TEXAS A&M UNIVERSITY-CORPUS CHRISTI
Clinical Laboratory Science Program

Course Number & Section: BIMS 3100-001
Class Meeting Time: R 12:30-1:20 PM
Location: CI102

Instructor: Dr. Felix Omoruyi
Office: Center for Sciences 130B
Hours: T – 12:00 - 1:00 PM
W – 12:00 – 2:00 PM
R – 2:00 – 4:00 PM

Fall 2012
Office Tel.: 825-2473
Phone: 825-2473 (Office)
Email: felix.omoruyi@tamucc.edu

BIMS 3100: ESSENTIALS FOR APPLIED LAB SCIENCE
FALL 2012 SYLLABUS

COURSE DESCRIPTION
This course consist of studies of general laboratory techniques and procedures, laboratory safety and regulations, professional ethics, phlebotomy technique, microscopy and chemical examination of urine and body fluids.

LEARNING OUTCOMES
The student will be able:
- to acquire and demonstrate skills in collection of blood samples by venipuncture or capillary techniques
- to describe and develop appreciation of professional responsibility and medical ethics
- to recognize normal and abnormal findings in the physical, microscopic and chemical examination of urine and other body fluids
- to correlate urine and body fluid results with the patient’s condition
- to develop an understanding of safety measures and regulations in hospital setting
- to demonstrate proper use and care of laboratory water, balances, pipettes, glassware, and dispensers
- to discuss the procedures and documentation for quality control for specimens, methodology, reagents, control materials, instrumentation, and reporting of results

TEXT AND MATERIALS

EVALUATION: The final course grade will be based on three exams, quizzes/attendance, problem portfolio, and the comprehensive final.

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination average (2 exams)</td>
<td>50%</td>
</tr>
<tr>
<td>Problem portfolio</td>
<td>20%</td>
</tr>
<tr>
<td>Final examination (comprehensive)</td>
<td>30%</td>
</tr>
<tr>
<td></td>
<td>100%</td>
</tr>
</tbody>
</table>
**GRADES**
Specific Course and Laboratory objectives are included in the required laboratory workbook. You are expected to read the material that corresponds to the objectives as they are covered. Mastering course objectives will require that you have read the material. All questions are keyed to the specific course and lab objectives. Use these objectives to study. **Unannounced quizzes may be given throughout the course of the semester, grades for this will be included in the Problem portfolio.**

There is no provision for making up late work and/or missed exams or quizzes. A grade of zero will be entered for any late or missed exam, lab, quiz or practical due to an unexcused absence. The only **excused** absences are personal illness, immediate family medical emergency or immediate family funeral.

The following scale will be used to report grades:

- **A** 90 - 100
- **B** 80 - 89
- **C** 70 - 79
- **D** 60 - 69
- **F** below 60

**ACADEMIC HONESTY**
As stated in the University catalog, "University students are expected to conduct themselves in accordance with the highest standards of academic honesty." Therefore, cheating will not be tolerated and will result in a failing grade for the course and possible further disciplinary action by the university.

**ATTENDANCE**
Class attendance is expected. If absent from class you will be responsible for knowing the material covered. In the case of an extreme emergency causing an absence on major exam days, evidence that the absence was necessary will be required.

