

***This is a SouthArk Master Syllabus. The course syllabus distributed by the instructor may include additional requirements, must be followed by the student in the given term, and is considered to supersede the Master Syllabus.***

**Course Number**

MLSC 2024

**Course Title**

Clinical Microbiology

**Course Description**

The student will receive instruction in the theory, practical application, and pathogenesis of clinical microbiology, including collection, setup, identification, susceptibility testing, and reporting procedures. The lab portion will include learning skills used within the clinical microbiology department.

**College Mission**

South Arkansas Community College promotes excellence in learning, teaching, and service; provides lifelong educational opportunities; and serves as a cultural, intellectual, and economic resource for the community.

**College Wide Student Learner Outcomes**

Critical Thinking

Responsibility

Communication

**ACTS Course**

**Program Course**

Medical Laboratory Science

**Program Outcomes**

1. Collect, process, and report testing on biological specimens.
2. Recognize factors that affect methods and test results and take appropriate actions within established guidelines.
3. Perform and monitor routine departmental quality control.
4. Perform preventive and corrective maintenance of equipment and instruments.
5. Apply principles of laboratory safety, including Standard Precautions, and evaluate new technologies within the department.

**ACTS Outcomes**

None

**Course Learner Outcomes**

CLO #	Course Learner Outcomes (CLO)	Unit Outcomes/ Competencies	ACTS	Program Outcomes	Critical Thinking	Communication	Responsibility	Assessment
CLO 1	Demonstrate proficiency in properly handling of biological specimens for culture.	14, 65, 72, 80		1		C3		Test Number 2, 5
CLO 2	Discuss the various bacterial descriptions and classifications and be able to describe this information both written and orally.	1, 2, 3, 4, 5, 6, 19, 21, 22, 64, 78, 86, 88		1		C1		Test Number 1, 2, 4
CLO 3	Choose the proper media for correctly processing specimens.	17, 31, 3233, 34, 35, 36, 37, 38, 42, 44, 46, 51, 55, 76, 83, 87, 93		1	CT 1			Test Number 3, 5
CLO 4	Identify unknown organisms using	13, 15, 16, 18, 23, 24, 25, 26, 2728, 29, 30,		1	CT 1			Test Number 2, 3

	established laboratory techniques.	39, 40, 41, 43, 45, 47, 48, 49, 50, 52, 53, 56, 58, 59, 61, 62, 63, 66, 67, 68, 69, 70, 74, 75, 77, 91, 92						
CLO 5	Apply principles of safety, quality assurance and quality control within the clinical microbiology setting.	3, 94, 95		2, 3, 4			R2	Test Number 1
CLO 6	Evaluate specimens as to their acceptability for culture.	7, 8, 9, 10, 11, 12, 54		1	CT 1			Test Number 1, 3
CLO 7	Correlate test results with other patient data.	20, 57, 60, 71, 73, 79, 81, 82, 84, 85, 89, 90		1, 5	CT 2			Test Number 3, 5, 6

### Unit Outcomes/Competencies/Objectives

Upon completion of this course, the student should be able to:

#### Lecture One

1. Define the terms Taxonomy, General Genetics (DNA, RNA, and Transcription) concerning Microorganisms.
2. Discuss the metabolism, structure and function of microorganisms.
3. Define the terms reservoir, transmission, vector, fomite, and colonization.
4. Describe the mode of defense the body uses against bacteria.
5. Demonstrate Catalase and Coagulase testing and explain their use in identification of Staphylococcus.

#### Lecture Two

6. Describe the five conditions that must exist in order for antimicrobial agents to work properly.
7. List and describe the five modes of antimicrobial agent actions and the antibiotics that fall into each category.
8. Describe how bacteria can become resistant to Beta-Lactams, Glycopeptides, Aminoglycosides and Quinolones with respect to enzymes produced by the bacteria or changes the bacteria can undertake.
9. Define Minimal Inhibitory Concentration (MIC) and its advantages.
10. Describe the three basic forms of conventional susceptibility testing.
11. Describe the two main automated methods of susceptibility testing.
12. Analyze when it is appropriate to perform susceptibility testing.

#### Lecture Three

13. List the physical and chemical differences between Staphylococci and Micrococci.
14. Discuss the clinical significance of MRSA.
15. List the diseases that Staph aureus can produce.
16. Describe the characteristics of Streptococci and List the diseases that Lancefield Groups A, B and D can produce.
17. List and describe the significance of the three forms of hemolysis.
18. List the tests that are used to identify Lancefield groups A, B, C, and D.
19. Describe why susceptibility testing is not required on Streptococcus Group A.
20. Describe why it is important to differentiate between Strep Group D enterococcus and non-enterococcus.

