



INSTRUCTIONAL PACKAGE

MLT 102
Medical Laboratory Fundamentals

Effective Term
Fall 2024/Spring 2025/Summer 2025

INSTRUCTIONAL PACKAGE

Part I: Course Information

Effective Term: Fall 2024/Spring 2025/Summer 2025

COURSE PREFIX: MLT 102

COURSE TITLE: Medical Laboratory Fundamentals

CONTACT HOURS: 5 hours

CREDIT HOURS: 3 hours

RATIONALE FOR THE COURSE:

This course introduces laboratory medicine, including techniques for routine laboratory procedures, medical terminology, safety, and an overview of each area within the laboratory.

COURSE DESCRIPTION:

This course introduces laboratory medicine, including techniques for routine laboratory procedures, medical terminology, safety, and an overview of each area within the laboratory.

PREREQUISITES/CO-REQUISITES:

Co-Req or Pre-Req MLT 105, ENG 101, MAT 120, BIO 112, or Bio 210 with a minimum grade of C

REQUIRED MATERIALS:

Please visit the [BOOKSTORE](#) online site for most current textbook information.

Enter the semester, course prefix, number and section when prompted and you will be linked to the correct textbook.

TECHNICAL REQUIREMENTS:

Access to Desire2Learn (D2L), HGTC's learning management system (LMS) used for course materials.

Access to myHGTC portal for student self-services.

College email access – this is the college's primary official form of communication.

STUDENT IDENTIFICATION VERIFICATION:

Students enrolled in online courses will be required to participate in a minimum of one (1) proctored assignment and/or one (1) virtual event to support student identification verification. Please refer to your Instructor Information Sheet for information regarding this requirement.

CLASSROOM ETIQUETTE:

As a matter of courtesy to other students and your professor, please turn off cell phones and other communication/entertainment devices before class begins. If you are monitoring for an emergency, please notify your professor prior to class and switch cell phone ringers to vibrate.

Part II: Student Learning Outcomes**COURSE LEARNING OUTCOMES and ASSESSMENTS*:**

After successful completion of this course, the student will be able to meet the following terminal behavior outcomes:

1. Categorize examples of preanalytical, analytical and post analytical parts of the laboratory testing process.
2. Explain Quality Control and Quality Assurance policies in the laboratory.
3. Discuss instrumentation used in the laboratory.
4. Explain and demonstrate professionalism when performing phlebotomy.
5. Explain laboratory safety protocols and procedures.
6. Describe manual, semiautomated testing in the laboratory.
7. Explain regulatory bodies: CLIA, OSHA, CMS, DHEC, COLA, CAP, JCAHO.
8. Name the typical departments of a clinical laboratory and briefly describe the functions of each department.
9. Explain the parts of the compound microscope.
10. Demonstrate manual pipetting using volumetric and precision pipettes.

Week 1Lecture

Materials Covered: Clinical Laboratory Science, 9e.

Chapter 1

1. Compare the characteristics of individual professional certifications. MLT, MT, and MLS.
2. Differentiate the classification of laboratory testing by complexity of the test: waived, moderately complex, highly complex, and provider-performed microscopy based on CLIA '88 regulations.
3. Define the acronyms and explain the purpose of OSHA, CLIA '88, CMS, TJC, HIPAA and CAP.
4. Describe the three testing phases: Pre-Analytical, Analytical and Post-Analytical
5. Name the typical departments of a clinical laboratory and briefly describe the functions of each department.

6. Describe the importance of federal, state, and institutional regulations concerning the quality and reliability of laboratory work.

Lab:

Materials Covered: Lab handouts.

- Correctly wash hands before wearing and after removing disposable gloves.
- Use general safety equipment correctly.
- Disposed of biohazardous material in the clinical laboratory.

Week 2

Lecture

Materials Covered: Clinical Laboratory Science, 9e.

Chapter 4

1. Define the terms numerical aperture and resolution.
2. Identify the parts of the microscope.
3. Describe the proper cleaning of a microscope.
4. Define alignment and describe the process of aligning a microscope.
5. Name the components of a phase-contrast microscope and explain how they differ from the components of a brightfield microscope.

