INTERNATIONAL HIGHER SCHOOL OF MEDICINE
Department of Fundamental disciplines

SYLLABUS
Laboratory analytics & diagnostics

2026 academic year
for students of medical faculty
2 course, 3 semesters, 11 groups
1 credit (30 h, including auditorial -18 h, independent work (scientific investigation) – 12 h)

Lecturer:	**Keneshova Kanykei** (0500)023-326 (Whatsapp) Email: kanykeisadyrbekovna@gmail.com
Venue:	Morphological corpus 1/2-002
Practical classes:	**Keneshova Kanykei** (0500)023-326 (Whatsapp) Email: kanykeisadyrbekovna@gmail.com Groups: 1, 4, 16, 23, 24, 28, 30, 36, 39, 40, 41
Venue:	Educational and Morphological Center: Campus 2 Classroom N301

The Syllabus is considered
at the meeting of Fundamental Disciplines Department
Protocol № 1 dated 07.09.2026

Head of the department _____ Dzh.N.Abdullaev

Course Objective of the educational discipline Laboratory analytics and diagnostics is to master the fundamental basis of the methodology of clinical laboratory practice, as well as methods of extra-laboratory research, the formation of skills and abilities to work with biochemical equipment, conducting biochemical experiments and analyzing clinical and biochemical indicators to make a preliminary diagnosis on their basis.

After study of the discipline the student must:

Knowledge: Functional bases of normal and abnormal results of the biochemical testing; mechanisms of pathological deviations of biochemical research results; principles and methodology of work with basic biochemical laboratory equipment and safety rules when working with it; basic methods of descriptive statistical analysis and methodology of the Excel statistical program use; basic information and communication resources in the field of laboratory science

Skill:

- work with biochemical laboratory equipment and instrumental techniques;
- making a preliminary diagnosis of considered diseases on the basis of the results of biochemical research;
- descriptive statistical analysis of the obtained data and their interpretation;
- searching and selecting information using qualitative resources;
- presented final results in the form of protocols, scientific text and presentation.

Attitude: Interpret the results of laboratory tests; select methods and equipment for biochemical testing

Pre-requisites: Normal Physiology, chemistry, biochemistry, anatomy, histology, pathology

Post-requisites: Internal medicine, family and polyclinical medicine, pediatrics, emergency medicine, public health

THEMATIC PLAN OF LECTURES

№	Theme of lecture	Hours	Date
1	Biochemical clinical testing, intergrating POCT,artificial intelligence and pH measurement and ABG analysis	2	15.09 – 19.09

THEMATIC PLAN OF PRACTICAL CLASSES (SEMINAR)

№	Theme of practical class	Hours	Date
1	The fundamentals of statistical analysis	2	14.09 – 26.09
2	Diagnostic & prognostic biomarkers for acute coronary syndrome (ACS)	2	28.09 – 10.10
3	Diagnostic testing of iron deficiency anemias	2	12.10 – 24.10
4	CSF analysis &interpretation	2	19.10 – 31.10
5	Group presentation of independent scientific investigation (article)*	2	02.11 – 14.11

THEMATIC PLAN OF LABORATORY CLASSES

№	Theme of laboratory work	Hours	Date
1	Calibration of Graduated Volumetric Glassware & Statistical Analysis of Data Set.	2	21.09 – 03.10
2	Cardiac biomarkers panel determination	2	05.10 – 17.10
3	CSF testing	2	26.10 – 07.11

THEMATIC PLAN OF INDEPENDENT WORK OF STUDENTS (Scientific investigation)

№	Theme of independent work	Hours	Date
1	Work with text material presented in Study Guides	4	15.09 – 31.10
2	Work with the test material in the section: Self-assessment questions & clinical cases (Study Guide)	4	02.11 – 14.11
3	Design of laboratory protocols and answers in the section of Pre-Lab & Post- Lab Quiz	4	21.09 – 07.11

Recommended reading for the discipline:

Basic:

1. Printed course material (Study Guide);
2. Mukhamedova I.P. Biochemistry practical book. –Bishkek, 2010. – 360p.

Additional:

1. William Marshal et al Clinical Biochemistry, 2017. - 605 p.
2. Allan Gavv, Robert Cowa, et al. Clinical Biochemistry, 2015
3. Dr.A.C.Deb Fundamentals of Biochemistry, 2004.-848p.

3. Grading policy and procedures for all types of work

For the period of studying the discipline, the student gains points for the relevant parameters (per unit):
current score - 40 points
independent work - 20 points
final score - 40 points
Maximum score: 100 = (40+ 20+ 40)

Grading system for student's achievements

Grading criteria per discipline				
Maximum score	Intervals			
	Unsatisfactory	***Satisfactory***	***Good***	***Excellent***
Laboratory report & Pre - and Post-Quiz - **40**	0-23	24-30	31-35	36-40
Interval description: **Mastering the methodology and report writing**	Did not master the propose algorithm of laboratory experiment and its protocol	Carriers out an experiment according the proposed algorithm, but makes mistakes in result protocol	Conducts the experiment according to the proposed algorithm, but makes minor errors in the presentation of results	Conducts the experiment in accordance with the proposed algorithm, draws up and correctly interprets the obtained results
Independent work - **20**	0-11	12-15	16-17	18-20
	Unsatisfactory	***Satisfactory***	***Good***	***Excellent***
Working with information	Unable to find the necessary information, or find its individual fragments within the framework of the task.	Can find the necessary information within the framework of the task.	Can both interpret and systematize the necessary information within the framework of the task.	Can find and systematize the necessary information, as well as identify additional sources of information within the framework of the task
Self-assessment Questions answers	Did not prepare	Prepare partially	Complete prepare, but with minor errors	Complete prepare, without mistakes
	0-23	24-30	31-35	36-40
Final score (MCQ; Short answer; brief explanation) **Degree of the knowledge completeness about studding object**	Have partial and fragmented knowledge that is not logically related to each other	Have minimum set knowledge necessary for a systemic approach to the object under study.	Have a set of knowledge sufficient for a systematic approach to the object under study.	Have complete knowledge and a systematic view of the object under study.

