COURSE OUTLINE

Course Number: MLT 112
Course Title: INTRODUCTION TO MEDICAL LABORATORY TECHNOLOGY
Credits: 3
Hours: 2 Lecture/3 Lab
Pre-requisite: Bio 102 or 104
Or permission of instructor
Summer A 2017

Catalog description: Basic principles, techniques and vocabulary applicable to medical laboratory technology. Overviews professional societies and major regulatory agencies; reviews safety practices within the laboratory that follow OSHA Standards, emphasizing specimen collection and preservation; phlebotomy and venipuncture procedures; introduction to serology; urinalysis and clinical microscopy; and lab information systems. The lab component develops laboratory skills related to lecture topics.

Course Modifications: 05/2017

Required Text:
Title: CLINICAL LABORATORY SCIENCE: The Basics and Routine Techniques
Author: Mary Louise Turgeon

Course Instructor:
Lisa M Shave MLS(ASCP)CMBBCM
Office hours: Mondays 9-Noon & Wednesdays 1pm-3pm OR By Appointment
Phone: 609-570-3378
Email: shavel@mccc.edu
Course Goals & Competencies

The student will be able to:

1. Identify the role of a medical laboratory professional in providing laboratory data that is used in the assessment of health and disease.
2. Develop an awareness of medical ethics and its application to the practice of health care.
3. Demonstrate knowledge of the major laboratory disciplines and basic laboratory techniques including specimen collection and preservation, laboratory safety, microscopy and the function of laboratory information systems.
4. Explain the value of using quality assurance programs in providing accurate and precise laboratory data.
5. Apply knowledge of phlebotomy and renal physiology to the collection and evaluation of body fluid samples.
6. Demonstrate competent laboratory skills in the preparation and analysis of clinical laboratory samples.
7. Demonstrate knowledge of the Immune System and how it applies to specimen analysis is Immunology and Serology
8. Describe the basic function of each of the major disciplines of Clinical Laboratory Science: hematology/coagulation, immunohematology, chemistry and microbiology.

MCCC’s General Education Knowledge Goals and Core Skills

Course’s General Education Knowledge Goals

Goal 1. Communication. Students will communicate effectively in both speech and writing.
Goal 2. Mathematics. Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.
Goal 8. Diversity. Students will understand the importance of a global perspective and culturally diverse peoples.

MCCC Core Competency Skills

A. Written and Oral Communication in English. Students will communicate effectively in speech and writing, and demonstrate proficiency in reading.
B. Critical Thinking and Problem-solving. Students will use critical thinking and problem solving skills in analyzing information.
C. Ethical Decision-Making. Students will recognize, analyze and assess ethical issues and situations.
D. Information Literacy. Students will recognize when information is needed and have the knowledge and skills to locate, evaluate, and effectively use information for college level work.
F. Collaboration and Cooperation. Students will develop the interpersonal skills required for effective performance in group situations.
Week of study:

Unit 1 Medical Laboratory Profession and Basic Laboratory Techniques

Learning Objectives
The student should be able to:

1. Give an overview of the practice of a medical laboratory professional. (CG1)
2. List professional societies associated with clinical laboratory science, stating each society’s continuing education policy. (CG1)
3. Differentiate the terms: accreditation, certification, and licensure. (CG1)
4. Identify CLIA regulations involving clinical lab certification as waived, physician-performed microscopy, moderate or high complexity testing laboratories. (CG1)
5. Demonstrate knowledge and application of the Principles of the Right to Know Act and the Bloodborne Pathogens Act. (CG2)
6. Demonstrate the proper use of safety equipment used in the lab and relate its use in following guidelines set by OSHA for standard precautions. (CG2)
7. Recognize the signs and symbols used to signify potential contact with radiation, carcinogens, poisons, biohazards, and flammable substances. (CG2)
8. Compare and contrast the function and operation of a hospital laboratory and a research laboratory. (CG1)
9. Identify the metric units of measurement for weight, length, volume, temperature. (CG2)
10. Explain the purpose of using a quality assurance program in the laboratory. (CG3)
11. Compare controls and standards understanding the function of each. (CG3)
12. List the overall function of a Laboratory Information System as it relates to pre-analytic, analytic and post-analytic function in a laboratory. (CG2, GE4)
13. Explain the correlation of a LIS interfacing with laboratory instruments and to the Hospital Information System or outreach centers. (CG2, GE4)

