

***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 1022

**Course Title**

Clinical Microscopy

**Course Description**

This course involves a study of the morphology, anatomy, and physiology of the renal system and principles of urinalysis. The course will also discuss various body fluids and the clinical significance of those fluids. The accompanying laboratory will present physical, chemical, and microscopic studies of urinalysis and various body fluids and associated interpretation of the results.

**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 for Clinical Microscopy**

1. Collect, process, and analyze 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 Outcomes**

CLO #	Course Outcomes	Unit Outcomes/ Competencies	ACTS	Program	Critical Thinking	Communication	Responsibility	Assessment
CLO 1	List the major components of the urinary system and discuss the function of each	1,4,5,10		5		C2		Test Number 1
CLO 2	List and discuss the function of the various components of the nephron.	2,30		5		C2		Test Number 1
CLO 3	Define "nephron" and list its functions.	3		5		C2		Test Number 1
CLO 4	List the various types of urine specimen collections and discuss the tests for each.	6, 7, 8, 9, 12, 13, 43		1		C2		Test Number 1, 3
CLO 5	Describe the various methods to preserve urine specimens if testing is delayed.	14, 15		1		C2		Test Number 1
CLO 6	List the 3 components of the routine urinalysis	16		1		C2		Test Number 2
CLO 7	Describe the performance of the 3 components of the routine urinalysis (i.e., physical, chemical & microscopic).	22, 23, 24, 25, 27, 33, 34, 35, 36		1		C2		Test Number 2

CLO 8	Discuss the clinical significance of the various components of the routine urinalysis.	17, 18, 19, 20, 21, 44	5	CT1		Test Number 2, 3
CLO 9	List the major sources of error in performance of the routine urinalysis.	26, 28	2		C2	Test Number 2
CLO 10	List and discuss the utility of the four urinalysis "confirmatory" tests.	31, 32	5		C2	Test Number 2
CLO 11	List the major disease states involving the urinary system (i.e., cystitis, pyelonephritis, etc.) and discuss the major laboratory findings in each.	11, 29, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61	5		C2	Test Number 1, 2, 3
CLO 12	Identify and name the major formed elements (i.e., cells, crystals, casts, etc.) in microscopic urinalysis.	37, 38, 39, 40, 41, 42, 45, 46, 47, 48, 49, 50, 51	4	CT1		Test Number 2, 3
CLO 13	Analyze the function and composition of CSF, Seminal Fluid, Synovial, and amniotic fluid.	62, 67, 68, 72, 75, 76, 80	1	CT2		Test Number 3
CLO 14	Analyze the tests that need to be performed on each body fluid and what precautions need to be taken.	63, 64, 65, 66, 69, 70, 71, 73, 74, 77, 78, 79, 81, 82, 83	1		R2	Test Number 3

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

#### Lecture One

1. Explain the function and structure of the organs of the urinary system including: Kidney, bladder, ureter, urethra, nephron, glomerulus, afferent arteriole, proximal convoluted tubule, loop of Henle, Bowman's capsule, efferent arteriole, distal convoluted tubule and collecting duct.
2. Describe how urine is formed, including what is filtered and what is not filtered.
3. Define "the renal threshold" and explain how it can be used to monitor blood glucose levels in the diabetic patient.
4. Discuss the functions and regulation of the renin-angiotensin-aldosterone system.
5. Explain the function and origin of Anti-Diuretic Hormone, Erythropoietin, and Vitamin D.

#### Lecture Two

6. Identify the laboratory procedures used to evaluate glomerular filtration, tubular reabsorption and secretion, and renal blood flow.
7. Discuss the advantages and disadvantages in using urea, insulin, and creatinine to measure glomerular filtration.
8. Define osmolality of a solution and its chemical makeup and describe the methods used to determine osmolality in the clinical laboratory.

#### Lecture Three

9. Discuss urine volume factors such as fluid intake, output, and antidiuretic hormone and list the normal values.
10. Explain the definitions of Oliguria, Polyuria, Nocturia, and Anuria.
11. Discuss the cause and symptoms of Diabetes Mellitus.
12. Discuss the various types of urine specimens such as random, first morning, fasting, two hour postprandial, catheterized, midstream, suprapubic and twenty four hour collections
13. List the basic rules for handling of urine specimens (urinalysis and culture).
14. List the changes that occur in urine that is left at room temperature and the reasons.
15. List the preservatives that can be added to urines.

#### Lecture Four

16. List the common terminology to report normal urine color.
17. Discuss the relationship of urochrome and normal urine color and to specific gravity.
18. Identify the colors which are commonly associated with normal and abnormal urines and list the pigments and/or pathological causes for each.

19. Discuss the significance of cloudy red urine and clear red urine.
20. List possible causes for urine turbidity, and distinguish between normal and pathological reasons.
21. Identify the odors commonly associated with abnormal urine and state the cause for each.
22. List the common terminology used to report clarity of urine.
23. Define specific gravity and discuss its significance in a routine urinalysis.
24. Describe the principles of an urometer and refractometer.

