GUIDELINES FOR STUDENT'S INDIVIDUAL WORK

Course:	Introduction to Scientific Research
Course code	ISR 2212
Educational program:	6B10115 «Medicine»
Number of academic hours/credits:	180/6
Year/Term:	2/4
Number hours of individual work:	120

Shymkent, 2024

The guidelines for student's individual work developed in accordance with the working curriculum of the course (syllabus) "Introduction to Scientific Research" and discussed at a meeting of the departments:

Medical biophysics and information technology

Protocol no. 11 from " 30 " 05 2024 y.

Head of department, ass. prof, _____ M.B. Ivanova

Social health insurance and public health

Protocol no. 18 from " 10 " 06 2024 y.

Head of department, ass. prof. _____ G.Zh. Sarsenbayeva

1. Theme 1: History of the development of biostatistics.

2. Aim: study of the formation and development of biostatistics as a science, determination of its role in the health care system.

3. Tasks: to find and study information on the following issues:

- the history of the emergence and development of biostatistics;
- stages of development of biostatistics and their general characteristics;
- the main representatives of each stage of development of biostatistics;
- the role of biostatistics in medical education and the work of a practitioner.

4. Execution/ evaluation form: Logic flowchart

5. Performance criteria SIW:

Individual task 1. Logic diagram		**Max 20**	
1	- The scheme is simple and concise, fits on one page; - The basic and sufficient concepts on the topic (section) are highlighted as elements of the scheme; - The elements of the scheme are arranged in such a way that their hierarchy is clear (for example, general and specific - in the center, on the periphery - optional); - Logical connections are established between the elements of the circuit (inside the circuit and outside, i.e. the relationship with adjacent circuits); - The scheme is visual (easy to understand): symbols, graphic material, color shades, tables, and illustrated material were used.	18-20	Excellent
2.	- The diagram fits on one page; - Basic and sufficient concepts on the topic are highlighted as elements of the diagram; - The hierarchy of the elements of the diagram is not traceable, the material is presented chaotically; - Logical connections are established between the elements of the circuit (inside the circuit and external, i.e., relationship with adjacent circuits); - The diagram is not visual.	11-17	Good
3.	- The diagram fits on more than one page; - The elements of the diagram are not basic and sufficient concepts on the topic; - The hierarchy of the elements of the diagram is not traceable, the material is presented chaotically; - Logical elements are not installed between the circuit elements; - The diagram is not visual.	1-10	Satisfactory
4.	- The scheme has not been completed.	0	Unsatisfactory

6. Delivery time: 1st day 1st week

7. Literature:

1. Rosner Bernard Fundamentals of Biostatistics: Texbook/ B.Rosner - 8th ed.: GENGAGE learning, 2016.
2. Armitage P. Encyclopedia of Biostatistics. - Wiley, 2016.

8. Control:

1. What are the main stages in the development of biostatistics?
2. What is the role of scientists F. Galton, K. Pearson, R. Fisher in the development of

biometrics?

3. What is the role of biostatistics in the health system?

1. Theme 2: Creating an interval frequency distribution.

2. Aim: developing skills in working with statistical populations.

3. Tasks:

1. Students measured the length of leaves of medicinal plants collected by them. The following results were obtained (in cm):

7,1; 9,2; 14,1; 10,8; 12,9; 9,8; 9,6; 8,4; 10,8; 8,2; 8,6; 12,1; 7,6; 12,9; 9,3; 11,5; 12,4; 14,1; 14,3; 11,9; 16,3; 9,6; 12,0; 7,6; 13,3; 12,2; 12,0; 8,0; 12,3; 12,9; 11,8; 11,5; 9,6; 12,8; 12,6; 11,4; 13,4; 10,5; 18,0; 13,1; 11,9; 10,0; 9,6; 11,4; 8,0; 12,0; 11,9; 7,9; 12,0; 10,6; 13,8; 11,3; 12,0; 8,7; 12,0; 12,3; 12,2; 10,3; 6,5; 9,1; 9,8; 10,8; 6,9; 10,9; 11,5; 9,7; 11,9; 9,6; 11,4; 11,5; 6,6; 10,7; 10,9; 10,8; 13,1; 12,6; 11,3; 7,8; 10,6; 10,3; 12,9; 11,6; 11,1; 12,4; 6,7; 11,4; 12,8; 11,6; 8,0; 9,9; 12,1; 14,1; 10,8; 8,9; 13,9; 12,0; 10,6; 10,4; 11,1; 13,7; 11,9; 12,0; 12,5; 11,6; 11,9; 11,5; 10,7; 10,8; 14,3; 14,2; 6,6; 12,7; 8,8; 12,8; 11,8; 15,4; 10,6; 14,7; 9,2; 14,9; 11,4; 10,4; 8,3; 11,1; 9,6; 10,5; 8,4; 7,3; 9,6; 8,5; 10,7; 10,4; 10,1; 10,5; 9,3; 9,8; 8,3; 14,7; 10,1; 4,1; 9,3; 13,3; 9,7; 14,0; 10,5; 9,6; 9,8; 11,3; 16,4; 8,3; 12,5; 8,7; 14,1; 11,8; 9,6; 12,8; 11,8; 13,7; 11,4; 12,9; 13,8; 10,4; 12,6; 10,5; 10,9; 10,0; 11,6; 12,5; 13,3; 11,2; 13,6; 9,4; 13,2; 11,4; 11,2; 11,2; 14,7; 9,2; 13,8; 11,0; 11,0; 12,4; 9,1; 12,3; 13,8.

