

# El Paso Community College

## Syllabus

### Part II

## Official Course Description

<b>SUBJECT AREA</b>	<u>Medical Laboratory Technology</u>
<b>COURSE RUBRIC AND NUMBER</b>	<u>MLAB 1211</u>
<b>COURSE TITLE</b>	<u>Urinalysis and Body Fluids</u>
<b>COURSE CREDIT HOURS</b>	<u>2    1    :</u> <u>Credits   Lec    Lab</u>

### I. Catalog Description

Provides an introduction to the study of urine and body fluid analysis. Includes the anatomy and physiology of the kidney, physical, chemical and microscopic examination of urine, cerebrospinal fluid, and other body fluids as well as quality control, quality assurance and lab safety. A grade of "C" or better is required in this course to take the next course. **Corequisite: MLAB 1261. (1:3) Lab fee.**

### II. Course Objectives

#### A. Unit I. Lab Operations and Laboratory Safety

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

1. Adhere to HIPAA protocols when communicating via telephone, facsimile, E-mail, or performing Delta Checks.
2. Demonstrate adherence to Standard Precautions and the organizations' SOP (Standard Operating Procedures) at all times.
3. Compliance with government, state, and organizational safety regulations involving Biological, Chemical, Radioactive, Fire, Physical, and Electrical Hazards.
4. Explain the word "STAT" in relation to turnout time for sample collection, test performance, and test reporting.
5. List the types of body fluids studied in the urinalysis department and identify their source.
6. Explain the importance of actively participating in Quality Assurance, Quality Control and Proficiency Testing protocols incorporating precision, accuracy, Levey Jennings Charts, and Westgard Rules.
7. Locate and make use of MSDS (Material Safety Data Sheets).
8. Discuss nosocomial infections and identify the basic programs for infection control.
9. Identify the potential routes of infection and methods for preventing transmission of microorganisms through these routes.
10. Explain the proper techniques for hand washing, gowning, gloving, and masking.
11. Compare and contrast the different blood collection biohazard containers used to dispose of contaminated materials.
12. Discuss urine sample collection methods, timed specimens, urine containers, preservatives used and the safety involved with these procedures.

#### B. Unit II. Introduction to the Clinical Microscope, Microscopy Techniques, and its Maintenance.

Upon satisfactory completion of this unit, the student will be able to:

1. Use appropriate microscopy terminology.
2. Identify the basic microscope components and explain their use.
3. Describe the daily care and preventive maintenance of a microscope.
4. Explain how to perform the Kohler Illumination Procedure to ensure optimal specimen imaging.
5. Compare and contrast the principles of the following type of microscopy:
  - a. Brightfield
  - b. Polarizing
  - c. Interference contrast

- d. Darkfield
  - e. Fluorescence
6. Explain the meaning of the following terms:
- a. Field of view
  - b. Parfocal
  - c. Parcentered
  - d. Resolution
  - e. Spherical aberration

C. Unit III. The Kidney and Renal Function

Upon satisfactory completion of this unit, the student will be able to:

1. Describe the role of the Urinary System, list its main components, and explain their function.
2. Identify the internal areas of the kidney including the cortex, medulla, pyramid, papilla, renal pelvis, major and minor calyx, and explain their function.
3. Identify the components of the Nephron and explain their function.
4. Trace the ultra-filtrate as it is filtered through the Urinary Tract System.
5. Describe the transport mechanisms of tubular reabsorption and tubular secretion, including the substances involved.
6. Explain the composition and amount of normal urine excreted by the kidney.
7. Differentiate between the solute amount (osmolality) and the solute mass (specific gravity) in urine and the ways in which they are measured.
8. Discuss the hormonal effects on both the kidney and urine production.

D. Unit IV. Collection and Preservation of Urine Specimens.

Upon satisfactory completion of this unit, the student will be able to:

1. Describe urine collection methods, supplies and equipment, and evaluate their effectiveness for the collection of quality urine samples.
2. Discuss the importance of giving correct and comprehensive "Urine Collection Procedure Instructions".
3. Explain the importance of adhering to the Chain-of-Custody protocols when required for Urine Drug Screening testing.
4. Compare and contrast voided urine and a midstream clean catch urine and when each would be appropriate to collect as such.
5. Name the skin disinfectant used when collecting a midstream clean catch urine sample and explain the outcome if used correctly.
6. Identify preservatives that may be used to preserve urine samples.
7. Discuss the following types of urine samples collected and identify a diagnostic use for each one:
  - a. Voided
  - b. Timed
  - c. Midstream "clean catch"
8. Explain the use of concentrated HCL in a 24 hour urine sample collection container.

