



Western Technical College
10513114 Urinalysis
Course Outcome Summary

Course Information

Description	This course prepares the student to perform a complete urinalysis which includes physical, chemical and microscopic analysis. Student will explore renal physiology and correlate urinalysis results with clinical conditions.
Career Cluster	Health Science
Instructional Level	Associate Degree Courses
Total Credits	2
Total Hours	54

Textbooks

Urinalysis and Body Fluids – with Access. 7th Edition. Copyright 2021. Strasinger, Susan King and Marjorie Schaub Di Lorenzo. Publisher: F. A. Davis Co. **ISBN-13:** 978-0-8036-7582-7. Required.

10-513-114: Urinalysis Study Guide and Lab Manual (WTC Fall 2023). Western. Publisher: Western. **ISBN-13:** 979-8-822-79215-9. Required.

Learner Supplies

Lab Coat - \$20. **Vendor:** Campus Shop. Required.

Safety Glasses. **Vendor:** Campus Shop. Required.

Sharpie Permanent Marker. **Vendor:** Campus Shop. Required.

Three-ring binder. **Vendor:** Campus Shop. Required.

Success Abilities

1. Cultivate Passion: Increase Self-Awareness
2. Refine Professionalism: Improve Critical Thinking

Program Outcomes

1. Practice laboratory safety and regulatory compliance
2. Collect and process biological specimens
3. Monitor and evaluate quality control in the laboratory
4. Apply modern clinical methodologies including problem solving and troubleshooting according to predetermined criteria
5. Correlate laboratory results to diagnosis of clinical conditions and/or diseases

Course Competencies

1. Summarize renal physiology.

Assessment Strategies

- 1.1. by developing a diagram of the process of urine production

Criteria

You will know you are successful when:

- 1.1. you depict all of the items in the process.
- 1.2. you show the relationship of one step to another.
- 1.3. you show a clear understanding of the topic.

Learning Objectives

- 1.a. Identify components of the kidney and nephron.
- 1.b. Trace the flow of blood through the nephron.
- 1.c. Summarize glomerular filtration.
- 1.d. Contrast tubular secretion and reabsorption.
- 1.e. Outline the movement of substances in the nephron.
- 1.f. Describe urine formation and composition.
- 1.g. Explain purpose of routine urinalysis tests.

2. Perform physical analysis of urine.

Assessment Strategies

- 2.1. by submitting a lab report

Criteria

You will know you are successful when:

- 2.1. you include correct patient identification.
- 2.2. you describe color and clarity of urine.
- 2.3. you report results in agreement with known specimen values.
- 2.4. you include specific gravity results via a refractometer or osmometry.

Learning Objectives

- 2.a. Describe types of specimens: random, first morning, fasting, timed, catheterized, midstream, suprapubic aspiration, pediatric.
- 2.b. Describe proper specimen collection and handling for each type of specimen.
- 2.c. Identify various urine colors and clarities.

- 2.d. Differentiate causes of various physical properties--color, clarity, odor.
- 2.e. Identify physical changes when specimen is not handled properly.
- 2.f. Contrast specific gravity methodologies.
- 2.g. Differentiate factors influencing urine volume.
- 2.h. List normal values.
- 2.i. Review safety procedures and PPEs required for specimen handling and testing.

3. Perform chemical analysis of urine.

Assessment Strategies

- 3.1. by submitting a lab report

Criteria

You will know you are successful when:

- 3.1. you include correct patient identification.
- 3.2. you describe urine reagent strip results.
- 3.3. you report results in agreement with known specimen values.
- 3.4. you include results from appropriate confirmatory tests.

Learning Objectives

- 3.a. Explain reagent strip technique.
- 3.b. Compare various types of chemical reagent strips.
- 3.c. Describe proper storage and handling of reagent strips.
- 3.d. Describe confirmatory tests methods.

4. Summarize chemical reactions included in a macroscopic urinalysis.

Assessment Strategies

- 4.1. by restating chemical reactions found in macroscopic urinalysis

Criteria

You will know you are successful when:

- 4.1. you describe the chemical reactions on reagent strip.
- 4.2. you describe reactions involved in confirmatory tests.
- 4.3. you evaluate results.
- 4.4. you correlate results to physiology.

Learning Objectives

- 4.a. Explain reagent strip chemical reactions.
- 4.b. Interpret reliability of test results.
- 4.c. Determine possible reaction interferences.
- 4.d. Determine chemical changes in specimen due to improper specimen handling and storage.
- 4.e. Contrast specific gravity methods test theories: urinometer, refractometer, reagent strip.
- 4.f. Determine when confirmatory tests need to be done.
- 4.g. Describe test theory of confirmatory tests: sulfosalicylic acid test, acetest, clinitest.

5. Use urinalysis instrumentation.

Assessment Strategies

- 5.1. using an automated reagent strip reader

Criteria

You will know you are successful when:

- 5.1. you perform all critical steps in the right order.
- 5.2. you organize work area.
- 5.3. you wear personal protective equipment.
- 5.4. you follow infection prevention and safety procedures.
- 5.5. you provide an explanation of the process as you perform it.
- 5.6. you describe the decisions you make throughout the process using sound reasoning.