Psychomotor Performance Objectives:

14. Demonstrate the techniques of using flasks, graduated cylinders, pipettes, and centrifuges in the preparation of solutions, aliquots, and dilutions prepared in the clinical laboratory. (CG2)
15. Calculate problems using the metric system of measurement. (CG2, GE2, B)
16. Calculate and perform dilution procedures. (CG2, GE2, B)
17. Construct a Levy-Jennings quality control chart. (CG3, GE2, B)
18. Given test values, calculate the mean, mode, and standard deviation of the data. (CG3, GE2)
19. Develop and evaluate quality control charts. Be knowledgeable of laboratory statistics differentiating standards, and controls, standard deviations, random and systematic errors. (CG3, GE2, B)
20. Identify the various parts of the compound microscope and describe the function of each part. (CG2)
21. Compare the function and operation of a compound microscope, a fluorescent microscope and a polarizing microscope. (CG2)
22. Demonstrate the proper care and maintenance of a microscope. (CG2)
Unit 2: The Theory and Practice of Phlebotomy

Learning Objectives
The student learner should be able to:

1. Discuss the skills needed to properly perform venipuncture and capillary blood collection techniques. (CG4)
2. Identify the equipment found on a phlebotomy tray. (CG4)
3. Identify common anticoagulants and additives used to preserve blood specimens. (CG4)
4. Demonstrate knowledge of the color coding system for evacuated tubes. (CG4)
5. Value the importance of accurate patient identification, discuss HIPAA and respect patient confidentiality. (CG4, GE9, C)
6. Discuss medical ethics, define law, consent, confidentiality, and liability. (CG6, GE9, C)
7. State the difference between informed consent and implied consent. (CG6, GE9, C)
8. Centrifuge a blood sample – understand the terms: hemolysis, lipemia, bilirubinemia. (CG2)
9. Define the term: Point of Care Testing and state examples of test procedures performed at the patient’s bedside. (CG2, GE E)
10. Discuss a patient’s bill of rights. (CG6, GE9, C)
11. Review the professional code of ethics for Medical Laboratory Professionals (CG6, GE9, C)
12. In group settings, discuss behavioral changes and age related issues as they pertain to the practice of phlebotomy. (CG4, GE8, F)

Psychomotor Performance Objectives:

13. In group settings and as partners, practice performing venipuncture and capillary procedures applying standard practices and guidelines. (CG4,5, GE8, F)
14. Observe and discuss techniques for collecting samples from newborns. (CG4, GE8)
15. Perform a point of care glucometer test procedure and recognize the laboratory’s role for quality assurance in point of care testing. (CG3,4, GE4, E)
16. Review videos on Blood Collection Techniques observing CDC guidelines used for safety. (CG2,4)

Unit 3: The Urinary System

Learning Objectives
The student learner should be able to:

1. Identify the anatomy of the kidney and the physiology of the renal system. (CG4)
2. Explain renal physiology including the principles of filtration, re-absorption and secretion. (CG4)
3. Describe the physical characteristics of urine and correlate abnormal physical characteristics to common clinical conditions or disease. (CG4)
4. Describe the chemical properties of urine that are tested in each area of reagent strip testing. (CG4)
5. Apply the principle of each test strip area and correlate abnormal results with common clinical conditions or disease. (CG4)
6. Recognize, identify, and evaluate organized and unorganized sediment from stained and unstained preps in a urine microscopic exam. (CG2,4,5, GE4, B)
7. Correlate physical, chemical, and microscopic findings and recognize discrepancies. (CG4)
8. Identify common kidney diseases and correlate the disease with expected laboratory data results. (CG4, GEB)
9. Analyze case studies in urinalysis correlating laboratory data to normal and abnormal clinical diagnosis. (CG4, GEB)
10. State the principle of reflectance. (CG2)

**Psychomotor Performance Objectives:**

11. Following standard practices perform the physical, chemical, and microscopic analyses of urinalysis samples. (CG4,5, GE4, E)
12. Operate a clinical instrument for urinalysis including quality control assessment and recognizing a need for basic maintenance and troubleshooting. (CG3,5, GE4, E)
13. Identify urinary sediment constituents on kodachrome slide and/or diagrams. (CG4)
14. Perform quality control procedures in urinalysis using the Kova system and controls. (CG3,5)
15. Review the Clinitek procedure manual for basic troubleshooting of the instrument. (CG2)
16. In timed laboratory practicals, students will perform phlebotomy techniques exhibiting good communication skills and perform urinalysis testing and evaluation. (CG2,4,5, GE1,4,8,A,B,F)