E. Unit V. Physical, Chemical and Microscopic Examination of Urine

Upon satisfactory completion of this unit, the student will be able to:

1. State at least three clinical reasons for performing a routine urinalysis.
2. State the importance of using established terminology for describing urine color and clarity.
3. Discuss the origin of the following pigments and their affect on urine color:
  - a. Bilirubin
  - b. Urobilin
  - c. Urochrome
  - d. Uroerythrin
4. List appropriate color terms and the substances that can produce the colors, and identify those substances that indicate a pathologic process.
5. List appropriate clarity terms, their definitions, and the substances that can cause clarity changes, and identify those substances that indicate a pathologic process.
6. Describe the effect that increased amounts of protein and bilirubin can have on urine foam.
7. Discuss the cause of normal urine odor, identify conditions that change this urine characteristic, and list any odors associated with each condition.
8. State the proper care and storage of commercial reagent strip and tablet tests and discuss potential causes of their deterioration.

9. Describe quality control procedures for commercial reagent strip and tablet tests.
10. Discuss the appropriate specimen and testing techniques used with commercial reagent strip and table tests.
11. Summarize the clinical significance of the following substances when they are found in the urine and describe the chemical principles used on reagent strips to measure them:
  - a. Glucose
  - b. Bilirubin
  - c. Ketone
  - d. Specific Gravity
  - e. Blood
  - f. pH
  - g. Protein
  - h. Urobilinogen
  - i. Nitrite
  - j. Leukocyte esterase
12. Discuss the limitations of the leukocyte esterase and nitrite reagent strip tests for the detection of leukocytes and bacteria.
13. Explain, perform, and interpret Confirmatory tests.
14. Discuss the importance of standardizing the microscopic examination of urine and describe how this standardization is achieved in the clinical laboratory.
15. Describe the microscopic appearance and clinical significance of erythrocytes and leukocytes in urine and correlate their presence with the physical and chemical of examination of urine.
16. Describe the microscopic characteristics and location of each type of epithelium found in the urinary tract, that is, squamous, transitional, and renal tubular epithelium (proximal, distal, and collecting duct).
17. Summarize briefly the clinical significance of increased sloughing of the urinary tract epithelium.
18. Describe the formation, composition, and clinical significance of urinary cast formation.
19. State the categories into which casts are classified, discuss the clinical circumstances that result in the formation of each cast type, and correlate the presence of casts with the physical and chemical examination of urine.
20. Describe the development of urinary crystals, including at least three factors that influence their formation.
21. Describe the characteristic form of each major type of urinary crystal; categorize each crystal type as being found in acid, neutral, or alkaline urine; and discuss the clinical significance of each crystal type. (2)
22. Identify the following elements found in urine sediment and discuss their clinical significance:
  - a. Bacteria
  - b. Clue cells
  - c. Fat
  - d. Fecal contaminants
  - e. Fibers
  - f. Red Blood Cells
  - g. Mucous threads
  - h. Crystals
  - i. Casts
  - j. Parasites
  - k. Yeast cells
23. Describe a protocol for a creatinine clearance test and discuss factors that can influence the results obtained.
24. Calculate a creatinine clearance results using data provided.
25. Describe the oral ammonium chloride test for the assessment of tubular function.

F. Unit VI. Renal and Metabolic Disease

Upon satisfactory completion of this unit, the student will be able to:

1. List examples of disorders and common diagnostic tests associated with the kidney system.

2. Explain possible kidney damage due to disease states, such as diabetes, and hypertension.
3. Discuss the pathogenesis of glomerular damage and describe four morphologic changes that occur in the glomeruli.
4. Describe briefly the morphologic appearances of the glomeruli, the mechanisms of glomerular damage, and the clinical presentations of the following glomerular diseases:
  - a. Acute glomerulonephritis
  - b. Chronic glomerulonephritis
  - c. Rapidly progressive glomerulonephritis
  - d. IgA nephropathy
  - e. Membranoproliferative glomerulonephritis,
5. Describe the pathologic mechanisms of glomerular damage in the following systemic diseases:
  - a. Systemic Lupus Erythematosus
  - b. Diabetes mellitus
  - c. Amyloidosis
6. State at least five clinical features that characterize the nephritic syndrome and identify diseases that are associated with this syndrome.
7. Describe the renal dysfunction and clinical features of the following renal tubular disorders:
  - a. Cystinosis
  - b. Cystinuria
  - c. Fanconi's syndrome
  - d. Renal glucosuria
  - e. Renal phosphaturia
  - f. Renal tubular acidosis
8. Compare and contrast the etiology, clinical features, and typical urinalysis findings in the following tubulointerstitial diseases and urinary tract infections:
  - a. Acute and chronic pyelonephritis
  - b. Acute interstitialnephritis
  - c. Lower urinary tract infections
  - d. Yeast infections