Lab:

Materials Covered: Lab handouts.

- Operate a microscope correctly.
- Correctly align and clean a microscope.
- Correctly name the parts of the microscope.

Week 3

Lecture

Materials Covered: Clinical Laboratory Science, 9e.

Chapter 2

1. Evaluate a strategy to mitigate patient risk during an information technology outage and assess potential high priorities in a strategy.
2. Define a laboratory-acquired infection (LAI) and name the top 10 microorganisms causing LAIs.
3. Explain the three required contents of a laboratory Safety Manual.
4. Explain successful implementation of chemical hazards "right-to-know" rules.
5. Summarize the top six safety audit issues and choose resolutions to each of the issues.

Lab:

2024-2025

Materials Covered: Lab handouts.

- Correctly select and use various types of manual pipettes.
- Describe lab Glassware usage.
- View 5 blood smears with the microscope.

Week 4

Lecture

Materials Covered: Clinical Laboratory Science, 9e.

Chapter 3

1. Name five effects of clinical laboratory testing.
2. Contrast systemic and random errors
3. Give at least two examples in each of the phases of testing: preanalytical, analytical, and postanalytical.
4. Describe the process of proficiency testing.
5. Describe the role of quality control in quality laboratory testing.
6. Describe the use of reference values, including using the mean and standard deviation in determining reference range.

Lab:

Materials Covered: Lab handouts.

- Used Micropipettor correctly.
- View 5 blood smears with the microscope.
- Identify the WBC's seen on the slide.

Week 5

Lecture

Materials Covered: Clinical Laboratory Science, 9e.

Chapter 5

1. Convert metric units of measurement for weight, length, and volume to English units and English units to metric units.
2. Calculate temperatures from degrees Celsius to degrees Fahrenheit.
3. Convert temperatures from degrees Fahrenheit to degrees Celsius.
4. Describe the various types of and uses for laboratory volumetric glassware, the techniques for their use, and the various types of glass used to manufacture them.
5. Evaluate the advantages and use of micropipettes, volumetric pipettes, and serologic pipettes.
6. Compare various types and uses of laboratory centrifuges.

7. Contrast various forms and grades of water used in the laboratory and their preparation methods.

Lab:

- Visit and tour local hospital laboratory.
- Describe what you observed during the tour.

Week 6

Lecture

Materials Covered: Clinical Laboratory Science, 9e.

Chapter 6

1. Explain and apply the rules for rounding off numbers and using significant figures.
2. Define the terms density and specific gravity.
3. Prepare a percent solution.
4. Define the terms molality, molarity, osmolality, and osmolarity.
5. Calculate proportions and ratios.
6. Describe the procedures for making a single dilution and a serial dilution.
7. Calculate the amount of one solution needed to make a solution of a lesser concentration.

Lab:

Materials Covered: Lab handouts.

- Explain and perform dilutions.
- View 5 blood smears with the microscope.
- Identify the WBC's seen on the slide.

Week 7

Lecture

Materials Covered: Clinical Laboratory Science, 9e.

Chapter 9

1. Compare the characteristics of patients in various age groups.
2. Interpret the principles and applications of Standard Precautions.
3. Describe the role of a phlebotomist.
4. Describe the equipment used for venous blood collection.
5. Arrange the proper steps in the collection technique for venous blood and analyze the outcomes if the sequence of steps is incorrect.

6. Identify the color codes of evacuated tubes with the additives contained in the tubes.
7. Identify the major potential type of error in specimen collection.
8. State examples of types of unacceptable blood specimens and their effects on test results.
9. Describe the preserving and storing of specimens.
10. Describe special blood collection considerations for pediatric and geriatric patients.
11. Categorize the symptoms of potential phlebotomy complications and propose treatment for each type of complication.
12. Demonstrate and describe the proper technique for collecting a venipuncture and a capillary blood specimen.

Lab:

Materials Covered: Lab handouts.

- Correctly weigh substances on an electronic analytical balance.
- Correctly prepare solution concentrations.
- Demonstrate technique for quantitative transfer of liquids.
- View 5 blood smears with the microscope.
- Identify the WBC's seen on the slide.