**DISABILITY AND VETERANS’ SERVICES**
Texas A&M University-Corpus Christi is committed to providing persons with disabilities an equal opportunity to access campus facilities, resources and programs. The ADA is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation for their disabilities. Support and accommodations are also available for returning veterans who experience cognitive and/or physical access issues in the classroom or on campus. Our Office of Disability Services arranges such support and academic accommodations. To make a request, or for more information, call (361) 825-5816 or visit the office in Driftwood 101. It is important to contact the Office of Disability Services in a timely fashion as it will take time for them to review requests and prepare accommodations and accommodation letters.
GRADE APPEALS
As stated in the Texas A&M University-Corpus Christi University Rules and Procedures (Section B [Academic Program], Part 13 [Students]: 13.02.99.C2 [Student Grade Appeals] and 13.02.99C2.01 [Student Grade Appeal Procedures]), a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is on the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, consult the University Rules and Procedures specified above (accessible through the University Rules and Procedures website at http://www.tamucc.edu/provost/university_rules/index.html). For assistance and/or guidance in the grade appeal process, students may contact the Office of Student Affairs.
<table>
<thead>
<tr>
<th>Day</th>
<th>Month</th>
<th>Date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thur</td>
<td>Aug</td>
<td>23</td>
<td>Introduction/Infection Control/Safety/First Aid</td>
</tr>
<tr>
<td>Thur</td>
<td>Aug</td>
<td>30</td>
<td>Phlebotomy Techniques</td>
</tr>
<tr>
<td>Thur</td>
<td>Sep</td>
<td>06</td>
<td>Complications, Variables &amp; Ethics</td>
</tr>
<tr>
<td>Thur</td>
<td>Sep</td>
<td>13</td>
<td>Introduction to Urinalysis/UA Quality Assurance</td>
</tr>
<tr>
<td>Thur</td>
<td>Sep</td>
<td>20</td>
<td><strong>EXAM 1</strong></td>
</tr>
<tr>
<td>Thur</td>
<td>Sep</td>
<td>27</td>
<td>Renal Function/ Urine Microscopy</td>
</tr>
<tr>
<td>Thur</td>
<td>Oct</td>
<td>04</td>
<td>UA Physical</td>
</tr>
<tr>
<td>Thur</td>
<td>Oct</td>
<td>11</td>
<td>UA Physical</td>
</tr>
<tr>
<td>Thur</td>
<td>Oct</td>
<td>18</td>
<td>UA Chemical</td>
</tr>
<tr>
<td>Thur</td>
<td>Oct</td>
<td>25</td>
<td>UA Chemical</td>
</tr>
<tr>
<td>Thur</td>
<td>Nov</td>
<td>01</td>
<td>UA Chemical</td>
</tr>
<tr>
<td>Thur</td>
<td>Nov</td>
<td>08</td>
<td>UA Chemical</td>
</tr>
<tr>
<td>Thur</td>
<td>Nov</td>
<td>15</td>
<td><strong>EXAM 2</strong></td>
</tr>
<tr>
<td>Thur</td>
<td>Nov</td>
<td>22</td>
<td>Thanksgiving Holiday</td>
</tr>
<tr>
<td>Thur</td>
<td>Nov</td>
<td>29</td>
<td>Forensic Drug Testing in Fluids</td>
</tr>
<tr>
<td>Thur</td>
<td>Dec</td>
<td>01</td>
<td>Metabolic Disorders</td>
</tr>
<tr>
<td>Tue</td>
<td>Nov</td>
<td>11</td>
<td><strong>FINAL 11:00 AM-1:30 PM</strong></td>
</tr>
</tbody>
</table>

**General Disclaimer:**
The instructor reserves the right to modify the schedule when necessary. These changes will be announced during regularly scheduled lecture periods. In case of absence during this announcement, it is the responsibility of the student to obtain the information as no effort will be made to contact students who were absent when the announcement was made.
LEARNING OUTCOMES FOR BIMS 3100: ESSENTIALS FOR APPLIED LAB SCIENCE

Infection Control/Safety/First Aid

Objective
1. Explain the measures that should be taken by fire, metrical, radiation, and chemical safety in a health care facility.
2. Identify protective measures to avoid transmission of blood borne pathogens.
3. Identify the basic program for safety, infection, control, and isolation procedures.
4. Explain the proper techniques for hand washing, gowing, gloving, masking, and interring and exiting the various isolation areas.

Phlebotomy Techniques

Objective
1. Describe differences between venipuncture and skin puncture equipment and supplies.
2. Identify the types of safety equipment needed to collect blood by venipuncture.
3. Identify the most appropriate sites for venipuncture.
4. Describe the procedure for making a blood smear.
5. Explain reasons for acquiring capillary blood specimens.

Complications, Variables & Ethics

Objective
1. List 5 factors about patients’ physical disposition that can affect blood collection and how it affects the blood sample.
2. Identify how the Preanalytical factors of syncope, hemoconcentration, IV therapy, seizure, and hemolysis affect blood collections.
3. Describe Preanalytical complications related to blood collection techniques.
4. List examples of substances that can interfere in clinical testing of blood analyses and describe methods used to prevent these interferences.
5. Identify Preanalytical complications that can arise with test request and identifications.
6. Describe which blood constituents are photosensitive or thermolable.
7. List reasons for specimen rejection.
8. List examples of policies and procedures important to phlebotomy.
Introduction to Urinalysis

Objective
1. List major chemical constituents of urine.
2. Describe a method for determining whether a questionable fluid is urine.
3. Define common terms encountered in urinalysis.
4. Discuss several methods for preserving urine specimens including their advantages and disadvantages.
5. Recognize normal and abnormal daily urine volumes.
6. Describe the type of specimen needed to obtain optimal results when a specific urinalysis procedure is requested.
7. List changes that may occur in a urine specimen that remains at RT for more than 2 hrs.

Quality Assurance in Urinalysis

Objective
1. Discuss procedures and documentation for quality control.
2. Describe the difference between quality assurance and quality control.
3. Describe post-analytical, analytical and preanalytical elements of urinalysis and describe effects of each on urine specimens.
4. Define accuracy and precision
5. Describe procedures and documentation for instrumentation the urinalysis laboratory.
7. Evaluate the differences between external Quality Control and internal Quality Control.
8. Describe CQI and TQM.