**Unit 4: The Immune System**

**Learning Objectives**

The student learner should be able to:

1. Discuss and compare the body’s innate and adaptive immune systems. (CG6)
2. Identify characteristics and properties of immunoglobin classes. (CG6)
3. Compare the description and function of cells associated with the immune response. (CG6)
4. State the characteristics and properties of antigens. (CG6)
5. State the characteristics and properties of antibodies. (CG6)
6. Explain the role of the MHC in the immune response. (CG6)
7. Compare the primary and secondary response of immune system. (CG6)
8. Describe the four classifications of hypersensitivity. (CG6)
9. List the components of complement. (CG6)
10. Differentiate between the classical and alternate pathways of complement activation. (CG6)
11. Explain the biological functions of complement. (CG6)
12. Differentiate between active and passive immunity, correlate the types of immunity received from vaccines, toxoids, attenuated bacteria, antitoxins and gamma globulin. (CG6)
Psychomotor Performance Objectives:

13. Observe demonstration of ANA procedure and identify positive cells on the fluorescent microscope. Distinguish between homogeneous and speckled patterns.
14. Demonstrate competency is performing latex agglutination testing for Rheumatoid Factor.
15. Successfully screen a patient sample for syphilis using the RPR kit.

Unit 5: Information Technology.

Learning Objectives
The student should be able to:

1. Attend an Information Literacy session developed and presented by the MCCC Library staff. (CG1,7, GE4, D)
2. Demonstrate the ability to locate reliable primary information resources using a web browser. (CG1, GE4, D)
3. Access the MCCC Library webpage developed for the MLT program. (CG1)
4. Access internet websites for the professional societies of clinical laboratory science. (CG1, GED)

Psychomotor Performance Objectives:

5. Locate one article from a professional scholarly/peer reviewed journal on the topic of ‘Ethics in Healthcare” (CG7, GE4,9,D)
6. Critique the above mentioned article on Ethics following guidelines discussed in class. (CG7, GE1,9,D)

Laboratory Competency Skills
Students will be accessed in the laboratory for competence in technical skills, understanding procedures and display of professional attributes. Timed laboratory practical exams measure the student’s mastery of entry level, basic laboratory techniques. Laboratory Competency in the affective domain will be evaluated on the student’s ability to 1) follow instructions and safety protocol, 2) display professionalism and 3) use good communication skills.

Grading:
To receive a passing grade, students must earn a 77 or higher. A final grade of 77 or higher is required in each Medical Laboratory Technology course in order to progress to the next MLT course and to graduate. No make-up exams are to be given unless there are extenuating circumstances.

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**Affective Objectives**

Affective objectives are behavioral standards that will be implemented during the professional phase of the Medical Laboratory Technology Program. Students will be evaluated by faculty using these standards throughout the course. Unsatisfactory performance in any area of the behavioral standards will require a consultation with the faculty and/or the MLT Program coordinator. The reason for the consultation will be clearly stated, counsel will be given and an action plan will be implemented. The student will be given the opportunity to give a written response. The consultation form will be kept in the student’s file.

**Affective Scoring based on Professional Performance**

Affective objectives are behavioral standards that will be implemented during the professional phase of the Medical Laboratory Technology Program. Students will be evaluated by faculty using these standards throughout the course. The student is evaluated on the demonstration of performance that reflects achievement of important objectives for medical laboratory technicians. This professional performance will be evaluated during the laboratory course and will be returned to the student with their all laboratory worksheets submitted. See the last page for a detailed list of the criteria.

**PROFESSIONAL PERFORMANCE EVALUATION**

1. **DEPENDABILITY**
   The student arrives in the laboratory with adequate time to start lab session as scheduled. The student comes with appropriate manual and supplies, and wearing required laboratory attire. The student shows evidence of having reviewed the assigned topic before coming to the laboratory. The student completes assignments (lab reports, homework assignments, etc) on time.