#### Lecture Five

21. List the physical characteristics of Bacillus.
22. Analyze the clinical significance of Bacillus.
23. List the physical and biochemical characteristics of various Corynebacterium species.
24. Analyze the clinical significance of C. diphtheria.
25. List the physical and biochemical characteristics of Listeria monocytogenes.
26. List the physical characteristics and clinical significance of Erysipelothrix.
27. List the physical characteristics and clinical significance of Nocardia species.

#### Lecture Six

28. Discuss the clinical significance of Lactobacillus and which media will support its growth.
29. Discuss the clinical significance of Gardnerella and list its general characteristics.

30. List the sources and clinical significance of *Streptomyces*, *Actinomyces*, and *Rhodococcus* and discuss their use in medicine and industry.

#### Lecture Seven

31. List the differential media used for gram negative isolation.
32. List the five tests that can be derived from TSI agar and use the information to identify bacteria.
33. Describe the mechanism behind urea agar and list its uses.
34. Describe how citrate agar is used and what a positive reaction looks like and means.
35. Describe how MRVP medium is used and be able to analyze its results.
36. Describe the indole test, its uses and what reagents are used.
37. Define IMViC and be able to describe how it is used in gram negative rod identification.
38. Describe the two ways you can use to determine if a bacterium is motile.
39. List the general characteristics of the family Enterobacteriaceae and how they are identified.
40. Define O and H antigens and describe how they are used in bacteria identification.
41. Describe the disease caused by *Salmonella* and how samples for culture are collected and how the organism is identified.
42. List the chemical tests used to identify *Arizona* and analyze how it is different from *Salmonella*.
43. List both species of *Citrobacter* and what organisms they can be confused with.
44. Describe the biochemical reactions and physical characteristics of *Shigella*.
45. Analyze how the capsule around *Shigella* affects its ability to be identified.
46. List the biochemical characteristics of *E. coli* on TSI and list the IMViC reactions.
47. Describe *E. coli* 0157 and its clinical significance and growth requirements.
48. List what are the disease states caused by *E. coli*.
49. List the clinical significance of *Edwardsiella* and how it can be differentiated from *Salmonella*.
50. Discuss the clinical significance of *Klebsiella*.
51. List the biochemical reactions on TSI and urease agar in conjunction with the physical characteristics of *Klebsiella*.
52. Discuss the clinical significance of *Enterobacter* and list its biochemical characteristics.
53. Discuss the clinical significance of *Serratia* and list its biochemical and physical characteristics.
54. Discuss the challenges in culturing *Proteus* sp.
55. List the biochemical characteristics of *Proteus* on TSI and urease agar and discuss the clinical significance of an infection with *Proteus* sp.
56. Analyze the difference between *Providencia* and *Shigella* based on clinical significance and biochemical characteristics.
57. List and describe the three forms of the "plague" caused by *Yersinia* spp. and graph their life cycle.
58. List the biochemical characteristics of *Yersinia* on TSI agar.

#### Lecture Eight

59. List the general characteristics of Nonfermentative, gram-negative rods.
60. List the clinical significance and biochemical differences between *P. aeruginosa* and *P. maltophilia*.
61. List the biochemical differences between *Alcaligenes*, *Achromobacter*, *Acinetobacter*, *Moraxella*, *Kingella*, *Flavobacterium*, *Eikenella*, and *Agrobacterium* species and discuss their clinical significance.

#### Lecture Nine

62. List the general characteristics of *Burkholderia*.
63. List the characteristics and clinical significance of *Vibrio* species.

#### Lecture Ten

64. Define a zoonotic pathogen.
65. List the sources, characteristics and clinical significance of *Pasteurella*, *Francisella*, and *Bordetella*.

#### Lecture Eleven

66. List the general characteristics of *Haemophilus* species.
67. Discuss the clinical significance between the five most common *Haemophilus* species.

#### Lecture Twelve

68. Describe the common route of transmission for *Campylobacter* infections.
69. Explain the clinical significance of *Campylobacter*, *Helicobacter*, *Legionella* and *Brucella*.
70. Discuss the general characteristics of the above mentioned bacteria.

#### Lecture Thirteen

71. Analyze the difference between *Neisseria* and *Moraxella*.
72. List the culture requirements for *Neisseria* species.