#### Lecture Five

25. Describe the proper technique for performing chemical tests on urine by reagent strip and give possible errors.
26. Discuss quality control procedures and storage requirements for reagent strips.
27. Explain and define the clinical significance, testing methodology of each of the following chemical tests: pH, Protein, glucose, and ketones.
28. Discuss the interfering substances for each test listed above.
29. Discuss the characteristics of Bence Jones protein and its disease states.
30. Discuss the renal threshold for glucose.
31. Discuss the copper reduction method for detecting reducing substances and its clinical use to distinguish between glucose and galactose.
32. List the three ketone bodies and discuss their physiological production.

#### Lecture Six

33. Explain the clinical significance and testing methodology for each of the following tests and their terminology: blood, bilirubin, nitrate, and WBC's.
34. Differentiate between hematuria, hemoglobinuria, with regard to appearance of the urine and the significance of each.
35. Describe the relationship of urinary bilirubin and urobilinogen to the diagnosis of bile duct obstruction, liver disease, and hemolytic disorders.
36. Discuss the proper preparation of urine for both macroscopic and microscopic examination.
37. List eleven formed elements found in urine and their clinical significance.
38. Differentiate between normal and abnormal sediment.
39. Identify the following casts: hyaline, WBC, RBC, Granular, Fatty and Broad casts.
40. Identify the following cells and give their clinical significance: WBC, RBC, and epithelial cells.
41. List and identify normal and abnormal crystals found in urine.
42. Correlate physical and chemical urinalysis results and recognize discrepancies between the two and discuss possible reasons.

#### Lecture Seven

43. Describe the recommended methods for standardizing specimen preparation and volume, centrifugation, sediment preparation, volume and examination.
44. Discuss the differences between commercial systems and the glass-slide methods.
45. List eight formed elements in urinary sediment.
46. Analyze the difference between normal and abnormal sediment.
47. Describe cast formation.
48. Identify hyaline, cellular and waxy casts.
49. Identify WBC's, RBC's, Epithelial cells, and renal cells and list their clinical significance.
50. List and identify normal crystals.
51. List and identify abnormal crystals.

#### Lecture Eight

52. Differentiate between Acute Poststreptococcal Glomerulonephritis, Rapidly Progressive Glomerulonephritis, Goodpastures Syndrome, Vasculitis, Berger's Disease and several causes of Membranous Glomerulonephritis.
53. Name two causes of tubular necrosis.
54. Discuss the characteristics of renal failure.

#### Lecture Nine

55. Explain the abnormal accumulation of metabolites in the urine in terms of overflow and renal disorders.
56. List the tests used for screening Phenylketonuria, Tyrosyluria, Alkaptonuria, and Melanuria.
57. Describe the basic laboratory observation that has relevance in Maple Syrup Disease.
58. Differentiate between the presence of urinary indican owing to intestinal disorders and Hartnup disease.
59. State the significance of increased urinary 5-hydroxyindolacetic acid.
60. Differentiate between cystinuria and cystinosis.

61. Explain the need for performing tests for tests for urinary reducing substances in all newborns.

#### Lecture Ten

62. Explain the function of Cerebrospinal Fluid (CSF).
63. Be able to list the order of testing for the 4 tubes of CSF submitted for testing.
64. List and explain the three observations (tests) that are performed in the hematology laboratory on CSF.
65. List and explain the clinical significance of the biochemical tests that can be performed in CSF.
66. Describe what Microbiological tests can be performed on CSF.
67. List the origin of Seminal fluid.
68. Describe the proper collection of Seminal fluid.
69. Describe the normal appearance of Seminal fluid.
70. Describe the difference in normal and abnormal sperm morphology.
71. Perform a cell count.
72. Describe the function and normal appearance of synovial fluid.
73. List six crystals that can be found in synovial fluid.
74. List the different types of cells that can be found in synovial fluid.
75. Differentiate between transudates and exudates.
76. Describe the different appearances and their clinical significance in pleural fluids.
77. Discuss the pathology behind Hemolytic Disease of the Newborn.
78. Describe the L/S ratio and its clinical significance.
79. Differentiate amniotic fluid from urine.
80. List the functions of gastric fluid.
81. Describe Zollinger-Ellison Syndrome.
82. Discuss the purpose behind analyzing fecal matter.
83. Discuss the various tests that can be performed on feces.

#### Assessment Description(s)

There are 3 section tests as indicated above and each test is worth 100 points. The comprehensive final exam is worth 200 points. There will be NO exemptions from the final exam. If scheduled tests are missed, whether excused or unexcused, either a makeup examination is to be taken at the same time as the final examination or the final examination may be counted as the score on the missed exam.

#### Materials and Technological Requirements

Sunheimer, Graves, Stockwin, Urinalysis and Body Fluids, first edition (2015). Boston, Pearson Company.  
ISBN978-0-13-278404-7

#### 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: 8/31/2016**