

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 1034

Course Title

Clinical Hematology/Coagulation

Course Description

Students rotate through the Hematology/Coagulation section of affiliated clinical laboratories and observe and perform test procedures under the supervision of the clinical staff (16 hours per week). Students participate in all aspects of laboratory work. The students acquire competencies based upon the level established by the programs clinical cognitive psychomotor and affective objectives. Upon completion of this course the student should have mastered skills necessary for entering the clinical laboratory as an employee at the technician level

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

ACTS Outcomes

Program Outcomes

1. Collect, process, and report biological samples
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.

Course Learner Outcomes

CLO #	Course Outcomes	Unit Outcomes/Competencies	ACTS	Program Outcomes	Critical Thinking	Communication	Responsibility	Assessment
CLO 1	List the major structures and organs of the hematopoietic system.	1, 3, 4		2, 5		C2		Test Number 1
CLO 2	Describe the Red Blood Cell, White Blood Cell, and platelet in regard to size, shape, internal components and function.	2, 6, 7, 8, 9, 10, 11, 12, 13		1		C2		Test Number 1
CLO 3	Discuss the maturation process for the three cellular components of the blood (RBC, WBC, and Platelet)	5		1, 5		C2		Test Number 1

CLO 4	Analyze the different anemias and discuss the various causes of anemia and impacts on the patient.	14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36		1			R2	Test Number 1, 2
CLO 5	Define leukemia and list the major types of leukemia.	49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61		1, 5		C2		Test Number 2
CLO 6	Discuss the function of the White Blood Cell and list various abnormalities and diseases that affect White Blood Cells.	37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48		1, 5		C2		Test Number 4
CLO 7	Analyze the formation, function, and diseases that can affect platelets.	67, 68, 69, 70, 71, 72, 73, 74		1, 5	CT2			Test Number 3
CLO 8	List the major test procedures performed in the hematology department and discuss their use.	92, 93, 94, 95, 96, 97, 98, 99, 100		1, 2, 5		C2		Test Number 3
CLO 9	List the various Myelodysplastic disorders	62, 63		1		C2		Test Number 2
CLO 10	List and discuss various coagulation disorders.	75, 76, 77, 78, 79, 80, 81, 83, 84, 85		1, 2		C2		Test Number 5
CLO 11	Analyze the major systems of coagulation.	64, 65, 66, 82		1, 2	CT2			Test Number 5
CLO 12	List the major procedures in the coagulation/hemostasis department and discuss their use.	86, 87, 88, 89, 90, 91		1, 2		C2		Test Number 6

Course Objectives

Upon completion of the lecture series, the student will be able to:

Lecture One

1. Map the formation of RBC origins from embryo to adult.
2. Explain the function of Blood.
3. List the functions of the spleen.
4. List the functions of the Bone Marrow.
5. List and describe the 6 stages of RBC development.
6. Identify various shapes and sizes of RBC's.
7. Identify various RBC inclusions (Howell-Jolly bodies, basophilic stippling, etc.) and discuss the pathology behind each.

Lecture Two

8. Discuss and identify the different proteins (globulins) that make up the various hemoglobin's (A₁, A₂, F, C, etc.)
9. Discuss the two parts of the hemoglobin molecule (Heme and Globin).
10. List the four globin subunits of various types of hemoglobin.
11. Discuss the function of hemoglobin in oxygen and carbon dioxide transport.
12. List the various abnormal hemoglobin's and discuss the differences between them.
13. Map and analyze the hemolytic process of hemoglobin recycling.
14. List Normal values for Hemoglobin for both male and female patients.
15. List factors that affect hemoglobin concentration.

Lecture Three

16. Explain iron absorption and its storage.
17. Break down the dietary needs for proper absorption of iron.
18. Analyze the pathology and origins of iron deficiency anemia.
19. List and discuss laboratory tests used in diagnosis of iron deficiency anemia.
20. Identify and discuss sideroblastic anemia.
21. Contrast the difference between alpha and beta thalassemias.
22. Discuss the pathology behind hemochromatosis.
23. Identify and interpret laboratory testing used in diagnosing microcytic anemias.

Lecture Four

24. Discuss the definition of Macrocytic anemia.
25. Describe the pathology behind Pernicious anemia.
26. Discuss the usage of the Shilling Test.

Lecture Five

27. Discuss the pathology behind and be able to identify spherocytosis.
28. Perform and interpret the osmotic fragility test.
29. Identify Elliptocytosis.
30. Discuss the pathology behind Stomatocytosis and Xerocytosis.
31. Briefly discuss G6PD deficiency.
32. Briefly describe the results of Pyruvate deficiency.
33. Identify the characteristics of aplastic anemia.

Lecture Six

34. Identify Sickle-cells and discuss the pathology behind the disease.
35. Differentiate between Hemoglobin F, Hemoglobin C and hemoglobin E.
36. Briefly discuss Fanconis anemia, Diamond-Blackfan anemia and Paroxysmal Nocturnal Hemoglobinuria.
37. Describe and interpret the Sugar-Water Test, Ham's Test, and Flow cytometry.
38. Analyze the difference between Cold Agglutinin Syndrome and Paroxysmal Cold Hemoglobinuria.