The sample size is n = 185. Calculate the number of intervals using the Sturges formula, determine interval width and the initial value of the first interval. Group numbers by intervals, construct an interval frequency distribution.

1. In a botanical study of cardiac motherwort, the height of adult plants was measured. The following results were obtained (in cm):

79; 93; 77; 79; 77; 80; 84; 84; 95; 84; 85; 61; 75; 70; 76; 86; 87; 69; 60; 71 71; 88; 69; 77; 91; 72; 102; 80; 82; 68; 83; 81; 67; 85; 103; 67; 70; 97; 81 86; 86; 70; 77; 86; 84; 86; 99; 74; 70; 88; 88; 45; 72; 86; 73; 73; 104; 76; 70 83; 75; 70; 102; 83; 86; 88; 82; 77; 92; 89; 87; 88; 75; 78; 66; 81; 87; 71; 75 110; 65; 78; 79; 55; 78; 87; 92; 91; 71; 56; 77; 86; 86; 85; 75; 81; 91; 86; 93 83; 90; 62; 71; 86; 71; 63; 83; 84; 76; 72; 97; 82; 83; 75; 77; 60; 84; 92; 94 81; 71; 83; 83; 71; 86; 74; 70; 89; 70; 72; 75; 79; 73; 72; 72; 81; 56; 99; 67 89; 71; 71; 70; 55; 85; 68; 87; 101; 56; 82; 103; 82; 69; 78; 94; 68; 83; 84; 74; 72; 81; 74; 73; 89; 88; 84; 77; 74; 71; 83.

The sample size is n = 170. Calculate the number of intervals using the Sturges formula, determine interval width and the initial value of the first interval. Group numbers by intervals, construct an interval frequency distribution.

3. For a statistical analysis of the manufactured products, the breaking strength of the tablets was determined. The following results were obtained (in decinewtons (dN)):

514; 533; 483; 510; 558; 524; 488; 395; 511; 488; 424; 509; 509; 481; 536; 495; 530; 515; 502; 442; 508; 544; 524; 508; 435; 474; 467; 489; 495; 521; 524; 483; 511; 508; 537; 486; 567; 515; 467; 536; 513; 465; 467; 534; 468; 507; 516; 449; 481; 482; 539; 471; 541; 521; 503; 455; 458; 526; 540; 454; 497; 446; 512; 536; 523; 479; 469; 490; 451; 566; 524; 523; 469; 507; 548; 543; 479; 448; 518; 515; 507; 561; 508; 493; 512; 508; 443; 513; 489; 509; 496; 452; 496; 493; 449; 508; 545; 447; 549; 463; 512; 488; 533; 453; 520; 461; 479; 493; 530; 562; 565; 519; 475; 518; 479; 412; 495; 556; 546; 506; 499; 510; 554; 549; 466; 445; 502; 517; 505; 464; 534; 493; 419; 542; 517; 472; 504; 572; 498; 469; 449; 485; 494; 439; 537; 527; 477; 476; 489; 485; 577; 457; 528; 385; 565; 499; 497; 523; 524; 527; 528; 479; 518; 529; 546.

The sample size is n = 170. Calculate the number of intervals using the Sturges formula, determine interval width and the initial value of the first interval. Group numbers by intervals, construct an

interval frequency distribution.

4. For a statistical analysis of the manufactured products, the ratio of the height of the tablets to the diameter was determined. The following results were obtained (in%):
36,97; 37,99; 38,17; 38,18; 38,03; 38,60; 38,17; 38,93; 37,21; 37,46; 38,11; 36,94; 37,75; 38,89; 37,76; 39,64; 39,57; 38,95; 37,19; 38,46; 36,35; 37,33; 37,78; 37,89; 37,69; 38,58; 38,58; 38,55; 38,34; 37,56; 36,65; 38,14; 38,41; 38,20; 37,22; 38,87; 37,43; 38,02; 37,02; 37,90; 37,58; 36,58; 37,20; 37,83; 39,56; 37,82; 37,98; 38,26; 39,10; 39,27; 37,15; 38,25; 37,91; 37,60; 39,07; 37,63; 37,09; 37,61; 38,16; 37,42; 38,27; 38,69; 38,61; 38,87; 37,51; 37,59; 37,95; 38,09; 38,01; 38,99; 38,06; 38,61; 37,84; 37,25; 38,21; 38,00; 38,65; 37,33; 37,25; 38,56; 38,15; 38,08; 38,56; 38,26; 38,60; 38,57; 39,19; 38,52; 39,09; 38,22; 38,36; 38,64; 37,09; 37,87; 37,45; 37,79; 37,88; 37,91; 38,78; 38,17; 37,96; 39,05; 38,34; 37,81; 39,08; 39,14; 37,31; 38,60; 38,61; 37,64; 37,12; 37,85; 38,05; 37,83; 37,84; 38,19; 38,39; 37,05; 38,09; 37,53; 38,45; 36,99; 38,58; 37,71; 39,07; 38,82; 38,07; 37,12; 38,28; 38,27; 38,39; 37,94; 38,93; 38,30; 38,85; 37,19; 38,23; 37,11; 38,66; 39,36.
The sample size is n = 140. Calculate the number of intervals using the Sturges formula, determine interval width and the initial value of the first interval. Group numbers by intervals, construct an interval frequency distribution.