Week 8

Lecture

Materials Covered: Clinical Laboratory Science, 9e.

Chapter 7

1. Describe the basic principle of the following techniques used in the Clinical laboratory:
 - a. Photometry.
 - b. Absorbance spectrophotometry,
 - c. Reflectance Spectrophotometry
 - d. Nephelometry,
 - e. Flow (Cell) Cytometry,
 - f. Immunoassays
 - g. Chemiluminescence,
 - h. Electrochemical Methods
 - i. Potentiometry,
 - ii. Coulometry
 - iii. Electrophoresis
2. Define Beer's law.

Lab:

Materials Covered: Lab handouts.

- Demonstrate the proper technique for venipuncture using fake arms.
- View 5 blood smears with the microscope.
- Identify the WBC's seen on the slide.

Week 9

Lecture

Materials Covered: Clinical Laboratory Science, 9e.

Chapter 8

1. Identify the four categories of Clinical Laboratory Improvement Amendments (CLIA) test procedures.
2. Discuss non-instrument-based testing (such as pregnancy and fecal occult blood).
3. Identify advantages and disadvantages to consider when selecting a POCT instrument.
4. Compare the characteristics and functions of LIMS and LIS
5. Categorize examples of preanalytical, analytical, and postanalytical testing.
6. Differentiate the major benefits of laboratory automation.

Lab:

Materials Covered: Lab handouts.

- Demonstrate the proper technique for venipuncture on a fellow student.
- View 5 blood smears with the microscope.
- Identify the WBC's seen on the slide.

Week 10

Lecture

Materials Covered: Clinical Laboratory Science, 9e.

Chapter 10 & 11

1. For the hematology and hemostasis departments:
 - a. Describe types of specimens used for testing.
 - b. List test procedures performed in these departments.
 - c. Explain unsuitable specimens and the effect of each test result.

Lab:

Materials Covered: Lab handouts.

- Explain the POCT-glucometer.
- Perform capillary puncture and glucometer testing.
- View 5 blood smears with the microscope.

- Identify the WBC's seen on the slide using the Diff counter.

Week 11

No Lecture- Election Day.

Week 12

Lecture

Materials Covered: Clinical Laboratory Science, 9e.

Chapter 12 & 13

1. For the Urinalysis & Body Fluid departments:
 - a. Categorize various types of urine collection, including midstream clean-catch, quantitative, and timed specimens, and compare the differences.
 - b. Identify the serous fluids and describe the components of their routine examination.
 - c. List test procedures performed in these departments.
 - d. Explain unsuitable specimens and the effect of each test result.

Lab:

Materials Covered: Lab handouts.

- Demonstrate Micropipetting techniques using design patterns.
- Demonstrate proper protocol for performing a venipuncture on a patient.
- View 5 blood smears with the microscope.
- Identify the WBC's seen on the slide using the Diff counter.

Week 13

Lecture

Materials Covered: Clinical Laboratory Science, 9e.

Chapter 14 & 15

1. For the Clinical Chemistry & Molecular Diagnostics departments:
 - a. Describe types of specimens used for testing.
 - b. Differentiate various aspects of the normal physiology of glucose metabolism, including glycogenesis, gluconeogenesis, lipogenesis, and glycolysis.
 - c. Define the terms: genome, karyotype, nucleotide, transcription, translation, translocation, mutation, and polymorphism.
 - d. List test procedures performed in these departments.
 - e. Explain unsuitable specimens and the effect of each test result.

Lab:

Materials Covered: Lab handouts.

- Design pattern and create Micropipetting artwork.
- Demonstrate proper protocol for performing a venipuncture on a patient.
- View 5 blood smears with the microscope.
- Identify the WBC's seen on the slide using the Diff counter.

Week 14

Lecture

Materials Covered: Clinical Laboratory Science, 9e.

Chapters 17 & 18

1. For the Immunology and Immunohematology departments:
 - a. Describe types of specimens used for testing.
 - b. List test procedures performed in these departments.
 - c. Explain unsuitable specimens and the effect of each test result.

Lab:

Materials Covered: Lab handouts.