73. Describe the importance of early detection for *N. meningitidis*.

#### Lecture Fourteen

74. Describe the significance difference between Mycobacteria and other bacteria.

75. List the Runyon groups, their characteristics and diseases they can cause.

76. List the common media used to culture Mycobacteria and describe how specimens are prepared for culture.

77. List screening tests for *M. tuberculosis* and how the infection is treated.

#### Lecture Fifteen

78. Discuss the physical characteristics of Mycoplasma.

79. Name the disease states caused by Mycoplasma and its identification.

80. Discuss the clinical significance, mode of transmission and stages of infection with *Treponema pallidum*.

81. List and discuss the two main diseases caused by *Borrelia* species.

82. List the origin and potential infections caused by *Leptospira* species.

#### Lecture Sixteen

83. List the culture requirements for anaerobic bacteria and differentiate between the various types of media used for culture.

84. List the differences between *Peptostreptococcus* and *Peptococcus* and their clinical significance.

85. Discuss the clinical significance and culture characteristics of *Clostridium* species and how they are identified.

#### Lecture Seventeen

86. Explain the difference between Molds and Yeasts.

87. Discuss the basic methods for culture of yeast and molds.

88. Analyze the difference between *Penicillium* and *Aspergillus*.

#### Lecture Eighteen

89. Compare the difference between Ectoparasites and Endoparasites.

90. Describe the methods of concentration of stool specimens for parasite identification.

91. Identify and List the common parasites found in Arkansas (*Trichomonas* and *Giardia*).

92. Map and analyze the life cycles of *Trichomona* and *Giardia*.

93. Describe the proper collection technique for Pinworm.

94. Analyze the significance and origin of Charot-Layden crystals.

95. Identify and list the parasite class of roundworms.

96. Map and analyze the life cycle of roundworms.

97. Identify and list the parasite class of cestodes.

98. Map and analyze the life cycle of cestodes.

99. List and discuss the common errors in parasite identification.

#### Lecture Nineteen

100. Perform and analyze a blood smear for blood borne parasites.

101. Identify *Plasmodium* and *Babesia* species in a blood smear.

102. Map and analyze the life cycle of *Plasmodium* and *Babesia* species and the impact on the human body (clinical symptoms).

103. Describe the uses of the following biochemical tests: acetamide utilization, acetate utilization, bacitracin test, bile esculin agar, cetrimide, citrate utilization, coagulase testing, decarboxylase tests, DNA hydrolysis, and esculin hydrolysis.

104. List bacteria that can be used as positive and negative controls for each test.

105. Describe the uses of the following biochemical tests: fermentative media, indole production, LAP test, Lysine Iron agar, Methyl Red/Voges Proskauer (MRVP) test, Motility testing, Optochin test, Triple Sugar Iron agar, Urea hydrolysis, X and V factors.

### **Assessment Description(s)**

The final course grade will be determined by the student's scores on up to six pop quizzes, four scheduled examinations, one final examination (comprehensive), up to ten practical (lab) projects and two lab quizzes, and any additional student projects.

### **Materials and Technological Requirements**

Forbes, Betty A., Sahm, Daniel F., Weissfeld, Alice S, Baily and Scott's Diagnostic Microbiology, 13th edition (2007). St. Louis: Mosby Elsevier. ISBN # 13 978:-0-323-03065-6

## **Class Attendance Policy**

Students are expected to attend all classes in which they are enrolled. If a student is absent from a class session, it is the student's responsibility to make arrangements to complete or make up any work missed. No make-up work for missed classes will be allowed without the approval of the instructor. Students who enroll late must assume all responsibility for work missed. Classes not attended as a result of late enrollment may be counted toward excessive absences. Students not attending the entire class period may be counted absent for that period. An instructor may drop students with a grade of "WE" if students have been absent for an excessive number of days. Warning letters will be sent to the students advising them of the consequences of nonattendance and urging them to contact their instructors immediately. Excessive absences are defined as follows:

### **Regular Semester**

Courses which meet once a week .....	2 absences
Courses that meet twice per week .....	3 absences
Courses that meet four times per week .....	5 absences

### **Summer Session**

Courses that meet four times per week in a five week session .....	3 absences
Courses which meet two evenings per week in a 10 week session .....	3 absences

Students enrolled in special programs or individualized instruction should contact their program director/instructor regarding specific attendance requirements for the program/course. Some of the selective-admission, health-science programs have specific criteria regarding attendance. Students are encouraged to refer to program policies in these matters.

### Jury Duty/Military/Official School Function

Scheduled absences are those that occur due to college-related activities or as a result of summons to jury duty or military duty. Classes missed as a result of scheduled absences will not be counted as excessive absences if the instructor is notified and provided documentation prior to the absence(s). Make-up work for scheduled absences will be at the discretion of the instructor.