4. Execution/evaluation form: Solving problems (assessment using a checklist)

5. Performance criteria SIW:

Individual task 2		**Max 40**	
1	- The number of intervals is correctly determined; - The width and initial value of the first interval are correctly defined; - The data is grouped correctly by intervals; - The interval variation series is correctly constructed; - Frequency analysis has been carried out.	36-40	Excellent
2	- The number of intervals is correctly determined; - The width and initial value of the first interval are correctly defined; - Errors were made when grouping data by intervals; - The interval variation series was constructed with minor errors. - Frequency analysis has been carried out.	30-35	Good
3	- The number of intervals is incorrectly defined; - The width and initial value of the first interval were incorrectly defined; - Errors were made when grouping data by intervals; - An interval variation series has been built; - Frequency analysis was carried out incorrectly.	1-29	Satisfactory
4	The task was not completed.	0	Unsatisfactory

6. Delivery time: 2nd day 1st week

7. Literature:

1. Rosner Bernard Fundamentals of Biostatistics: Texbook/ B.Rosner - 8th ed.: GENGAGE learning, 2016.
2. Armitage P. Encyclopedia of Biostatistics. - Wiley, 2016.

8. Control:

1. What is the difference between discrete and interval frequency distribution?
2. Why is the Stagers formula used?
3. How is the interval width determined?
4. What is frequency distribution?

1. Theme 3: Calculation of numerical characteristics of an interval frequency distribution, its graphical representation.
2. Aim: developing skills in working with statistical populations, developing skills in graphically representing a sample population.
3. Tasks: in accordance with the data of the problem (see theme 2) (in accordance with your variant), calculate the sample mean, sample variance, standard deviation, and coefficient of variation; in accordance with the conditions of the problem (see topic 2) (in accordance with your option), construct a polygon, a histogram,stem-and-leaf plot and box-and-whisker plot
4. Execution/ evaluation form: Solving problems (assessment using a checklist)
5. Performance criteria SIW:

Individual task 3		**Max 40**	
1	- The numerical characteristics of the variation series (average, dispersion, standard deviation, range, coefficient of variation) were calculated correctly; - The interval series is correctly presented graphically: a polygon, a histogram, a "box with whiskers", and a "stem with leaves" are constructed; - The solution was checked in the STATISTICA program, a screenshot is attached.	36-40	Excellent
2	- When calculating the numerical characteristics of the variation series, minor errors were made, which were corrected by the student during testing; - Errors were made in the construction of some graphs; - The solution was checked in the STATISTICA program, a screenshot is attached.	30-35	Good
3	- When calculating the numerical characteristics of the variation series, gross errors were made; - The graphs were built with errors; - There is no screenshot of the solution in the STATISTICA program.	1-29	Satisfactory
4	- The task was not completed.	0	Unsatisfactory

6. Delivery time: 3rd day 1st week
7. Literature:
1. Rosner Bernard Fundamentals of Biostatistics: Texbook/ B.Rosner - 8th ed.: GENGAGE learning, 2016.
2. Armitage P. Encyclopedia of Biostatistics. - Wiley, 2016.
8. Control:
1. How is a sample mean determined?
2. How is sample variance determined?
3. How is the standard deviation determined?
4. How is the coefficient of variation determined?
5. What is the difference between dispersion and standard deviation?
6. What is a polygon?
7. What is a histogram?
8. How to interpret the graph "mustache box"?

1. Theme 4: Goodness-of-fit tests.
2. Aim: skills formation applying goodness-of-fit tests to test the hypothesis that the population is

normally distributed.

3. Tasks: for the frequency distribution obtained in individual task 2 (see topic 2 in accordance with your option), test the hypothesis about the normal distribution of the sample using Pearson's χ2 goodness-of-fit test and the Kolmogorov-Smirnov goodness-of-fit test.

4. Execution/ evaluation form: Solving problems (assessment using a checklist)

5. Performance criteria SIW:

Individual task 4		**Max 100**	
1	- The values of the theoretical distribution function of a random variable are correctly determined; - A calculation table has been created to calculate the calculated value of the Kolmogorov-Smirnov λ-criterion; - The hypothesis of the normal distribution of the sample was tested in accordance with the algorithm of the Kolmogorov-Smirnov agreement test; - The result of the decision was interpreted correctly.	90-100	Excellent
2	- Minor errors were made in calculating the values of the theoretical distribution function of a random variable; - The calculation table for calculating the calculated value of the Kolmogorov-Smirnov λ-criterion contains minor errors; - The hypothesis of the normal distribution of the sample was tested in accordance with the algorithm of the Kolmogorov-Smirnov agreement test; - The result of the decision was interpreted correctly.	70-89	Good
3	- Errors were made in calculating the values of the theoretical distribution function of a random variable; - The calculation table for calculating the calculated value of the Kolmogorov-Smirnov λ-criterion contains errors; - The hypothesis of the normal distribution of the sample according to the Kolmogorov-Smirnov agreement criterion has been incorrectly verified; - The result of the decision was interpreted incorrectly.	1-69	Satisfactory
4	The hypothesis about the normal distribution of the sample was not tested using the Pearson and Kolmogorov-Smirnov goodness-of-fit tests.	0	Unsatisfactory

