** – the student chooses between two options True and False;

**For compliance** – each element of the answers of the first group needs match an element of the responses of the second group;

**Nested responses (Cloze)** – these are very flexible questions, consisting of text (in Moodle format), directly into which the answers are inserted. This type of question can include Short Answers, Numeric, and Multiple Choice.

### Topics for which test tasks will be drawn up

1. Classification of the instrumental methods of analysis
2. Spectroscopic methods. Atomic spectroscopy
3. Atomic absorption spectroscopy
4. Atomic fluorescence spectroscopy
5. Interferences
6. X-ray spectroscopy
7. Electron spectroscopy
8. Molecular spectroscopy. Molecular absorption spectroscopy in the ultraviolet and visible regions
9. Derivative spectrophotometry
10. Infrared and Raman Spectroscopy
11. Molecular luminescence
12. Nephelometry and turbidimetry
13. Diffuse reflectance spectroscopy
14. Optical-acoustic spectroscopy
15. Thermal lens spectroscopy
16. Radiospectroscopic methods
17. NMR
18. Mass spectrometric methods

19. Sensors
20. Electrochemical Methods.
21. Potentiometry
22. Coulometry
23. Electrochemical methods in modern research
24. Chromatography
25. Miniaturization of chemical analysis

### **Rules for conducting the exam form**

Lecturer develops test questions in accordance with the requirements of the selected system (75 questions). The teacher creates an element "Quiz" in the Moodle LMS and fills it in with questions that he manually added to the question bank. When creating a test, at least 4 types of questions must be used in equal proportions in 1 test set.

1. According to the dates established in the disposal (order) on loading examination tasks timings, upload prepared PDF-file (depending on the system in which you organize testing) "Final exam rules. Testing" in PDF format.

In the rules, be sure to inform about the condition - 30 minutes before the start, students must prepare for the exam in accordance with the requirements of the proctoring instruction.

2. Lecturer creates an element "Test" in the LMS Moodle and fills in it using a random selection of questions by the system from the bank of questions. When creating a test, at least 4 types of questions must be used in equal proportions in 1 test set. Please note that in LMS Moodle "Multiple choice" questions with one correct answer and several correct answers are counted as one type of questions.

3. After uploading the Rules to the system, in the chat of the messenger, inform the students in which system they can familiarize themselves with the "Final exam rules. Testing": in Moodle LMS.

4. Be sure to ask each student to confirm in the chat that they have read the schedule, rules, and requirements of the proctoring instruction.

5. On the scheduled exam day, remind students of the exam.

6. At the end of the testing time, evaluate the student scoresheet and save the scores on the attestation paper: the score is reflected in the Moodle system scorebook for the created element "Quiz" immediately after testing. Lecturer have to manually transfer the score to the attestation paper in Univer IS. Before saving, carefully check that all students have scores. Do not save the statement without checking the completion of points! Save the checked sheet.

ATTENTION. If it is necessary to additionally check the students' answers in the Moodle LMS and to correct the final score (for example, if a student makes a typo when answering a question of the "Short answer" type), the teacher should contact the INET specialists.

It is forbidden to open the test and correct comment on the student answers on your own.

Time for scoring is up to 48 hours. It is possible to revise the duration according to the decision of the Department of Academic Issues.

Test results can be revised based on proctoring results. If a student violated the rules for passing the test, his result will be canceled.

Regulations for organizing video recording of testing in Moodle LMS in the absence of proctoring for groups of up to 20 students

1. Recording and control of passing the exam (proctoring) is carried out by lecturer.

2. Information about the presence/absence of proctoring in the Moodle LMS is displayed below the "Test" element created by lecturer.

3. Lecturer plans a conference / meeting on one of the selected services (MS Teams, Zoom, Skype) and publishes links to connect to the conference in the appropriate section of IS Univer. In the case of a change in the platform and/or a link to a video conference, it is imperative that students be notified of the changes in advance (no later than a day before the exam).

4. Before the start of the exams (10 minutes) on the exam schedule, the exam conference organizer, starts the conference on Microsoft Teams or other video conferencing services and launches the exam participants.

5. After all participants are connected to the conference online, lecturer:

a) includes a video record of the exam;

b) welcomes the participants to the exam;

c) warns that video is being recorded;

d) asks each examinee to turn on the video and audio link, as well as to show on the video camera the original identification document (identity card or passport). It is forbidden to take an exam on an ID-card and on a photocopy of documents, as well as the room in which it is located - there should be no strangers in the room, additional sources of information (if possible from the student's side);

e) warns about the prohibition of the use of additional sources of information and headphones.

6. After completing the organizational activities, the student begins the procedure for passing the exam by logging into the Moodle LMS.

7. In order to control the passing of the exam, during testing, lecturer monitors compliance with the rules of the exam and periodically asks students to turn on the demonstration of their screen.

8. After completing the test, the student can leave the video conference by notifying lecturer.

9. After the exam, the teacher uploads a video recording of the course of the exam to a cloud storage service or video hosting (Google Drive, OneDrive, YouTube, etc.) and places a link in the appropriate section of IS Univer.

Test results can be revised based on proctoring results. If the student violated the rules for passing the test, his result will be canceled.

### **Student instruction**

During the exam the student:

1. According to the schedule of exams in one of the services chosen by the teacher (MS Teams, Zoom, Skype) connects to the conference or meeting 10 minutes before.
2. At the request of the teacher, the video camera displays an identity document (identity card or passport), includes video and audio communication. The student also shows the sitting room - there are no strangers in the room, no additional sources of information (if this is possible by the student). The use of additional sources of information and headphones is prohibited.
3. Upon completion of the organizational activities, the student logs in to Moodle with his/her account and starts the examination procedure.
4. Shows his/her screen at the request of the teacher.
5. Students are not allowed to disconnect video or audio communication during the test.
6. At the end of the test, the student can leave the video conference, notifying the teacher.

### **Evaluation policy**

By answering one question correctly, the student receives 4 points. In total, there will be 25 questions in the exam. Thus, a student can score 100 points in the exam.

### ***Recommended Literature Sources for Exam Preparation***

1. S. S. Mahajan. Instrumental Methods of Analysis. - Popular Prakashan Limited, 2010 – 458 p.
2. D. Muralidhara Rao, A. V. N. Swamy, D. Dharaneeswara Reddy. Instrumental Methods of Analysis. - CBS Publishers & Distributors, 2020. – 384 p.
3. D. A. Skoog, F.J. Holler, S.R. Crouch. Principles of Instrumental Analysis. – Cengage, 2017.
4. F. Rouessac, A. Rouessac. Chemical Analysis: Modern Instrumentation Methods and Techniques. – Wiley, 2013.