Learning Objectives

- 5.a. Review available semiautomated and automated urinalysis instruments.
- 5.b. Describe maintenance and cleaning procedures.

- 5.c. Review quality control and calibration data.
- 5.d. Explain instrument test methodology and testing procedures.

6. Interpret QC data.

Assessment Strategies

- 6.1. performing quality control procedures as required and reporting your actions

Criteria

You will know you are successful when:

- 6.1. you describe results of QC.
- 6.2. you interpret results of QC and discuss necessary actions.

Learning Objectives

- 6.a. Identify preanalytical factors: test orders, patient preparation, specimen collection and handling.
- 6.b. Identify analytical factors: reagents, instrumentation, test procedures.
- 6.c. Describe Quality Control procedures and protocols for urinalysis tests.
- 6.d. Describe postanalytical factors: reporting and interpretation of test results.

7. Perform microscopic urinalysis.

Assessment Strategies

- 7.1. processing a specimen for microscopic analysis
- 7.2. submitting a lab report

Criteria

You will know you are successful when:

- 7.1. you perform all critical steps in the right order.
- 7.2. you organize work area.
- 7.3. you wear personal protective equipment.
- 7.4. you follow infection prevention and safety procedures.
- 7.5. you provide an explanation of the process as you perform it.
- 7.6. you present sound reasoning as you describe the decisions you make throughout the process.
- 7.7. you include correct patient identification.
- 7.8. you include identification of formed elements.

Learning Objectives

- 7.a. Compare urine sediment preparation methods.
- 7.b. Explain microscopic exam reporting methods.
- 7.c. Compare sediment stain characteristics.
- 7.d. Indicate uses for bright-field, phase-contrast, and polarizing microscopy.
- 7.e. List microscopic exam normal values.
- 7.f. Differentiate microscopic features of cells, crystals, casts, and other significant cells.
- 7.g. Explain cast composition and formation.
- 7.h. Explain crystal formation.
- 7.i. Recognize normal and abnormal crystals found in alkaline and acid urine.
- 7.j. Discriminate between significant structures and artifacts.
- 7.k. Select best microscopy or stain method for urinary sediment structure.

8. Correlate urinalysis results with disease states and conditions.

Assessment Strategies

- 8.1. by providing explanation for urinalysis results

Criteria

You will know you are successful when:

- 8.1. you describe the possible clinical conditions in your analysis.
- 8.2. you list criteria for evaluating the interpretation.
- 8.3. you interpret the results.
- 8.4. you explain your reasoning of why the interpretation was selected.
- 8.5. you use correct terminology.

Learning Objectives

- 8.a. Discuss clinical significance of urine colors, odors, and clarities.
- 8.b. Relate specific gravity results with diagnosis.
- 8.c. Describe clinical significance of pH results.
- 8.d. Diagnose renal diseases based on protein chemical results.
- 8.e. Associate urine glucose results with diseases.
- 8.f. Describe clinical significance of elevated ketone levels.
- 8.g. Correlate positive reactions for blood with diseases.
- 8.h. Classify liver diseases based on elevated bilirubin and urobilinogen levels.
- 8.i. List normal values.
- 8.j. Explain clinical significance of positive nitrite and leukocyte esterase results.

9. Correlate macroscopic and microscopic results.

Assessment Strategies

- 9.1. by analyzing a complete urinalysis report

Criteria

You will know you are successful when:

- 9.1. you describe of the correlation of macroscopic and microscopic results.
- 9.2. you list criteria for evaluating the interpretation.
- 9.3. you identify and explain possible causes for inappropriate and erroneous values.
- 9.4. you include an explanation or action for correcting inappropriate results.
- 9.5. you defend your interpretation.
- 9.6. you explain why the interpretation was selected.
- 9.7. you use correct terminology.

Learning Objectives

- 9.a. Associate microscopic elements with physical and chemical findings.
- 9.b. Associate chemical findings with physical observations.
- 9.c. Predict probable microscopic structures with various physical and chemical findings.
- 9.d. Describe criteria used to verify accuracy of tests by comparing macro and micro results.
- 9.e. Predict chemical test results based on other chemical test results.

10. Explore testing methods on misc. specimens.

Assessment Strategies

- 10.1. by summarizing testing methods for misc. specimens

Criteria

You will know you are successful when:

- 10.1. you describe testing methods for feces.
- 10.2. you describe testing methods for semen.
- 10.3. you describe clinical applications.

Learning Objectives

- 10.a. Describe clinical indications for fecal microscopic exam for leukocytes, and qualitative and quantitative fecal fat.
- 10.b. Describe specimen collection, patient instruction, and test methods for fecal exams.
- 10.c. Describe occult blood test methodology and procedures.
- 10.d. Discuss semen specimen characteristics and testing methods.
- 10.e. Discuss post-vasectomy semen analysis.