6. Delivery time: 4th day 1st week

7. Literature:

1. Rosner Bernard Fundamentals of Biostatistics: Texbook/ B.Rosner - 8th ed.: GENGAGE learning, 2016.
2. Armitage P. Encyclopedia of Biostatistics. - Wiley, 2016. - 6100 p

8. Control:

1. What is a statistical hypothesis? What types of statistical hypotheses do you know?
2. What is the general scheme for testing statistical hypotheses?
3. What are consent criteria used for?
4. What is the procedure for applying the χ2-Pearson goodness-of-fit test?
5. What is the scheme for applying the Kolmogorov-Smirnov goodness-of-fit test?

1. **Theme 5:** Testing the hypothesis of the equality of two averages using the Student's t-test for dependent samples.
2. **Aim:** the study of the principles of testing the hypothesis of the equality of two averages using the Student's t-test for dependent samples. Implementation of the Student's criterion in the STATISTICA program.
3. **Tasks:** find and study information on the following issues:
   - to clarify in which cases the Student's paired t-test is used;
   - learn how to formulate null and alternative hypotheses;
   - learn the criterion algorithm;
   - learn how to interpret the result;
   - to form the skills of conducting the application of the Student's paired t-test in the STATISTICA program.
4. **Execution/ evaluation form:** Solving problems (assessment using a checklist)
5. **Performance criteria SIW:**

Individual task 5		**Max 40**	
1.	- The null and alternative hypotheses are correctly formulated; - The calculated value of the Student's t-test for dependent samples was calculated correctly; - The hypothesis was tested according to the Student's t-test algorithm for dependent samples; - The result of the decision is interpreted correctly; - The solution was checked in the STATISTICA program, a screenshot is attached.	36-40	Excellent
2.	- The null and alternative hypotheses are correctly formulated; - The calculated value of the Student's t-test for dependent samples was calculated correctly; - The hypothesis was tested according to the Student's t-test algorithm for dependent samples; - The result of the decision is interpreted correctly.	30-35	Good
3.	- The null and alternative hypotheses are correctly formulated; - Errors were made in calculating the calculated value of the Student's t-test for dependent samples; - The hypothesis was tested according to the Student's t-test algorithm for dependent samples; - The result of the decision is interpreted incorrectly.	1-29	Satisfactory
4	- The hypothesis of the equality of the two averages was incorrectly tested using the Student's t-test for dependent samples.	0	Unsatisfactory

6. **Delivery time:** 5th day 1st week
7. **Literature:**
1. Rosner Bernard Fundamentals of Biostatistics: Texbook/ B.Rosner - 8th ed.: GENGAGE learning, 2016.
2. Armitage P. Encyclopedia of Biostatistics. - Wiley, 2016.
8. **Control:**
   1. Why is the Student's t-test very popular in the statistical analysis of biomedical data?
   2. What conditions should be met when using the Student's t-test?
   3. How are the null and alternative hypotheses formulated for the Student's t-test?
   4. In what ways can the Student's t-test be implemented in the STATISTICA program?

5. How can I check the conditions for applying the Student's criterion in the STATISTICA program?
6. How is the information contained in the summary table interpreted?

4. **Theme 6:** One-way analysis of variance (ANOVA).
5. **Aim:** studying the principles of conducting one-way analysis of variance. Formation of skills for conducting one-way analysis of variance in cases where samples do not have a normal distribution.
6. **Tasks:** find and study information on the following issues:
   - obasic concepts and methods of analysis of variance;
   - total, factor and residual variances;
   - scheme for using one-way analysis of variance (Fisher's F test).

4. Execution/ evaluation form: Solving problems (assessment using a checklist)

5. Performance criteria SIW:

Individual task 6		**Max 40**	
1.	- Correctly formulated null and alternative hypotheses; - Correctly calculated factor and residual variances; - The hypothesis was tested according to the Fisher F-criterion algorithm; - The result of the decision is interpreted correctly; - The solution was checked in the STATISTICA program, a screenshot was attached; - The hypothesis was tested according to the Kruskal-Wallis algorithm; - The result of the decision is interpreted correctly; - The solution was checked in the STATISTICA program, a screenshot is attached.	36-40	Excellent
2.	- Correctly formulated null and alternative hypotheses; - Correctly calculated factor and residual variances; - The hypothesis was tested according to the Fisher F-criterion algorithm; - The result of the decision is interpreted correctly; - The hypothesis was tested according to the Kruskal-Wallis algorithm; - The result of the decision was interpreted correctly.	30-35	Good
3.	- Correctly formulated null and alternative hypotheses; - Errors were made when calculating factor and residual variance; - The hypothesis was tested according to the Fisher F-criterion algorithm; - The result of the decision is interpreted correctly; - The hypothesis was tested according to the Kruskal-Wallis algorithm; - The result of the decision was interpreted correctly.	1-29	Satisfactory
4	- One-way analysis of variance was not performed.	0	Unsatisfactory

Tasks:

1. Three groups of subjects were examined on a scale of the severity of the asthenic state. The results are shown in the table below. Is it possible to say that different groups differ in the level of

severity of asthenia?