- Explain the serial dilution process.
- Demonstrate the serial dilution procedure.
- View 5 blood smears with the microscope.
- Identify the WBC's seen on the slide using the Diff counter.

Week 15

Lecture

Materials Covered: Clinical Laboratory Science, 9e.

2. Final Exam Review

Lab:

Materials Covered: Lab handouts.

- Complete the Comprehensive Lab Competency
- View 5 blood smears with the microscope.
- Identify the WBC's seen on the slide using the Diff counter.

****Students – please refer to the Instructor's Course Information sheet for specific information on assessments and due dates.***

Part III: Grading and Assessment

EVALUATION OF REQUIRED COURSE MEASURES/ARTIFACTS*:

Students' performance will be assessed, and the weight associated with the various measures/artifacts are listed below.

EVALUATION*

Chapter Tests (4 tests)	50%
Lab Assignments	20%
Lab Comprehensive evaluation	50%
Lab skills competencies	25%
Weekly Affective Skills	25%
Homework Assignments	5%
In class quizzes	5%
Final Exam	<u>20%</u>
	100%

****Students, for the specific number and type of evaluations, please refer to the Instructor's Course Information Sheet.***

GRADING SYSTEM:

The College's or departmental grading system as delineated in the Catalog. Please note the College adheres to a 10-point grading scale A = 100 – 90, B = 89- 80, C = 79 – 70, D = 69 – 60, F = 59 and below.

Grades earned in courses impact academic progression and financial aid status. Before withdrawing from a course, be sure to talk with your instructor and financial aid counselor about the implications of that course of action. Ds, Fs, Ws, WFs and Is also negatively impact academic progression and financial aid status.

The Add/Drop Period is the first 5 days of the semester for **full term** classes. Add/Drop periods are shorter for accelerated format courses. Please refer to the [academic calendar](#) for deadlines for add/drop. You must attend at least one meeting of all of your classes during that period. If you do not, you will be dropped from the course(s) and your Financial Aid will be reduced accordingly.

Part IV: Attendance

Horry-Georgetown Technical College maintains a general attendance policy requiring students to be present for a minimum of 80 percent (80%) of their classes in order to receive credit for any course. Due to the varied nature of courses taught at the college, some faculty may require up to 90 percent (90%) attendance. Pursuant to 34 Code of Federal Regulations 228.22 - Return to Title IV Funds, once a student has missed over 20% of the course or has missed two

(2) consecutive weeks, the faculty is obligated to withdraw the student and a student may not be permitted to reenroll. **Instructors define absentee limits for their class at the beginning of each term; please refer to the Instructor Course Information Sheet.**

For online and hybrid courses, check your Instructor's Course Information Sheet for any required on-site meeting times. Please note, instructors may require tests to be taken at approved testing sites, and if you use a testing center other than those provided by HGTC, the center may charge a fee for its services.

Part V: Student Resources



THE STUDENT SUCCESS AND TUTORING CENTER (SSTC):

The SSTC offers to all students the following **free** resources:

1. **Academic tutors** for most subject areas, **Writing Center support**, and **college success skills**.
2. Online **tutoring** and academic support resources.
3. Professional and interpersonal communication **coaching** in the EPIC Labs.

Visit the [Student Success & Tutoring Center](#) website for more information. To schedule tutoring, contact the SSTC at ssc@hgtc.edu or self-schedule in the Penji iOS/Android app or at www.penjiapp.com. Email ssc@hgtc.edu or call SSTC Conway, 349-7872; SSTC Grand Strand, 477-2113; and SSTC Georgetown, 520-1455, or go to the [Online Resource Center](#) to access on-demand resources.



STUDENT INFORMATION CENTER: TECH Central

TECH Central offers to all students the following **free** resources:

1. **Getting around HGTC**: General information and guidance for enrollment, financial aid, registration, and payment plan support!
2. Use the [Online Resource Center \(ORC\)](#) including Office 365 support, password resets, and username information.
3. **In-person workshops, online tutorials and more services** are available in Desire2Learn, Student Portal, Degree Works, and Office 365.
4. **Chat with our staff on TECH Talk**, our live chat service. TECH Talk can be accessed on the student portal and on TECH Central's website, or by texting questions to (843) 375-8552.



