ACADEMIC AFFAIRS

Course Number: CLLS-203   Department: Clinical Lab Science

Course Title: Principles of Analyses   Semester: Spring   Year: 2014

Objectives/Competencies

Course Objective	Competencies
1. Students will comprehend and apply safety rules and policies in all areas of the laboratory. (CLLS-103)	• List all rules of safety and proper apply them while performing student laboratory exercises.
2. Review the basics of laboratory glassware and its uses (CLLS-101)	• Identify two methods used to produce clinical laboratory-grade water for use in the clinical laboratory • Identify four types of glassware available for laboratory use • Identify four types of plastics used in laboratory plasticware • Define the following terms: to contain (TC), to deliver (TD) in reference to types of pipettes,
3. Review the principles and uses of basic laboratory equipment (CLLS-101)	• Distinguish swinging-bucket, fixed angle-head, and ultra centrifuges from one another • Cite three types of balances used to weigh substances in the laboratory • Identify three alternative thermometers that do not contain mercury • Identify a source of calibration material for balances, thermometers, and pipettes
4. Review the basics of laboratory mathematics (CLLS-101)	• Correctly complete the mathematical calculations presented in this unit and report results with the appropriate significant digits • Convert results from one unit format to another

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	• Calculate the volumes required to prepare a 1:2, 1:5, and 1:10 dilution.
5. Learn and practice laboratory mathematics as the apply to solutions prepared and used in the laboratory	• Calculate molarity, molality, normality, and percent solution in given examples
6. List the different levels of technology available and explain the advantages to adding technology to the modern laboratory	• List four advantages of automated analysis • Define the following terms: throughput, test menu, carryover, discrete testing, random-access testing, open-reagent analyzer, and closed-reagent analyzer • Distinguish the three stages of laboratory testing from one another • Identify five laboratory tasks associated with the pre-analytical stages of laboratory testing • Give examples of how automated analyzer performs the following functions: ▪ Mixing, incubating, transfer of reagents • List three drawbacks of total laboratory automation • Distinguish between workstation and work cell • Identify three tasks associated with the post-analytical stage of laboratory testing
7. Understand the basic principles of instrumentation used in the Clinical laboratory.	• Identify three types of light scatter • Diagram the correct sequence of significant components of a spectrophotometer • Explain how the absorbance and transmittance of light are related • List several major instrument components for the following analyzers: o Spectrophotometer, Flurometer, Nephelometer, Mass spectrometer, Gas chromatograph, and Densitometer • List four spectrophotometric function checks • Define the following terms associated with electrochemical

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	methods: potentiometer, amperometry, coulometry, conductance, resistivitiy, and voltammetry • Recognize the Nernst equation • Identify four examples of separation techniques used in the clinical laboratory • Explain the fundamental principles of selected instruments in this unit • Identify specific analyte(s) that are measured by each device or instrument
8. Understand the basic principles of immunoassays and their uses in the clinical laboratory	• *Define the terms: antigen, antibody, immunogen, and hapten* • Identify five specific examples of labels used in immunoassays • Identify five specific examples of solid-phase material used to bind antibodies • Explain the differences between competitive immunoassays and non-competitive (sandwich) immunoassays • Distinguish homogeneous immunoassays from heterogeneous immunoassays • Explain the fundamental differences among enzyme, fluorescent, and chemiluminescent immunoassays • Explain the principles of the reactions for the following immunoassays: EMIT, FPIA, LOCI
9. Explain the importance of Quality Control in the clinical laboratory	• Define "accuracy" and " precision" • Describe a Gaussian distribution. • Identify three types of error. • Identify five factors to consider when selecting quality control material.

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10. List the tools used to define quality and demonstrate their use as applied to clinical data in the laboratory.	• Explain the characteristics of a Levey-Jenning chart and include x- and y- axis labels. • Explain each Westgard rule violation • Distinguish between a random and systematic error • Interpret the results of selected laboratory statistics • Calculate selected statistics • Explain the models for CQI, TQM, and Six Sigma quality programs • Give one example of how a problem is identified and solved based on each of the programs listed above.

11. Students will adhere to all affective behavioral objectives	**1. Safety**
	  a. Comply with all established laboratory safety regulations including:
	      i. Standard precautions including PPE use and handwashing.
	     ii. Practice proper handling and disposal of biohazardous materials.
	    iii. Proper handling and disposal of sharps.
	    iv. Exercise proper safety practices when using all laboratory equipment, reagents and chemicals.
	  b. Comply with established departmental dress code.
	
	2. Work Practices and Organization
	  a. Adhere to department attendance policies by arrive to lecture/ laboratory at the expected time, as denoted in the course syllabus.
	  b. Follow all written instructions.
	  c. Actively listen to verbal instructions.
	  d. Ask quality questions (clarifying, analytical and related to task).
	  e. Submit neat, legible, organized and complete assignments.
	  f. Demonstrate effective time management and complete all tasks within the assignment time frame.
	  g. Keep all laboratory work areas neat, clean and in order.
	  h. Properly care for and use all laboratory equipment.

Course Objective	Competencies

	i. Achieve competency and independence in performance of all demonstrated lab skills.
	
	3. Cooperation and Teamwork
	  a. Actively participate in class activities and discussions by:
	      i. Effectively communicating with class members.
	      ii. Showing respect and consideration for other students and instructors.
	      iii. Willing to share ideas and equally contribute to assigned tasks.
	  b. In laboratory sessions:
	      i. Share resources and equipment.
	      ii. Work cooperatively by adjusting work style and speed.
	      iii. Discuss equitable task allocation and organization prior to performing.
	
	4. Ethics and Professionalism
	  a. Respond maturely to constructive criticism and instruction and make appropriate modifications.
	  b. Seek advice when necessary, admitting limitations when appropriate.
	  c. Recognize and admitting errors.
	  d. Maintain patient confidentiality according to HIPPA regulations.
	  e. Communicate using appropriate terminology and professional procedures.
	  f. Display calm demeanor in all circumstances and maintain work quality under stress.
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