Lecture Seven

39. List and discuss the 4 stages of phagocytosis.
40. Explain the pathology behind HIV infections.
41. List the difference between Gaucher's, Tay-Sachs, and Niemann-Pick disease.
42. Recognize and explain Platelet Satellitism.
43. List the five types of WBC's and discuss the role of each.
44. Analyze various reasons why the WBC can either increase or decrease.
45. List the steps involved in performing a CBC.
46. List the stages of maturation for each of the WBC cell lines.

Lecture Eight

47. Identify and discuss toxic granulation and Dohle bodies.
48. Analyze the difference between May-Higgin, Alders, and Pelger-Huet anomalies.
49. Briefly discuss Chediak-Higashi syndrome.
50. Recognize and discuss the clinical significance of reactive lymphocytes

Lecture Nine

51. Break down the difference between Acute and Chronic leukemia.
52. Explain the symptoms and characteristics of Acute Myeloid Leukemia.
53. Be able to list and discuss the use of various cytochemical stains.
54. Compare the differences between Acute Myelomonocytic, Monoblastic, Erythroid, Megakaryoblastic and Lymphoblastic leukemia.

Lecture Ten

55. List the differences between Chronic Myelogenous, Neutrophilic, Eosinophilic and Lymphocytic leukemia.
56. Analyze characteristics and treatment for Polycythemia Vera.
57. List the characteristics and clinical significance of Essential thrombocythemia.

Lecture Eleven

58. Discuss the characteristics, symptoms and diagnosis of chronic lymphocytic leukemia.
59. Recognize and discuss Hairy Cell Leukemia.
60. Evaluate the difference between Hodgkin's and Non-Hodgkin's lymphoma.
61. Identify a plasma cell and list its functions.
62. List the five types of immunoglobulins and give at least one function of each.
63. Discuss the difference between Multiple Myeloma and Waldenstroms' Macroglobulinemia.

Lecture Twelve

64. Discuss the various Myelodysplastic Syndromes and the methods of diagnosis.
65. List the various refractory anemias.

Lecture Thirteen

66. List the clotting factors and their clinical significance.
67. Discuss the difference between extrinsic, intrinsic and common pathways.
68. List the 4 phases of platelet aggregation.

Lecture Fourteen

69. Describe platelet maturation and duration.
70. Demonstrate platelet estimating on a peripheral smear.
71. List causes for a low platelet count.
72. Analyze platelet aggregation studies.
73. Discuss the causes of thrombocytopenia.
74. Discuss Von-Willebrand's disease, Glanzmann's thrombasthenia, Bernard-Soulier syndrome, Hermansky-Puduk syndrome, Chediak-Higashi syndrome, Wiskott-Aldrich syndrome and TAR and analyze their differences.
75. List various methods used to count platelets and test their ability to stop bleeding.
76. Discuss the normal life span of a platelet.

Lecture Fifteen

77. Analyze the difference between Hemophilia A and Hemophilia B.
78. Explain the role of vitamin K in the coagulation cascade.

Lecture Sixteen

79. Distinguish between Afibrinogenemia, Hypofibrinogenemia and Dysfibrinogenemia.
80. Discuss the role of Thrombin and Protein C in the coagulation mechanism.
81. List two Fibrin Degradation products and their clinical significance.
82. Analyze the laboratory findings associated with DIC.

Lecture Seventeen

83. Explain the clinical significance of Thrombosis.
84. Analyze the role of Antithrombin, Protein C, and Protein S plays in thrombotic episodes.
85. Discuss the role of Lupus-Anticoagulant in the APTT test.
86. List various anti-platelet drugs and their use.
87. Define thrombocytopenia and thrombocytosis and list the cell maturation series of platelets.

Lecture Eighteen

88. Discuss the significance and usage of a Protime.
89. Calculate an INR.
90. List the reagents used in a Protime.

91. List the significance and usage of an Activated Partial Thromboplastin Time (APTT).
92. List the reagents used in the APTT.
93. Analyze prolonged PT and APTT results and discuss the methods used to identify missing factors.

Lecture Nineteen

94. Discuss the theory behind the Microhematocrit.
95. List the limitations of the ESR test.
96. Compare the two methods of counting manual retic counts.
97. Explain the theory behind the Sickle Cell screen.

Lecture Twenty

98. Discuss troubleshooting of PT and APTT testing.
99. Analyze scatterplots from cell counters.
100. Explain the principle behind Flow Cytometry.

Assessment Description(s)

The instructional methods and activities of this course will include hands-on approach to performance of laboratory testing to include quality control, quality assurance, instrument operation and troubleshooting, accreditation agency requirements, and any other projects required by the individual facility. The final score will be determined by the student's scores on up to 6 pop quizzes, 6 scheduled examinations, 1 final examination and up to ten practical (lab) projects plus lab quizzes and any additional student projects.

Materials and Technological Requirements

Hematology in Practice, by Betty Ciesla, F. A. Davis, ISBN# 978-0-8036-1526-7, Second edition.

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

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