

***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 2215

**Course Title**

Clinical Chemistry

**Course Description**

Routine methods for analyzing body specimens for chemical components. Significance of test results in determining state of health and diagnosing disease. Basic Clinical Chemistry techniques are performed in the student laboratory.

**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 for Clinical Chemistry**

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	Describe the various functional areas of Clinical Chemistry.	24, 28, 29, 30, 36, 39, 44, 45, 53, 54, 55, 65		1		C2		Test Number 2, 3
CLO 2	List the tests that are performed on serum and plasma.	67, 68		2		C2		Test Number 3
CLO 3	Apply basic principles and practice of clinical chemistry including:	1, 2, 3, 5, 12, 15, 16, 17, 18, 19, 20, 21, 22, 41, 48, 51		3	CT 3			Test Number 1, 2

CLO 4	Explain routine methods of measurement in the clinical chemistry laboratory:	4, 6, 7, 13, 14, 37, 38, 40, 46		4		C2		Test Number 1
CLO 5	Describe types of substances and methods used to measure them in:	23, 25, 26, 27, 31, 32, 33, 34, 35, 42, 43, 47, 49, 50, 52, 56, 57, 58, 59, 60, 61, 62, 63, 64, 66		5		C2		Test Number 2, 3
CLO 6	Define Quality Control and describe the methods used in interpretation of the data.	8, 9, 10, 11		3		C1		Test Number 1
CLO 7	Design and operate a QA program within the Clinical Chemistry Department.	69		4			R2	Test Number 3

### Unit Outcomes/ Competencies/Objectives

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

#### Lecture One:

1. Define the units of measurement such as length, mass and temperature.
2. Define the prefixes such as giga, mega, kilo, centi, milli, micro, nano, and pico.
3. Perform basic math such as addition and multiplication using laboratory units.
4. List the differences between TD and TC pipettes.
5. Define concentration and be able to describe how to make simple dilutions.
6. Describe the difference between an enzyme rate and a linear rate reaction.
7. List the six steps of an automated chemistry system.
8. Define Mode, Mean and statistical average.
9. Analyze and prepare a Levy-Jennings chart.
10. Contrast various Westgard rules used with the clinical laboratory.

#### Lecture Two:

11. Define mean, mode, standard deviation and reference range.
12. Define Beer's Law and discuss the difference between percent Transmittance and Absorbance.
13. Label the parts of a spectrophotometer and describe how they are used.
14. Discuss the physics of atomic absorption, flame photometry, flurometry, chemoluminescence, nephelometry, ISE, and osmometry.
15. Create and analyze a standard curve.

#### Lecture Three:

16. List and define the 4 techniques for separation of mixtures using Chromatography.
17. Describe the differences in Thin-Layer Chromatography, High-Performance Liquid Chromatography, Gas Chromatography, and Mass Spectrometry.

#### Lecture Four:

18. Analyze the difference between Competitive and non-competitive binding techniques.
19. List and describe three different types of labels used in immunochemical techniques.
20. Define Affinity
21. Define Avidity.
22. Analyze the pros and cons of PCR testing for infectious diseases.

#### Lecture Five:

23. Describe the basic structure of an Amino Acid.
24. Discuss the pathology behind Phenylketonuria.
25. Describe the Guthrie Test and its use.

26. Briefly discuss Tyrosinemia.
27. Compare the relationship between Alkaptonuria and Homogentistic acid.
28. List the three amino acids involved with Maple Syrup Urine Disease.
29. Define Cystathionine beta synthases deficiency.
30. Describe Cystinuria.
31. Describe the structure, size and clinical significance of Proteins.
32. List and discuss the clinical significance of fourteen plasma proteins.
33. Analyze the pros cons of four methods for analyzing biological fluids for protein.

#### Lecture Six:

34. Discuss the clinical significance of urea.
35. Discuss the clinical significance of creatinine.
36. Compare and analyze the values of blood urea nitrogen and creatinine in the diagnosis of dehydration.
37. Discuss the common methods for analysis of both BUN and Creatinine.
38. Define an Enzyme and how it works in bodily systems.
39. List ten common enzymes found in the blood and assess their clinical significance.
40. Describe the relationship of NAD and NADH in the assay of enzymes.

#### Lecture Seven:

41. Define a Carbohydrate.
42. Chart how glucose is used in the body for fuel.
43. Compare the difference between hypoglycemia and hyperglycemia.
44. Contrast the difference between Diabetes mellitus type I and type II.
45. Discuss the clinical significance of glycosylated hemoglobin in the management of diabetes.
46. Discuss the significance of Ketones and Microalbumin in the management of carbohydrate metabolism.
47. List and assess the five tests that make up a lipid profile and their clinical significance.
48. Calculate the relationship between triglycerides and VLDL.

#### Lecture Eight:

49. List the functions of water as far as the body is concerned.
50. List the differences in intracellular and extracellular fluid compartments.
51. Define hypertonic, isotonic and hypotonic.
52. List the major electrolytes and their clinical significance.
53. List the organs involved with Acid-Base balance.
54. Discuss the dietary requirements and absorption of Iron.
55. Evaluate the function of and clinical disorders of Iron.
56. Discuss the clinical significance of Copper, Zinc, Chromium, Fluoride, Manganese, Molybdenum, and Selenium.
57. Discuss the relationship of Porphyrins and Hemoglobin.
58. List the different types of Hemoglobin and their clinical significance.

#### Lecture Nine:

59. Explain the difference between the two hormones produced by the anterior pituitary and list their functions.
60. Explain the difference between the two hormones produced by the posterior pituitary and list their functions.
61. Explain the difference between the four hormones produced by the adrenal gland and list their functions.
62. Explain the difference between the two hormones produced by the ovaries and give their function.
63. Identify the hormone produced by the Testes and give its function.
64. List the three hormones produced by the Thyroid and Parathyroid and give their functions.
65. Discuss some of the disease states that involve abnormal hormone function.
66. Describe the uses of Digoxin, Valproic Acid, Phenobarbital, Dilantin, Theophylline and Lithium.
67. Rate and identify the difference between Peak and Trough in the assay of medications.
68. Discuss the appropriate draw times of various medications.
69. Create and analyze a QA program to monitor a section of the Clinical Chemistry Department.

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

This class will be assessed on tests that are made up of multiple choice, matching, true and false, and short answer questions. The point values varies with the degree of difficulty. Laboratory assignments are graded on the variation of acquired assay values as compared to the theoretical values calculated by the instructor. Quizzes will be graded

on the point value assigned each question. Homework will be graded on completeness of questions answered and degree of difficulty assigned to the project/question.

### **Materials and Technological Requirements**

Bishop, Michael. Clinical Chemistry: Principles, Procedures, Correlations. Lippencott, Williams & Wilkins. Fifth edition. ISBN 0-7817-4611-6.

### **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

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