G. Unit VII. Fecal Analysis

Upon satisfactory completion of this unit, the student will be able to:

1. Describe the composition and formation of normal fecal material.
2. Describe the effect of abnormal intestinal water reabsorption on the consistency of the feces formed.
3. Classify the condition of diarrhea according to the physiologic mechanisms involved.
4. Compare and contrast the mechanisms of maldigestion and malabsorption and the relationship of each to diarrhea.
5. Differentiate steatorrhea from diarrhea and discuss the physiologic conditions that result in steatorrhea.
6. Describe the following types of fecal collections and give an example of a test requiring each type:
  - a. A random stool collection, with and without dietary restrictions
  - b. A 3-day fecal collection, with and without dietary restrictions.
7. List the major causes of abnormal fecal color, consistency, and odor.
8. State the primary purpose of the microscopic examination for fecal leukocytes.
9. Discuss the microscopic examination for fecal fat.
10. Describe Occult Blood/Guaiac stool testing.
11. List at least five causes of blood in the feces and state the importance of fecal occult blood detection.

H. Unit VIII. Seminal and Vaginal Fluid Analysis

Upon satisfactory completion of this unit, the student will be able to:

1. Outline the maturation of spermatozoa and identify the morphologic structures in which each maturation phase occurs.
2. Summarize the collection of seminal fluid for analysis, including the importance of timing and the recovery of a complete specimen.
3. Describe the performance of the physical examination (appearance, volume, and viscosity) of seminal fluid and the results expected from a normal specimen.

4. Describe the procedures used to evaluate the following characteristics of spermatozoa in seminal fluid, state the normal range for each parameter, and relate each function to male fertility:
  - a. Agglutination
  - b. Concentration
  - c. Morphology
  - d. Motility
  - e. Viability
5. Identify and describe the morphologic appearance of normal and abnormal forms of spermatozoa.
6. Discuss the origin and clinical significance of cells other spermatozoa in the seminal fluid.
7. Discuss briefly the role of quantifying the following biochemical substances in seminal fluid and identify the structure evaluated by each substance:
  - a. Acid phosphatase
  - b. Citric acid
  - c. Fructose
  - d. pH
  - e. zinc
8. Discuss the collection and proper handling of vaginal secretion specimens.
9. Describe the performance of each of the following tests and discuss the clinically significant entities:
  - a. Wet mount examination
  - b. Amine test
  - c. KOH preparation and examination
10. Discuss vaginal secretion results associated with health including the pH and microscopic entities such as:
  - a. Bacterial vaginosis
  - b. Candidiasis
  - c. Trichomoniasis

#### I. Unit IX. Amniotic, Cerebral, Synovial and Fluid Analysis

Upon satisfactory completion of this unit, the student will be able to:

1. Identify the types of body fluid specimens, other than blood, that are analyzed in the clinical laboratory, and the correct procedures for collecting and/or transporting these specimens to the laboratory.
2. Identify the types of body fluid specimens collected for microbiological cultures and the protocol that health care workers must follow when transporting these specimens.
3. Discuss amniotic fluid formation and the interactive role the fetus has in the composition of the amniotic fluid.
4. State at least four indications for performing an amniocentesis and the stage in pregnancy best suited for each analysis.
5. Identify at least four sources of error in amniotic fluid testing caused by inappropriate specimen handling or chemical contamination.
6. Differentiate amniotic fluid from urine.
7. Describe the analysis of bilirubin in the amniotic fluid and the relationship of this value to fetal distress.
8. Describe the formation of cerebrospinal fluid and state at least three functions that the CSF performs.
9. Discuss the importance of timely processing and testing of CSF and state at least three adverse effects of time delay on CSF specimens.
10. Discuss the clinical importance of the microscopic examination of CSF.
11. Compare and contrast the concentration of constituents that may be found in CSF in health and disease.
12. Discuss the proper microbiologic examination of CSF and its importance in the diagnosis of infectious diseases of the central nervous system.
13. Explain briefly the role of CSF immunologic tests in the diagnosis of meningitis.
14. Describe the formation and function of synovial fluid.
15. Summarize the four principal classifications of joint disease.
16. Classify synovial fluid as normal, noninflammatory, inflammatory, septic, or hemorrhagic using various laboratory results.