Renal Function

Objective
1. Discuss physiologic mechanisms of glomerulus filtration tubular resorption, tubular secretion, and renal blood flow.
2. Identify lab procedures used to evaluate these 4 renal functions.
3. Differentiate between indigenous and exogenous procedures.
4. Describe the advantages and disadvantages in using, urea, inulin, creatinine, B2 microglobulin and radionucleotides for the measurement of glomerular filtration.
5. Calculate creatinine clearance and determine if results are normal
6. Define osmolarity and discuss its relationship to urine concentration
7. Describe basic principles of clinical osmometers.
8. Calculate a PAH clearance and relate this to renal blood flow.
9. Describe the relationship of urinary ammonia and titratable acidity to the production of acidic urine.
Urine Microscopy

**Objective**
1. Differentiate among phase contrast, interference-contrast, and polarized microscopy.
2. Discuss methods used for the standardization of microscopic exams.
3. Correlate physical and chemical urinalysis results with microscopic observations.
4. Discuss the significance of RBC’s, WBC’s and cast urinalyses sediment.
5. Name and describe normal crystals found in acidic urine and alkaline urine.
6. State the significance of cystine, leucine, tyrosine, cholestrol, sulfonamide, x-ray dye, acyclovir and ampicillin crystals.
7. Explain how casts can be formed and include major proteins found in casts.
8. Name and describe 3 types of epithelial cells found in urinary sediment.
9. List normal values for RBCs, WBCs and hyaline casts.
10. Differentiate between RBCs, yeast and oil droplets.

Physical Properties of Urine

**Objective**
1. Discuss the relationship of urochrome to normal urine color.
2. Discuss the significance of cloudy urine and clear red urine.
3. Name 2 pathologic causes of black or brown urine.
4. List common terminology used to report normal and abnormal urine color.
5. Discuss the significance of pyridium in a specimen.
7. Define specific gravity and explain why this measurement can be significant in routine urinalysis.
8. Name 2 non-pathogenic causes of abnormally high specific gravity readings.

Chemical Properties of Urine

**Objective**
1. Describe proper technique for performing chemical test on urine by reagent strip and give possible errors if technique isn’t followed.
2. Use several causes of premature derivation of reagent strips and how to avoid them.
3. Name 2 reasons for measuring urines PH and discuss their clinical applications.
4. Discuss the principle of PH testing by reagent strip.
5. Describe 3 renal causes of proteinuria and 2 non-renal reasons for proteinuria.
6. Name a confirmatory test for urine protein and name sources of error associated with the procedure.
7. State the renal threshold urine for glucose
8. Describe the principle of the glucose oxidase method of reagent strip testing for glucose and name possible causes of interference with this method.

9. Describe the copper reaction method for detection of urinary reducing substance and list causes of interference.

10. Name 3 reasons for the appearance of ketonuria

11. List the 3 “ketone bodies” appearing in urine and describe their measurements by the sodium nitroprusside reaction and causes of interference.

12. Differentiate between hematuria and hemoglobinuria and explain the clinical significance.

13. Describe the chemical principle of the reagent strip method for blood testing.

14. Describe the degradation of hemoglobin.

15. Describe the relationship of urinary bilirubin and urobilinogen to the diagnosis of bile duct obstruction, liver disease, and hemolytic disorders.

16. Discuss the principle of oxidation test and diazotization test for urinary bilirubin.

17. Explain the advantage of performing an Ictotest for detection of urine bilirubin.

18. Describe the Watson-Schwartz test used to differentiate between urobilinogen, porphobilinogen, and Ehrlich-reactive compounds.

19. Discuss the principle of the nitrite reagent strips test for bacturia.

20. List survival causes of false negative result in the reagent strip test for nitrite.

21. Compare reagent strip testing for urine specific gravity with refractometer and urinometer testing.

22. Describe the principle of the reagent strip test for leukocytes.

23. Discuss the advantages and disadvantages of the reagent strip test for leukocytes.

### Forensic Drug Testing

**Objective**

1. Define the term toxicology.

2. List the major toxicants.

3. Define the pathologic mechanisms of the major toxicants.

4. Discuss the laboratory methods used to evaluate toxicity.

5. Explain the difference between quantitative and qualitative tests in toxicology.

6. Explain why it may not be important to measure free drug concentrations and metabolites.

7. Describe the NIDA -5 drugs and the process by which they are measured.

8. List commonly used antidotes.

9. Explain key differences between a clinical a clinical laboratory and a forensic laboratory.
Metabolic Disorders

Objective
1. Explain the abnormal accumulation of metabolites in the urine in terms of over flow and renal disorders.
2. Name the metabolic defect in phenylketounria and describe the clinical manifestations it produces.
3. Describe the test used in the detection of PICU.
4. Describe screening test for urinary tyrosine and its metabolites how its presence can be determined.
5. Name the abnormal urinary substance in alkaptonuria and state how its presence can be determined.
6. State the clinical significance of branched chain amino acid disorders.
7. Define porphyria and how it correlates to heme production pathway.
8. Define mucopolysaccharidosis and how these diseases are detected.
9. Explain reasons for performing test for urinary reducing substances on all newborns.

GENERAL DISCLAIMER:
The instructor reserves the right to modify the schedule when necessary. These changes will be announced during regularly scheduled lecture periods. In case of absence during this announcement, it is the responsibility of the student to obtain the information as no effort will be made to contact students who were absent when the announcement was made.