Requirements to knowledge and practical skills

Reference to it in Moodle -- edu.grsmu.by

The practical skills which students have to master at the practical lessons on Microbiology and to perform at the corresponding Concluding lesson (mini-exam) (Concluding lesson N1 – General Microbiology, Concluding lesson N2 – Immunology and Concluding lesson N3 – Medical Bacteriology)

	The name of the skill	The number of the Concluding lesson			The way of estimation
		N1	N2	N3	
1	The algorithms of staining techniques	+		+	Computer-based assessment
2	Making a smear, seeding of the material containing bacteria and other standard bacteriological techniques	+		+	A lecturer
3	Immersion microscopy technique	+		+	A lecturer
4	The algorithms of setting up serological reactions		+	+	Computer-based assessment
5	The estimation of the results of serological reactions (reading of the results of the tests)		+	+	Computer-based assessment
6	Identification of microorganisms in the smears	+		+	Computer-based assessment
7	Evaluation of the immunogram		+	+	Computer-based assessment
8	Visual evaluation of the growth characteristics of microorganisms and of their features	+		+	Computer-based assessment

The criteria of evaluation of the practical skills including making smear, seeding of the material containing bacteria and other standard bacteriological techniques performed by a student

The performed work	The evaluation
Satisfactory (good) work	= (no change to the basic mark)
Non satisfactory work done with significant mistake	– 1 grade

The criteria of evaluation of immersion microscopy technique performed by a student

Time taken for the performance of the technique	The evaluation
45 seconds or less	= (no change to the basic mark)
46 or more	– 1 grade

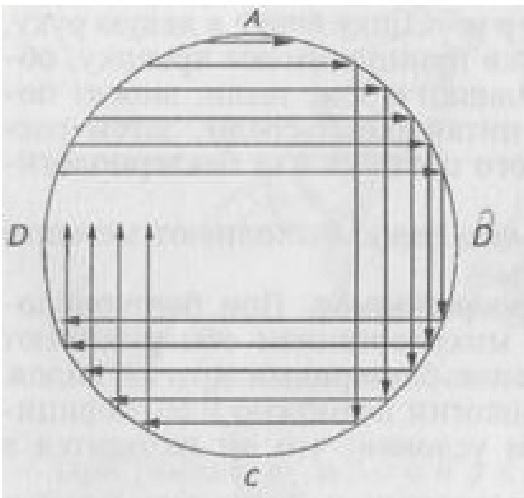
The approaches to the estimation of the knowledge of practical skills performed by computer-based assessment at the Concluding lesson

Every student has to give answer to one question of the assessment of practical skills knowledge. The time is 1 minute. Right answer (shown in green colour) or partly right answer (shown in yellow colour) will not change the mark of computer-based assessment obtained by a student. For wrong answer (shown in red colour) the mark obtained for computer-based assessment will be decreased by one grade.

So the mark obtained by a student can be changed (decreased by 1, 2 or even 3 grades) according to the knowledge of practical skills.

LIST OF THE PRACTICAL SKILLS TO BE MASTERED BY EVERY STUDENT AT THE SECOND SEMESTRE OF STUDY OF MICROBIOLOGY

1. Making a smear using bacteria grown in liquid medium:	1. degrease the slide using a piece of soap and clean textile cloth; 2. light the alcohol lamp; 3. take the culture tube by one hand and the inoculation loop by another one; 4. sterilize the inoculation loop by leaving it in the flame of the alcohol lamp until it glows red (sterilization in a fire or "flaming"); 5. open the culture tube near the fire and flame its neck; 6. touch the inside surface of the culture tube wall by inoculation loop to cool it; 7. take a drop of bacterial culture by the inoculation loop; 8. remove the inoculation loop from the culture tube, flame its neck and recap the culture tube; 9. put the culture tube in a test tube rack; 10. touch surface of the glass slide by the inoculation loop to transfer the drop of bacterial culture to it; 11. spread evenly the drop over the surface of the slide to form an oval spot; 12. sterilize the inoculation loop by leaving in the flame of the alcohol lamp until it glows red and then put it back in a rack; 13. dry the smear; 14. fix the smear.
2. Making a smear using bacteria grown on solid agar medium:	1. degrease the slide using a piece of soap and clean textile cloth; 2. using inoculation loop place a drop of water on the middle part of the glass slide; 3. light the alcohol lamp; 4. take the culture tube by one hand and the inoculation loop by another one; 5. sterilize the inoculation loop by leaving in the flame of the alcohol lamp until it glows red (sterilization in a fire or "flaming"); 6. open the culture tube with bacteria grown on agar slant near the fire and flame its neck;