17. Correlate the cells and crystals observed during the microscopic examination of synovial fluid with various joint diseases.
18. Compare and contrast the concentration of selected chemical constituents of synovial fluid from healthy joints to those with joint disease.

J. **Unit X. Pleural, Pericardial, and Peritoneal Fluid Analysis**

Upon satisfactory completion of this unit, the student will be able to:

1. Discuss appropriate collection requirements for serous fluid specimens.
2. Describe the function of serous membranes as it relates to the formation and absorption of serous fluid.
3. Correlate the concentration of selected chemical constituents of serous fluids with various disease states.
4. Discuss the microbiologic examination of serous fluids and its importance in the diagnosis of infectious diseases.
5. Describe four pathologic changes that lead to the formation of an effusion.

**III. THECB Learning Outcomes (WECM)**

1. Apply principles of safety, quality assurance and quality control.
2. Evaluate specimen acceptability.
3. Explain principles of each test included in a routine urinalysis.
4. Describe the composition, formation and function of selected body fluids.
5. Explain the anatomy and functions of the renal system.
6. Evaluate and correlate laboratory results with patient condition(s).

**IV. Evaluation**

A. **Preassessment**

Students should have successfully completed the Specialized Admissions process to enter the Medical Laboratory Technology Program. Pre-requisites and/or Co-requisites may be required for MLAB courses.

B. **Postassessment**

1. Quizzes, lecture exams, and a final comprehensive written examination will be used to assess students' competency in didactic objectives.
2. Lab competency exams and lab practical exams are used to assess students' achievement of psychomotor objectives.
3. Lab practical exams require students to demonstrate a particular skill learned in the lab component of the class.
4. Written unit exams will consist of the following question types: multiple-choice, completion, essay, matching, spelling, analysis, and definition or any combination of these.

C. **Final Examination**

A comprehensive final exam will be administered at the end of the course.

D. **Evaluation**

To evaluate students' achievement of course objectives, student grades are tabulated using a final grade break down sheet. To successfully complete MLAB1211 Urinalysis and Body Fluids, the student must achieve at least 70% in course components. The student's overall grade must be no less than "C". (Note: All health programs require a grade of no less than "C," therefore no "D's" will be awarded for this course)

E. **Remediation**

If a student scores less than 70% on any exam, the instructor will encourage the student to conference with the instructor or tutor, to review problem areas. Different learning and studying techniques will be discussed.

#### D. **Grading**

Grading Scale used in calculating students' final grade for MLAB 1211 Urinalysis and Body Fluids.

<u>Evaluation Tools</u>	<u>% Value</u>	<u>Grading Scale</u>
Quizzes	10%	A = 90-100%
Lecture Exam I	20%	B = 80 -89%
Lecture Exam II	20%	C = 70- 79%
Lecture Exam III	20%	D = 60 - 69%
Comprehensive Final	30%	F = 59% and below

*(Urinalysis Lab is on a Pass/Fail bases. Laboratories will be graded on a Pass/Fail system based on the competency limits set by the program for each individual procedure. An average of 80% is required to pass the laboratory portion of MLAB 1211 Urinalysis and Body Fluids.)*

Each grade will initially be determined in decimals to the tenths. The final grade however, will only be recorded as a whole number. The guide used will be to round 0.1 through 0.4 to the lower whole number, and 0.5 through 0.9 are raised to next whole number. Example: If at the end of the course a student earns 87.4, the grade will be reflected as 87%. If the student earns 87.6 the grade is rounded to 88%. No decimals will be shown on the final grade scanners.

#### V. **Disability Statement (Americans with/Disabilities Act [ADA])**

EPCC offers a variety of services to persons with documented sensory, mental, physical, or temporary disabling conditions to promote success in classes. If you have a disability and believe you may need services, you are encouraged to contact the Center for Students with Disabilities to discuss your needs with a counselor. All discussions and documentation are kept confidential. Offices located: VV Rm C-112 (831-2426); TM Rm 1400 (831-5808); RG Rm B-201 (831-4198); NWC Rm M-54 (831-8815); and MDP Rm A-125 (831-7024).

#### VI. **6 Drop Rule**

Students who began attending Texas public institutions of higher education for the first time during the Fall 2007 semester or later are subject to a 6-Drop limit for all undergraduate classes. Developmental, ESL, Dual Credit and Early College High School classes are exempt from this rule. All students should consult with their instructor before dropping a class. Academic assistance is available. Students are encouraged to see Counseling Services if dropping because exemptions may apply. Refer to the EPCC catalog and website for additional information.