Conduct Policy: (lateness, absence, behavior in the auditorium, late submission of work).
- Punctuality and completion of tasks.
- Mandatory attendance of classes.
- Attending class in a clean medical uniform.
- Eliminating conversations on a cell phone in the classroom.
- Active participation in the learning process.
- Doing homework on time.
- Academic detention at the time specified by the teacher.

For violations of the Conduct Policy, the total points for discipline might be reduced to1-5 points.
Academic Ethics Policy

- Be tolerant, respect the opinions of others.
- Formulate objections in the correct form.
- Constructively support feedback in all classes.
- Plagiarism and other forms of dishonest work are unacceptable. Plagiarism includes the following: the absence of references when using printed and electronic materials, quotes, thoughts and works of other authors or students.
- For violations of the Academic Ethics Policy, the total points for the discipline may be reduced to 1-5 points.

Guidelines for the lecture:
Key questions covered in lecture: Clinical laboratory and Point-of- Care testing (POCT)
1. Clinical laboratory and biochemical testing (types, scope, organization)
2. Biochemical tests in clinical medicine (phases, errors, factors that can affect biochemical test result)
3. Point-of-Care Testing (POCT)
4. Artificial intelligence in laboratory medicine, applications in healthcare (diagnostics, automated data analysis and pattern recognition)
5. Clinical relevance of pH measurement
6. Arterial blood Gas analysis: principles, interpretations of ABG results, clinical case studies in ABG (diabetic ketoacidosis)

Recommended reading for the lesson
1. Printed course material

Guidelines for the lessons (practical class) of the discipline
Key questions covered in lesson 1: The fundamentals of statistical analysis (on Excel platform)
1. Quality Assurance and Quality Control of laboratory reports (accuracy / or bias, precision, sensitive, specificity; reference data, range)
2. Measures of frequency
3. Measures of central tendency (mean, median, mode);
4. Measures of dispersion or variation (range; standard deviation; variance; confidence interval)
5. Indicators of laboratory test reliability (accuracy, precision, bias, sensitivity, specificity)

Recommended reading for the lesson 1
1. Printed course material (Study Guide)
2. Excel program (version 10 and higher)

Key questions covered in lesson 2: Diagnostic and prognostic biomarkers for acute coronary syndrome (ACS)
1. ACS: definition, causes, classification according to the changes in ECG
2. Biochemical pathological processes in myocardium due to hypoxia
3. Current markers of cardiac necrosis: CK-MB, CK-MB isoforms; Mb; cTnI, cTnT, hsTn
4. Markers of inflammation: MPO, CPR, PGF, MMP
5. Markers of cardiac ischemia: PL-D, FABP, IMA

Recommended reading for the lesson 3
1. Printed course material (Study Guide)
2. Internet resources: Scientific articles/ key words: biomarkers, acute coronary syndrome

Key questions covered in lesson 3: Diagnostics of iron-deficiency anemias
1. Hematopoiesis (overview)
2. Anemias: deficiency, causes, classification
3. Iron deficiency anemia: stages, diagnostic criteria
4. Interpretation of clinical protocol

Recommended reading for the lesson 2
1. Printed course material (Study Guide)
2. Internet resources: Scientific articles/ key words: dynamic tests, GIT, pancreas test, iron status assay; breath test

Key questions covered in lesson 4: CSF examination
1. CSF formation
2. Macroscopic, biochemical & microscopic examination of CSF
3. Interpretation of CSF examination data (OSCE)

Recommended reading for the lesson 4
1. Printed course material (Study Guide)
2. Internet resources: Scientific articles/ key words: liver function test, interpretation, bilirubin metabolism, jaundice

Guidelines for the laboratory works of the discipline

Laboratory work 1: Calibration of Graduated Volumetric Glassware & Statistical Analysis of Data Set.

1. Calibration methods (types, characteristics); calibration curve
2. Pre-Lab. & Post-Lab Quiz
3. Statistical analysis of data set
4. Laboratory report

Recommended reading for the laboratory work 1

1. Printed laboratory material (Laboratory report)
2. Internet resources: Scientific articles/ key words: calibration, analytical chemistry, colorimetry, calibration curve (plot)

Laboratory work 2: Detection of some cardiac biomarkers

1. Determination of blood AST
2. Determination of serum total creatine phosphokinase (CPK)
3. Determination of cardiac troponin (cTn) by immunoassay (POCT)
4. Laboratory report

Recommended reading for the laboratory work 2

1. Printed laboratory material (Laboratory report)

Laboratory work 3: Macroscopic& Biochemical examination of CSF

1. Macroscopic examination of CSF
2. Analysis of the CSF glucose
3. Analysis of the CSF albumin & globulin
4. Analysis of CSF electrolytes
5. Laboratory report

Recommended reading for the laboratory work 3

1. Printed laboratory material (Laboratory report)

Methodological instructions for the implementation of independent work:

1. The problem is posed and the hypothesis is defined.
2. Statistical analysis of the results of the experiment is carried out
3. Information research on the studied problem is carried out