1 group	2nd group	3 group
thirty	34	51
33	58	84
48	63	36
50	71	75
32	35	64

2. In diseases of the retina, the permeability of its vessels increases. The study compared vascular permeability in three groups: in healthy people (group 1), in patients with retinal damage predominantly in the central fovea (group 2), in patients with anomalies in both the central fovea and the periphery (group 3). The results are shown in the table below. Is it possible to say that the permeability of retinal vessels differs statistically significantly in these groups??

1 group	2nd group	3 group
0.5	1.2	6.2
0.7	1.4	12.6
0.7	1.6	12.8
1	1.7	13.2
1	1.7	14.1
1.2	1.8	15
1.4	2.2	20.3
1.4	2.3	22.7
1.6	2.4	22.7
1.6	6.4	22.7
1.7	19	
2.2	23.6	

3. When the left coronary artery is damaged, the blood supply to the left ventricle deteriorates. At rest this does not manifest itself in any way, but during physical activity it leads to the accumulation of blood in the lungs. This does not happen with damage to the right coronary artery. To confirm this hypothesis, 29 people were examined: 9 healthy (group 1) and 20 patients with coronary heart disease, of which 5 with damage to only the right coronary artery (group 2) and 15 with damage to both coronary arteries or only the left (group 3). The ratio of blood filling in the lungs during physical activity to blood filling at rest was calculated. The results are presented in the table. Are the groups different from each other?

1 group	2nd group	3 group
0.83	0.86	0.98
0.89	0.92	1.02
0.91	1.00	1.03
0.93	1.02	1.04
0.94	1.20	1.05
0.97		1.06
0.97		1.07
0.98		1.22
1.02		1.07
		1.23

		1.13
		1.08
		1.32
		1.37
		1.18

4. A number of medicines and foods contain caffeine. Pregnant women should not indulge in strong coffee, since caffeine can have an adverse effect on the fetus, and caffeine excretion is slower in pregnant women. There is an assumption that the slow elimination of caffeine is due to high levels of sex hormones during pregnancy. Scientists decided to confirm this assumption by determining the rate of caffeine elimination in women taking oral contraceptives (when taking oral contraceptives, the level of estrogens and progestogens in the blood increases - the same thing happens during pregnancy). The half-life of caffeine was determined in women taking (group 1) and not taking (group 2) oral contraceptives, as well as in men (group 3). The results are presented in the table. Is it possible to say that the half-life of caffeine differs statistically significantly between these groups??

1 group	2nd group	3 group
10.36	5.3	2.04
13.28	7.28	5.16
11.81	8.98	6.11
4.54	6.59	5.82
11.04	4.59	5.41
10.08	5.17	3.51
14.47	7.25	3.18
9.43	3.47	4.57
13.41	7.60	4.83
		11.34
		3.79
		9.03
		7.21

5. There is data on the causes of mortality in different social groups of the population. Using the Kruskal-Wallis test, test the hypothesis about the homogeneity of these groups. The data is shown in the table.

Cause of death	Kind of activity				
	Senior managers	Teachers	Middle managers	Agricultural workers	Industrial workers
Neoplasms	150	140	205	290	350
Cardiovascular diseases	130	150	180	190	185
Accidents	45	30	75	175	95
Cirrhosis of the liver	15	16	33	75	95
Suicides	20	25	36	30	45

6. Delivery time: 6th day 1st week

7. Literature:

3. Rosner Bernard Fundamentals of Biostatistics: Texbook/ B.Rosner - 8th ed.: GENGAGE learning, 2016.
4. Armitage P. Encyclopedia of Biostatistics. - Wiley, 2016.

8. Control:

1. What null hypothesis is tested using ANOVA?
2. What conditions must be met when using analysis of variance?
3. What is the main idea of analysis of variance?
4. What is the procedure for using one-way analysis of variance?
5. When is the Kruskal–Wallis H test used?
6. What is the procedure for applying the Kruskal–Wallis H test?

1. Theme 7: Midterm control 1.

2. Aim: Assessment of students' knowledge and skills based on the materials of lectures, practical exercises and SIWT 1-6 topics.

3. Tasks: Answer MCQs.

4. Execution/ evaluation form: Assessment on a 100-point scale.

5. Performance criteria SIW:

Percentage	Grade
90-100	Excellent
89-75	Good
74-50	Satisfactory
0-50	Unsatisfactory

6. Delivery time: 7th day 2nd week

7. Literature:

1. Rosner Bernard Fundamentals of Biostatistics: Texbook/ B.Rosner - 8th ed.: GENGAGE learning, 2016.
2. Armitage P. Encyclopedia of Biostatistics. - Wiley, 2016.