In all instances, documentation must be provided to the instructor within 24 hours of receipt. Documentation should come from an appropriate party on letterhead or other official stationery with a signature and contact information. Documentation should list the corresponding dates of the leave.

### Medical leave

For medical-related absences, documentation must include written notice from the treating medical professional documenting time needed off related to medical reasons and time student may resume classes. The medical reason does not need to be listed on the documentation; the documentation must include only that there is a medical reason, the amount of time the student needs to be absent, and the time the student should be able to return to classes. Students who elect to work at home while on excused leave must meet with their instructors to make arrangements to do so. Working on coursework while on medical leave is not a requirement but can be requested by students. If students request that they be allowed to work at home while on an excused leave, the instructor will make every reasonable effort to ensure that the student is able to do so.

For students who have a medical condition necessitating time off or accommodation:

- 1) They may work at home on assignments if they choose to if on medical leave approved by a medical professional
- 2) Receive appropriate accommodations related to coursework (i.e., excused from labs with potentially harmful chemicals, have a larger desk, etc.)
- 3) Resume their studies where they left off once they return to classes
- 4) Be allowed to make up any missed work related to medical leave
- 5) Receive incompletes on their transcripts until coursework is completed, according to the incomplete grade contract.
- 6) Be given a reasonable time frame in which to complete missed coursework

## **Academic Honesty Policy**

Students enrolled at South Arkansas Community College are expected at all times to uphold standards of integrity. Students are expected to perform honestly and to work in every way possible to eliminate academic dishonesty. Academic dishonesty includes cheating and plagiarism, which are defined as follows:

- Cheating is an attempt to deceive the instructor in his/her effort to evaluate fairly an academic exercise. Cheating includes copying another student's homework, class work, or required project (in whole or in part) and/or presenting another's work as the student's own. Cheating also includes giving, receiving, offering, and/or soliciting information on a quiz, test, or examination.

- Plagiarism is the copying of any published work such as books, magazines, audiovisual programs, electronic media, and films or copying the theme or manuscript of another student. It is plagiarism when one uses direct quotations without proper credit or when one uses the ideas of another without giving proper credit. When three or more consecutive words are borrowed, the borrowing should be recognized by the use of quotation marks and proper parenthetical and bibliographic notations.

If, upon investigation, the instructor determines that the student is guilty of cheating or plagiarism, the following penalties will apply:

- The student will receive a penalty of no less than a zero on the work in question.
- The instructor will submit a Student Academic Misconduct Form, written report of the incident, to the appropriate dean.
- The dean will submit form to Vice President for Learning to determine disciplinary action.
- The Vice President for Learning will determine whether further disciplinary action will be taken.
- All decisions may be appealed for review through the college's academic appeals procedure.

### **Equal Opportunity-Affirmative Action Statement**

South Arkansas Community College does not discriminate on the basis of age, race, color, creed, gender, religion, marital status, veteran's status, national origin, disability, or sexual orientation in making decisions regarding employment, student admission, or other functions, operations, or activities.

### **Library Services**

Library Homepage: <http://southark.libguides.com/homepage> Library Contact: LibraryStaff@southark.edu or 870.864.7115

### **Procedures to Accommodate Students with Disabilities:**

If you need reasonable accommodations because of a disability, please report this to the Vice President of Student Services with proper documentation. . VPSS Contact: 870.875.7262

### **The Early Alert System**

In an effort to ensure student retention and success, South Arkansas Community College employs an Early Alert System to identify and support at-risk students as soon as possible in a given semester. The intent of Early Alert is to provide this assistance while there is still time to address behaviors or issues that have the potential of preventing students from completing their courses and degree plans. Students referred through the Early Alert System will be required to work on a corrective action plan with their student advising coach and to include attendance accountability and mandatory academic tutoring either in the academic division or in the Testing and Learning Center (TLC).

Once the Student Advising Coach has met with the referred student, and again when the student has met the prescribed corrective actions, the coach will update the Early Alert System so that the instructor is kept informed of the progress in resolving issues.

### **Behavioral Review Team**

At South Arkansas Community College (SouthArk), we are committed to proactive leadership in student wellbeing and campus safety. By focusing on prevention and early intervention with campus situations that involve any person experiencing distress or engaging in harmful or disruptive behaviors, the BRT will serve as the coordinating hub of existing resources to develop intervention and support strategies and offer case management. Students, faculty, staff, and campus guests are encouraged to report any person on campus who is a concern. BRT Contact: 870.875.7262 BRT@southark.edu

**Date of Revision: 9/21/2016**