	7. touch the inside surface of the culture tube wall by inoculation loop to cool it; 8. take a minimal amount of bacterial growth from the surface of the slant by the loop to the collect material; 9. remove the inoculation loop from the culture tube, burn it neck and recap the culture tube; 10. put the culture tube in a test tube rack; 11. using inoculation loop transfer the bacteria into the drop of water to obtain moderate turbidity; 12. burn the rest of the bacterial mass left on the loop by flaming in the fire of the alcohol lamp; 13. cool the inoculation loop; 14. mix bacteria with water in the drop on the slide; 15. spread the material evenly over the surface of the glass slide; 16. sterilize the inoculation loop by placing it in the flame of the alcohol lamp until it glows red and then put it in a rack; 17. dry the smear by keeping high over the flame; 18. fix the smear by passing the glass slide through the flame.
3. Obtaining isolated colonies of bacterial culture by seeding of the pathological material (specimen) using a streak-plate technique:  	1. light the alcohol lamp; 2. take by different hands the test tube and the inoculation loop; 3. sterilize the inoculation loop by keeping it in the flame until it glows red; 4. remove the cap of the test tube containing liquid specimen (pathological material or broth bacterial culture) and sterilise the mouth of the test tube in the flame; 5. touch the wall of the test tube from inside to cool inoculation loop; 6. take a small amount of the material from the tube; 7. remove the inoculation loop from the tube (**do not flame it!**), sterilise the mouth of the test tube in the flame, recap and place it back into a test tube rack; 8. lift the top of the Petri dish containing sterile agar(agar plate) just enough to insert your inoculating loop easily and make several streaks over the agar plate spreading out the bacteria (**do not dig into the agar when you carry out the streaking procedure!**); 9. remove the inoculating loop, close the Petri dish and rotate it counter clockwise about 90 degrees; 10. sterilise the inoculating loop in order to kill any remaining bacteria by flaming them; 11. open the agar plate again, insert the loop under the lid and cool it at the edge of the agar; 12. keeping in mind where the initial streaks ended make new streaks over the agar plate spreading out bacteria starting from the previous ones;

	13.close the Petri dish and turn the Petri dish counter clockwise about 90 degrees again; 14. repeat the sequence of the streaking procedures described above twice to make a set of four cross-streaks; 15. finally sterilize the inoculation loop.
4. seeding the test strain on agar plate for making a lawn growth:	1. Sterilise the inoculating loop by flaming. 2. Remove the cap and sterilise the mouth of the test tube containing liquid specimen (pathological material or broth bacterial culture)in the flame. 3. Using the sterile loop, take a loopful of a liquid specimen from the tube. 4. Streak the specimen to cover all surface of an agar plate, rotating the plate when streaking the material. 5. Don’t flame the loop to ensure that the whole surface has been seeded. 6. Remove the inoculating loop, close the petri dish, sterilize the inoculating loop and put it out.
5. Inoculation of the Hiss medium with the bacteria grown on an agar slant:	1. take tube with the bacterial culture grown on slant agar and inoculation loop in different hands; 2. sterilize the inoculation loop by keeping it in the flame until it glows red; 3. open the tube with the bacterial culture grown on slant agar keeping it close to the flame and sterilize the mouth of the tube; 4. touch the wall of the test tube from inside to cool inoculation loop; 5. pick up a small amount of bacterial growth from the slant; 6. remove the inoculation loop from the test tube with bacterial culture, burn the mouth of the tube, recap it and place back into a test tube rack; 7. take the test tube with pure Hiss medium, open it keeping close to the flame and sterilize the mouth of the tube by flaming; 8. inoculate the tube with Hiss medium moving the loop through the medium from the top up to the bottom; 9. remove the inoculation loop from the tube, flame its mouth, recap and place back into a test tube rack; 10. finally sterilize the inoculation loop by leaving it in the flame until it glows red.
6. Reseeding of the isolated colony making a streak over the surface of an agar slant:	1. take an inoculation loop, sterilize it by flaming until it glows red; 2. slightly open the agar plate with grown isolated colonies, cool the loop by touching the inside part of the lid;

	3. sample a small amount of the required separate colony without touching any other colonies; 4. remove the inoculation loop and close the Petri dish; 5. take the test tube with pure agar slant, remove the cap and sterilize the mouth of the test tube in a flame; 6. spread the specimen onto the agar making a streak over the surface of the slant moving the loop from the bottom up to the top; 8. remove the inoculation loop from the culture tube, burn the mouth of the tube, recap it and place back into a test tube rack; 9. put the culture tube in a test tube rack; 10. finally sterilize the inoculation loop by leaving in the flame until it glows red.
7. Inoculation of the pathological material by applying Shukevich's method:	1. inoculate the specimen into the condensed water at the bottom of the test tube; 2. don't touch the walls of the tube and the surface of the agar slant; 3. if there specimen is *Proteus vulgaris* – it will grow from the bottom to the top over the surface of the agar slant.