8. Control: MCQs

1. Theme 8: Summarizing the material using logical flowchart.

2. Aim: Odds ratio and relative risk (Generalization of information using the χ2-Pearson criteria (for tables of size 2x2 and mxn), χ2-McNemar, and Fisher's exact test).

3. Tasks: present graphically the process of comparing two samples, taking into account the cases of dependent and independent samples, the presence or absence of a normal distribution in the samples.

4. Execution/ evaluation form: logical flowchart (assessment using a checklist).

5. Performance criteria SIW:

Individual task 6.		**Max 20**	
1.	- The diagram is simple and concise, fits on one page; - Basic and sufficient concepts on the topic (section) are highlighted as elements of the diagram; -The elements of the diagram are arranged so that their hierarchy is clear (for example, general and specific - in the center, on the periphery - auxiliary); - Logical connections are established between the elements of the circuit (inside the circuit and external, i.e., relationship with adjacent circuits);	18-20	Excellent

	-The diagram is visual (easy to understand): symbols, graphic material, color shades, tables, and illustrated material are used.		
2.	- The diagram fits on one page; - Basic and sufficient concepts on the topic are highlighted as elements of the diagram; - The hierarchy of the elements of the diagram is not traceable, the material is presented chaotically; - Logical connections are established between the elements of the circuit (inside the circuit and external, i.e., relationship with adjacent circuits); - The diagram is not visual.	11-17	Good
3.	- The diagram fits on more than one page; - The elements of the diagram are not basic and sufficient concepts on the topic; - The hierarchy of the elements of the diagram is not traceable, the material is presented chaotically; - Logical elements are not installed between the circuit elements; - The diagram is not visual.	1-10	Satisfactory
	- There is no scheme	0	Unsatisfactory

6. Delivery time: 8th day 2nd week.

7. Literature:

1. Rosner Bernard Fundamentals of Biostatistics: Texbook/ B.Rosner - 8th ed.: GENGAGE learning, 2016.
2. Armitage P. Encyclopedia of Biostatistics. - Wiley, 2016.

8. Control:

1. What is the peculiarity of the analysis of qualitative characteristics?
2. What is the mxn size conjugacy table?
3. What conditions must be met when applying Pearson's criterion $\chi 2$?
4. In which cases does the McNemar criterion apply?

1. Theme 9. Priority directions of public health protection.

2. Aim: familiarize students with the priority areas of protection public health.

3. Tasks:

1.Code "On health and health care system" in the Republic of Kazakhstan.
2. Basic principles State health policy.
3. The concept of healthcare development in the Republic of Kazakhstan until 2025.
4. Strategy Kazakhstan -2050.

4. Execution/ evaluation form: presentation, abstract.

5. Performance criteria SIW: see Appendix 1, 2.

6. Delivery time: 9th day 2nd week.

7. Literature: see Appendix 3.

8. Control:

1. What are the priority directions of healthcare development at the present stage?
2. What is the healthcare system in Kazakhstan?
3. What law defines the legal, economic and social foundations for protecting the health of citizens in the Republic of Kazakhstan?

1. Theme 10. Demographic development of Kazakhstan.
2. Aim: acquaintstudents with socio-demographic problems in the Republic of Kazakhstan.
3. Tasks:
1. Demographic policy of Kazakhstan.
2. Modern demographic situation in Kazakhstan.
3. Demographic and migration situation as one of the global problems of our time.
4. Ways to solve the demographic problem.

4. Execution/ evaluation form: presentation, abstract.
5. Performance criteria SIW: see Appendix 1, 2.
6. Delivery time: 10th day 2nd week.
7. Literature: see Appendix 3.
8. Control:
1. What do you know about the demographic situation in Kazakhstan?
2. What demographic problems exist in Kazakhstan?
3. What are the features of socio-demographic processes in Kazakhstan?
4. What is the main obstacle to population growth?

1. Theme 11. Current trends in the incidence of the population of Kazakhstan.
2. Aim: to give knowledge and skills in the field of public health on the morbidity of the population, training in methods for studying morbidity.
3. Tasks:
1. The concept and types of morbidity in the population.
2. Morbidity according to the data of attendance, their indicators.
3. Morbidity according to medical examinations, their indicators.

4. Execution/ evaluation form: presentation, abstract.
5. Performance criteria SIW: see Appendix 1, 2.
6. Delivery time: 11th day 3rd week.
7. Literature: see Appendix 3.
8. Control:
1. What is meant by the incidence of the population?
2. From what sources do you get data on incidence?
3. What does the concept of "actual morbidity" mean?
4. What does the term "prevalence" mean?
5. What does the concept of "pathological affection" mean?
6. What types of morbidity are usually distinguished in the incidence statistics?

1. Theme 12. Socially significant diseases and their control.
2. Aim: acquaint students with the problem of socially significant diseases in Kazakhstan.
3. Tasks:
- The main risk factors for the development of MSE.
- Impact of MSE on life expectancy.
- The role of information technology in health promotion.
- Conduct health promotion activities.

4. Execution/ evaluation form: presentation, abstract.
5. Performance criteria SIW: see Appendix 1, 2.
6. Delivery time: 12th day 3rd week.
7. Literature: see Appendix 3.

8. Control:
1. Who is at risk for MSE?
2. What are the socioeconomic consequences of MSE?
3. What are the main ways to combat MSE?