2. **ATTENTIVENESS**
   The student is attentive to the instructor, takes complete notes and proceeds with laboratory work without repeated instructions. The student follows verbal and written instructions, asks pertinent questions when necessary, and seeks the instructor’s assistance when needed. The student neither distracts others nor allows distractions to affect completion of laboratory exercises.

3. **ORGANIZATION**
   The student demonstrates the ability to organize work to be done within the available laboratory time. The student is able to perform multiple tasks without jeopardizing accuracy and precision.

4. **INDEPENDENCE**
   The student demonstrates the ability to work independently by exercising independent judgement and thinking logically in using the protocols and instructions given. The student draws on previously gained information to solve problems without prompting from instructor. The student seeks activities to expand knowledge, ability and performance.
5. **RECORD KEEPING**
   The student demonstrates the importance or proper record keeping by accurately and legibly labeling/recording laboratory work and reports (i.e. sample containers, reagents and worksheets).

6. **MANAGEMENT AND ECONOMY**
   The student conserves reagents and supplies. The student maintains an adequate supply of common use items at their appropriate workstation. The student takes proper care of equipment.

7. **SAFETY**
   The student works in an orderly and safe manner, enabling others to safely work in the same general area. The student adheres to the guidelines of the Laboratory Safety Regulations (e.g. wearing eye protection, keeping long hair tied back, and properly storing hazardous materials).

8. **INTERPERSONAL SKILLS**
   The student communicates in a professional, positive, tactful manner with peers and instructors. The student consistently shows common courtesy (e.g. restocks supplies) and contributes towards achieving an environment conducive to work and learning for self and others.

9. **COMPOSURE**
   The student maintains composure and work quality under stressful conditions and adapts quickly to new situations. The student recognizes his/her own personal strengths and weaknesses and works positively within that framework. The student accepts evaluation of performance as constructive when offered by instructors and follows through with suggestions made.

10. **INTEGRITY**
    The student accepts accountability for work performed. The student readily admits errors, follows procedures (including quality control) as written, and maintains confidentiality of patient results, if applicable. Student exhibits perseverance to obtain accurate results.

**Scoring:**
Total number of possible points = # of weeks x # of categories x 4 (Greatest achievable score) = # Achieved points = student scores: Total of numbers each week (#4s + #3s + #2s + #1s)

**Cut off values:**
- Upper cut-off value = 0.675n;
- lower cut-off value = 0.425n

**How your Final Grade can be Affected**
- IF a > 0.675n, then the course grade is increased one step (e.g., from C to C+);
- If a is between 0.425n and 0.675n, then the course grade is unaffected (e.g., C remains C);
- If a < 0.425(n), then the course grade is decreased one step (e.g., C to C-).

If course grade remains within range: student will receive full credit for affective score.

**Progression in the MLT Professional Courses**
As noted in the course handbook, a final grade of a C+ or better in each Medical Laboratory Technology course is necessary to progress to the next professional phase course.

**Unsatisfactory Performance**
Unsatisfactory performance in any area (cognitive, psychomotor or affective), failure to follow directions or procedures, unsafe or unethical behavior, or failure to keep a grade of 77 or above in the
course will require a consultation with the faculty and/or the MLT Program coordinator. The reason for the consultation will be clearly stated, counsel will be given and an action plan will be implemented. The student will be given the opportunity to give a written response. The consultation form will be kept in the student’s file and progress must be made by following the plan of action.

**Attendance Policy**

Students are expected to attend all lecture and laboratory sessions. If an absence is anticipated, please E-mail shovel@mccc.edu or call/leave a message at my office 609-570-3387. The student is responsible for any material missed. For any missed labs, the student will receive a zero as a participation and assignment grade for that day; there is no chance to make-up labs.

**Academic Integrity Statement:**

Mercer County Community College is committed to a policy of Academic Integrity. Students are responsible for observing this policy by representing all work in the form of quizzes, assignments, tests and laboratory evaluation or reports, as their own. Cheating can include plagiarism, looking or copying from another person’s test or quiz; looking at notes during a test or quiz, or talking during an examination, or engaging in cell phone activity. The student found cheating on any type of an evaluation will receive a grade of a zero for that evaluation activity. Cheating is not tolerated and all incidents of cheating will be reported to the Academic Integrity Committee.

The MCCC Academic Integrity Statement is posted on the MCCC website.

