

Virginia Western Community College

MDL 140

Clinical Urinalysis

COURSE OUTLINE

Prerequisites

N/A

Course Description

Focuses on urinalysis studies including physical and chemical properties, microscopic techniques. Emphasizes the significance of abnormal results. Discusses collection and analysis of body fluids, including cerebrospinal fluid, synovial joint fluid, and amniotic fluid along with cell counting in these fluids.

Semester Credits: 2

Lecture Hours: 1

Lab/Clinical/Internship Hours: 3

Required Materials

Textbook: Graff's Textbook of Urinalysis and Body Fluids. Lillian A. Mundt & Kristy Shanahan. 3rd Edition.
ISBN: 9781496320162

Course Outcomes

At the completion of this course, the student should be able to:

- Understand the physiology and pathophysiology of the human renal and urinary systems
- Identify proper collection and storage of urine samples
- Explain how to instruct a patient on collection and storage of specimens
- Manually perform a complete urinalysis including macroscopic and microscopic examinations
- Correlate chemical reactions in urine tests to urine dipstick methodology
- Interpret the results of a urine dipstick test, realizing that there are several different brands and types of dipsticks available
- Correlate an abnormal dipstick result to a possible clinical condition, such as the presence of blood cells or hemoglobin in the urine or the presence of proteins in the urine
- Accurately identify types of cells that can appear in urine, including red and white blood cells and epithelial cells
- Accurately identify types of renal casts that can appear in urine, and be able to correlate the appearance of casts to various disease states
- Identify the presence of bacteria and parasites in the urine and be able to correctly identify the types of parasites
- Differentiate normal urine artifacts and contaminants such as fibers from abnormal urine constituents
- Identify and differentiate acidic and basic urine crystals and amorphous solids
- Explain types of automation used to perform urinalysis and understand the protocols for proper instrument quality control
- Perform and calculate results of manual cell counts for body fluids
- Use knowledge base to evaluate cerebrospinal, synovial, and amniotic fluids test results

Topics

I: Urinary System Anatomy and Physiology and Urine Formation

- Renal Anatomy; Anatomy and Physiology of the Nephron
- Renal Blood Flow and the Glomerulus
- The Formation of Urine; Tubular Reabsorption; Tubular Secretion
- Hormonal Effects on the Kidney and on Urine Production
- Final Urine Volume and Composition
- Assessing Renal Function
- Assessing Glomerular Filtration Rate Using Creatinine Clearance Testing
- Classifying the Stages of Chronic Kidney Disease with the GFR
- Additional Test to assess Kidney Function
- Assessing Renal Secretory Function

II: Collection and Preservation of Urine

- Specimen Collection Methods
- Nonsterile Urine Collection Methods
- Sterile and Near Sterile Urine Collection Methods
- Urine Collection Systems
- Unacceptable Urine Collection Methods
- Timing of Collection
- Specimen Preservation
- Preservatives

III: Urinalysis Clinical Laboratory Operations

- Federal Regulations and Regulatory Organizations
- Laboratory Standards
- Quality Assessment
- Safety in the Clinical Laboratory
- Physical Hazards
- Electrical Hazards
- Fire/Explosive Hazards
- Chemical Hazards

IV: Microscopy

- The Microscope
- Components of a Microscope
- Types of Microscopy
- Adjustments to Illumination
- Methods to Increase Contrast
- Care and Preventive Maintenance

V: Physical Examination of Urine

- Urine Color
- Urine Clarity
- Miscellaneous: Foam and Odor
- Urine Concentration/Specific Gravity
- Examination Methods

VI: Chemical Analysis of Urine

- Urinary pH
- Urinary Protein
- Glucose and Other Reducing Substances
- Clinitest Procedure
- Urine Ketones
- Reagent Test Strips
- Acetest Tablets
- Occult Blood
- Myoglobinuria
- False Positive and False Negative Reagent Test Strips Results
- Bilirubin Testing/Ictotest
- Urobilinogen
- Nitrites
- Leukocyte Esterase Test
- Additional Urine Reagent Strip Tests

VII: Microscopic Examination of Urine Sediment I

- Sediment Preparation
- Microscopic Observation and Enumeration
- Cells

VIII: Microscopic Examination of Urine II

- Crystals
- Casts
- Miscellaneous Structures
- Artifacts and Contaminants

IX: Renal and Urinary Tract Diseases and Related Urinalysis Findings

- Anatomical Conditions Affecting the Urinary Tract
- Infections of the Lower Urinary Tract
- Urolithiasis
- Diseases of the Kidney
- Common Diseases of the Kidney: Vascular Disease and Diabetes
- Diseases Affecting the Glomerulus

- Tubular Disorders
- Tips for Categorizing Urinary Tract Diseases

X: Metabolic Diseases and Related Urinalysis Findings

- Newborn Screening
- Aminoaciduria
- Disturbances of Amino Acid Transport
- Disturbances of Amino Acid Metabolism
- Disorder of Carbohydrate Metabolism and Transport
- Fatty Acid Oxidation Disorders
- Porphyrinurias

XI: Introduction to Body Fluids

- Body Fluid Composition
- Types of Body Fluids
- Accumulation of Excess Body Fluids
- Body Fluid Collection
- Cell Counts in Body Fluids
- Cellular Morphologies and Differentials
- Crystal Analysis

XII: Cerebrospinal Fluid

- Cerebrospinal Anatomy
- Specimen Collection
- Laboratory Examination
- Chemical Analysis

XIII: Amniotic Fluid

- Anatomy and Physiology of Amniotic Fluid Formation
- Amniocentesis, Specimen Collection and Handling
- Differentiation of Amniotic Fluid from Maternal Urine

XIV: Miscellaneous Urine and Body Fluid Tests

Urine Pregnancy Tests

- Urine Eosinophils
- Bronchoalveolar Lavage and Bronchial Washings
- Ear Fluid
- Vitreous Fluid
- Other Fluids

XV: Automation in Urinalysis and Body Fluids Examination

- Rationale for Automating Urinalysis and Body Fluids

- Automated Urinalysis Systems
- Automation of Urine Pregnancy
- Automation of Fecal Occult Blood

Laboratory Topics

- Introduction and Laboratory Safety and Quality Assessment
- Specimen Collection/ Receipt, Processing, Handling, Labeling & Storage
- Automated Urinalysis- Laboratory Equipment Used in Urinalysis
- Urine Appearance- Physical Examination of Urine
- Use Refractometer and Urinometer
- Chemical Examination of Urine -Urine Dipstick Tests I
- Chemical Examination of Urine Supplemental Tests II
- Urine Sediment Microscopy I: Cells and Bacteria
- Urine Sediment Microscopy II: Crystals
- Urine Sediment Microscopy III: Casts
- Miscellaneous Urine Sediments: Artifacts and Fibers
- Gastric and Fecal Occult Blood
- Urine Pregnancy Test
- Examination of Other Body Fluids -Other Specimen Collection/ Handling/ Processing
- Cerebrospinal Fluid and Body Fluid Cell Counts

Note to Instructors