1. Theme 13. Medico-social aspects of a healthy lifestyle.
2. Aim: formation of the needs of university students in a healthy lifestyle.
3. Tasks:
1. Professional health of students as a factor in improving the quality of training.
2. Physical culture - as a leading factor in the student's health.
3. Influence of hypokinesia on the state of body systems.
4. Execution/ evaluation form: presentation, abstract.
5. Performance criteria SIW: see Appendix 1, 2.
6. Delivery time: 13th day 3rd week.
7. Literature: see Appendix 3.
8. Control:
1. Define the concept of "healthy lifestyle" and reveal its principles and factors.
2. What factors influence the physical development of student youth?
3. What is the role of physical education in the health of students?
4. What is good physical shape for?

1. Theme 14. Ethical aspects of diseases immunoprophylaxis.
2. Aim: to familiarize students with the ethical aspects of immunoprophylaxis.
3. Tasks:
1. Legal aspects of immunoprophylaxis.
2. Ethics of planning and conducting vaccination.
3.Regulatory documents that ensure the implementation of immunoprophylaxis in the Republic of Kazakhstan.
4. Execution/ evaluation form: presentation, abstract.
5. Performance criteria SIW: see Appendix 1, 2.
6. Delivery time: 14th day 3rd week.
7. Literature: see Appendix 3.
8. Control:
1.The rights of patients during immunoprophylaxis.
2. Types of preventive vaccinations.
3. Organization of vaccinations.
4. Contraindications to vaccination.

1. Theme 15. Confidentiality and communication with relatives of the patient.
2. Aim: explain to the trainees the principle of observing the confidentiality rule when communicating with the patient's relatives.
3. Tasks:
•The principle of confidentiality.
•Basic communication skills.
•The principle of a patient-centered approach.
•Iatrogenic and the principle of confidentiality.
4. Execution/ evaluation form: presentation, abstract.

5. Performance criteria SIW: see Appendix 1, 2.
6. Delivery time: 15th day 3rd week.
7. Literature: see Appendix 3.
8. Control:

1. Under what conditions can the principle of confidentiality be violated when communicating with the patient's relatives?
2. What is the impact of basic communication skills on communication between a doctor and a patient's relative? Give examples.
3. What are the goals, objectives and principles of the patient-centered approach?
4. What regulatory documents regulate the interaction between a doctor and a patient's relative?

1. Theme 16: Moral, legal and organizational aspects of transplantology.
2. Aim: to study the rule of proportionality in transplantation, as well as the bioethical and moral aspects of organ transplantation from living donors and from corpses.
3. Tasks:

•The rule of proportionality in transplantation.
•Bioethical and moral aspects of organ transplantation from living donors and cadavers.
•Types of organ harvesting from corpses.
•Medical criteria for the distribution of organs and tissues (histocompatibility, urgency, priority).

4. Execution/ evaluation form: presentation, abstract.
5. Performance criteria SIW: see Appendix 1, 2.
6. Delivery time: 16th day 4th week**.**
7. Literature: see Appendix 3.
8. Control:

1. What is transplantology, its types, goals, tasks?
2. What is the basis of the proportionality rule in transplantation?
3. What are the bioethical and moral aspects of organ transplantation from living donors?
4. What are the bioethical and moral aspects of organ transplantation from cadavers?
5. How does histocompatibility, urgency and sequencing affect the distribution of donor organs and tissues, what is the bioethical aspect?

Appendix 1

Completion criteria: presentation

Slides design	
Style	• Uniform design style • Avoid styles that distract from the presentation itself • Auxiliary information should not prevail over the text, picture
Background	• Choose cool tones
Use of color	• On one slide, it is recommended to use no more than three colors: for the background, title and text
Animation effects	• Use the possibilities of computer animation, but this should not detract from the content of the information on the slide
Slide types	• To ensure variety, slides with text, tables, diagrams should be used.
Presentation of information	
Information content	• Use short words and sentences • Headlines should grab the attention of the audience
Location on the page	• Preferably horizontal layout of information • The most important information should be in the center of the screen • The inscription should be placed under the picture
Amount of information	• Do not fill one slide with too much information. • Display key points one on each individual slide

Completion criteria: abstract

Approximate scheme: topic, goals and objectives, relevance, list of specific issues studied on this topic. Conclusions and offers. The volume of the abstract is 5-8 pages. The content includes an introduction, a list of numbers and headings of all sections. Conclusions and suggestions, list of used literature; The introduction, which occupies 1-2 pages, provides a brief rationale for the topic, goals and objectives, relevance; The literature review (8-10 pages) provides a systematic analysis of the published literature on the topic of the abstract, while the student gives a critical assessment of the issues raised by different authors, etc. A reference in the text is indicated in brackets by a number corresponding to the serial number of the source in the list of references. Conclusions contain 2-5 points; Requirements: literacy, clarity, specificity and logical sequence of presentation of the material; persuasiveness of the argument; brevity and accuracy of wording; A4 format, Times New Roman font, font size 14, margins top, right, bottom 2 cm, left 3 cm;

Essay evaluation criteria: the validity of goals and objectives, the ability to consistently, competently, clearly state, the amount of literature used. The quality of the design, the protection of the abstract (brevity, clarity, clarity, consistency, the level of proficiency in the problem and professional speech, completeness of answers to questions, etc.)