**Support Services for Differing Abilities**

Mercer County Community College is in compliance with both the ADA and section 504 of the Rehabilitation Act. If you have, or believe you have, a differing ability that is protected under the law please contact Arlene Stinson in LB 216, 609 570-3525, stinsona@mccc.edu for information regarding support services.

If you do not have a documented differing ability, other support services are available to all students on campus including the Learning Center located in LB 214

Note: *Students must seek out help from this department and alert the instructor of the accommodation(s) prior to the start of the course. We CANNOT make the accommodations AFTER the course has started.*

**OTHER NOTES:**

**KAHOOT**

The instructors may use short 5-10 question quizzes at the beginning of class to evaluate student understanding of the homework assignments and some class meeting content. To make these assessments more enjoyable for the students, we will use the Kahoot game-based web/mobile application to administer the quizzes. To earn participation credit, students must log on to Kahootit.com from any tablet, smartphone or laptop and enter in a NICKNAME.

For more information, visit kahoot.it.com
**LECTURE SCHEDULE**

**WEEK 1**  
(5/23/17)  (Tues)  *Clinical Laboratory Science – the Profession (Chapters 1, 2, 10)*  
History of Medical Technology  
Medical Ethics  
Lab Layout/Safety  
Computer Technology & Laboratory Information Systems (LIS)  

(5/25/17)  (Thurs)  *Specimen Collection & Phlebotomy (Chpt 3)*

**Week 2**  
(5/31/17)  (Tues)  *Week 1 Homework Due*  
*Quiz 1 (Covering Week 1)*  
Laboratory Equipment (Chpts. 4, 5, 6, 7, 8)  
Laboratory Measurements/Lab Math/QA/QC  
Equipment and Reagents  
Microscope  

(6/1/17)  (Thurs)  *Molecular Techniques (Ch. 8 + Supplementary Material)*

**Week 3**  
(6/6/17)  (Tues)  *Week 2 Homework Due*  
*Quiz 2 (Covering Week 2)*  
Anatomy of the Urinary Tract System (Chpt. 14)  
Physical and Chemical Properties of Urine  
Confirmatory Tests  

(6/8/17)  (Thurs)  *Clinical Pathologies and Microscopic Properties of urine*

**Week 4**  
(6/13/17)  (Tues)  *Mid-Term (covering weeks 1-3)*  
The Immune System & the Immune Response (Chpt. 17)  

(6/15/17)  (Thurs)  *Principles of Immunological and Serological Methods*

**Week 5**  
(6/20/17)  (Tues)  *Week 4 Homework Due*  
*Quiz 3 (covering week 4)*  
Hematology (Flow Cytometry, Coagulation), Immunohematology (Chpt 12, 13, 18)  

(6/22/17)  (Thurs)  *Chemistry, Microbiology, Body fluids & POC testing overview (Chpts. 9, 11, 15, 16)*

**Week 6**  
(6/27/17)  (Tues)  *Cumulative Final exam*
LABORATORY SCHEDULE

**WEEK 1**
(5/23/17) (Tues) **Information Literacy Session – MCCC Library**

(5/25/17) (Thurs) **Introduction to Phlebotomy**
Capillary Collection & Intro into Venipuncture

**Week 2**
(5/31/17) (Tues) **More Phlebotomy**
Venipuncture Assessment; Practice with Butterfly (time allotting)

(6/1/17) (Thurs) **Glassware, Microscope, Centrifuge Explanation**
Introduction to Pipetting

**Week 3**
(6/6/17) (Tues) **Quiz 2 (Covering Phlebotomy & Equipment)**
Physical, Chemical & Confirmatory Testing of Urine

(6/8/17) (Thurs) **Microscopic Examination of Urine**

**Week 4**
(6/13/17) (Tues) **Mid-Term Practicum (covering weeks 1-3)**

(6/15/17) (Thurs) **Lab Techniques in Immunology and Serology**
Precipitation, Flocculation and Agglutination assays
ANA Testing

**Week 5**
(6/20/17) (Tues) **Body Fluid Analysis/Intro to Blood Typing (Slide method)/Micro Plate Streaking**

(6/22/17) (Thurs) **Laboratory/POCT Tour** **LAB TIME ADJUSTMENT**

**Week 6**
(6/27/17) (Tues) Optional Review Session

(6/29/17) (Thurs) **Cumulative Final exam**