Appendix 2

Criteria for evaluation:

STUDENTS INDIVIDUAL WORK (SIW)

The form of control	Mark	Criteria for evaluation
Topic presentation	**Excellent** Corresponds to the ratings: A (95-100%); A- (90-94%).	The presentation was made independently, on time, with a volume of at least 20 slides. At least 5 literary sources were used. The slides are informative and concise. During the defense, the author demonstrates deep knowledge on the topic. Does not make mistakes when answering questions during the discussion.
	Good Corresponds to the ratings: B+ (85-89%); B (80-84%); B- (75-79%); C+ (70-74%).	The presentation was made independently, on time, with a volume of at least 15 slides. At least 4 literary sources were used. The slides are informative and concise. During the defense, the author demonstrates good knowledge on the topic. Makes minor mistakes when answering questions that he corrects.
	Satisfactory Corresponds to the ratings: C (65-69%); C- (60-64%); D+ (50-54%).	The presentation was made independently, on time, with a volume of at least 10 slides. At least 3 literary sources were used. The slides are not meaningful. When defending, the author makes fundamental mistakes when answering questions.
	Unsatisfactory Corresponds to the assessment FX (25-49%); F (0-24%).	The presentation was not delivered on time, the volume is less than 8 slides. Less than 3 literary sources were used. The slides are not meaningful. When defending, the author makes gross mistakes when answering questions. Does not focus on own material.

The form of control	Mark	Criteria for evaluation
Preparation and defense of the report	**Excellent** Corresponds to the ratings: A (95-100%); A- (90-94%).	The report was made accurately and delivered on time, written independently on at least 15 typewritten pages, using at least 5 literary sources. Schemes, tables and figures corresponding to the topic of the abstract are given. When defending a report, the text does not read, but tells. Confidently and accurately answers all questions asked.
	Good Corresponds to the ratings: B+ (85-89%); B (80-84%);	The report was made accurately and delivered on time, written independently on at least 10 typewritten pages, using at least 4 literary sources. Schemes, tables and figures corresponding to the topic of the abstract are given. When defending a report, the text does not read, but tells. When answering questions, he makes

	B- (75-79%); C+ (70-74%).	minor mistakes.
	Satisfactory Corresponds to the ratings: C (65-69%); C- (60-64%); D+ (50-54%).	The report was made accurately and delivered on time, written independently on at least 8 typewritten pages, using at least 3 literary sources. When protecting the report, the text is read. Uncertainty answers questions, makes fundamental mistakes.
	Unsatisfactory Corresponds to the assessment FX (25-49%); F (0-24%).	The abstract was not drawn up in detail, it was not submitted before the deadline. The topic does not show figures, tables. Read during the defense of the report. Made serious mistakes in answering the questions asked.

Appendix 3

Literature:

Main:

1. Public health: textbook / A. A. Akanov [and others]. - ; Approved and rec. committee for control in the field of education and science. Ministry of Education and Science of the Republic of Kazakhstan. - M. : "Litterra", 2017. - 496 p.
2. Boleshov, M. A. Kogamdyk densaulyk zhane densaulykty saktau: okulyk / M. A. Boleshov. - Almaty: Evero, 2015. - 244 bet p.
3. Campbell, A. Medical Ethics / A. Campbell, G. Gillette, G. Jones; ed. Yu. M. Lopukhin. - M: GEOTAR - Media, 2014. - 368 bet. With.

Additional:

1. Rymanov, D.M.
2. Medic, V. A. Public health and health care: hands. to practical exercises. - M: GEOTAR - Media, 2012. - 400 p.

Electronic resources:

1. Lisitsyn, Yu. P. Public health and healthcare [Electronic resource]: textbook / Yu. P. Lisitsyn, G. E. Ulumbekova. - 3rd ed., revised. and additional - Electron. text data. (43.1Mb). - M: GEOTAR - Media, 2017. - el. opt.
2. Medic V. A. Public health and healthcare [Electronic resource]: textbook / V. A. Medic, V. K. Yuryev. - Electron. text data. (47.6 Mb). - M: GEOTAR - Media, 2013. - 608 p. email
3. Lisitsyn, Yu. P. Public health and healthcare [Electronic resource]: textbook / Yu. P. Lisitsyn, G. E. Ulumbekova. - 3rd ed., revised. and additional - Electron. text data. (40.9 Mb). - M.: Ed. group "GEOTAR-Media", 2011. - 544 el.
4. Shchepin, O. P. Public health and healthcare [Electronic resource]: textbook / O. P. Shchepin, V. A. Medic. - Electron. text data. (43.6 Mb). - M.: Ed. group "GEOTAR-Media", 2011. - 592 p. email opt. disc (CD-ROM).
5. Medic, V. A. Public health and healthcare [Electronic resource]: a textbook for honey. Schools and colleges / V. A. Medik., V. K. Yuriev. - 3rd ed., revised. and additional - Electron. text data. (37.2 MB). - M: Publishing group "GEOTAR-Media", 2011. - 288 p. email opt. disk