HGTC LIBRARY:

Each campus location has a library where HGTC students, faculty, and staff may check out materials with their HGTC ID. All three HGTC campus libraries are equipped with computers to support academic research and related school work; printing is available as well. Visit the [Library](#) website for more information or call (843) 349-5268.

STUDENT TESTING:

Testing in an **online/hybrid** course and in **make-up exam** situations may be accomplished in a variety of ways:

- Test administered within D2L.
- Test administered in writing on paper.
- Test administered through Publisher Platforms (which may have a fee associated with the usage)

Furthermore, tests may have time limits and/or require a proctor.

Proctoring can be accomplished either face-to-face at an approved site or online through our online proctoring service. To find out more about proctoring services, please visit the [Online Testing](#) section of the HGTC's Testing Center webpage.

The **Instructor Information Sheet** will have more details on test requirements for your course.

DISABILITY SERVICES:

HGTC is committed to providing an accessible environment for students with disabilities. Inquiries may be directed to HGTC's [Accessibility and Disability Service webpage](#). The Accessibility and Disability Services staff will review documentation of the student's disability and, in a confidential setting with the student, engage in an interactive process to develop an educational accommodation plan.

Note: It is the student's responsibility to self-identify as needing accommodations and to provide acceptable documentation. After a student has self-identified and submitted documentation of a disability, accommodations may be determined, accepted, and provided. Students will need to reach out to the Accessibility and Disability Services staff each semester to renew their accommodations.

COUNSELING SERVICES:

HGTC Counseling Services strives to optimize student success through managing personal and academic concerns that may interfere with achieving educational goals. Staff are available to every student for assistance and guidance on personal matters, academic concerns and other areas of concern. HGTC offers free in-person and telehealth counseling services to students. For more information about counseling services, please reach out to counseling@hgtc.edu or visit the website the [Counseling Services webpage](#).

STATEMENT OF EQUAL OPPORTUNITY/NON-DISCRIMINATION STATEMENT:

Horry-Georgetown Technical College shall not discriminate in employment or personnel decisions or in student admissions or in student decisions, or in all other segments of the College community on the basis of race, color, sex, national or ethnic origin, age, religion, disability, marital or family status, veteran status, political ideas, sexual orientation, gender identity, or pregnancy, childbirth, or related medical conditions, including, but not limited to, lactation, in the educational programs and activities which it operates, and the college is prohibited from discrimination in such manner by applicable laws. Practices and requirements for nondiscrimination extend to the enrollment of students in programs and activities of the College and employment by the College.

All inquiries regarding the federal laws as they relate to discrimination on the basis of sex may be directed to Tamatha Sells, Title IX Coordinator, Horry-Georgetown Technical College, Building 1100C, Room 107B, 2050 Hwy 501 E, PO Box 261966, Conway, SC 29528-6066, 843-349-5218, tamatha.sells@hgtc.edu or to the US Department of Education Office of Civil Rights. (Telephone: 800-421-3481/Email: OCR@ed.gov).

Other employee and applicant inquiries concerning the federal laws and their application to the College may be directed to Jacquelyne Snyder, Vice President, Human Resources and Employee Relations & the College's Affirmative Action/Equal Opportunity Officer, Horry-Georgetown Technical College, Building 200C, Room 205B, 2050 Hwy 501 E, PO Box 261966, Conway, SC 29528-6066, 843-349-5212, jacquelyne.snyder@hgtc.edu.

Other student and prospective student inquiries concerning the federal laws and their application to the College or any student decision may be directed to Dr. Melissa Batten, Vice President, Student Affairs, Section 504 & Title II Coordinator Horry-Georgetown Technical College, Building 1100C, Room 107A, 2050 Hwy 501 E, PO Box 261966, Conway, SC 29528-6066, 843-349-5228, melissa.batten@hgtc.edu.

TITLE IX REQUIREMENTS:

Title IX of the Education Amendments of 1972 protects students, employees, applicants for admission and employment, and other persons from all forms of sex discrimination.

HGTC prohibits the offenses of domestic violence, dating violence, sexual assault, and stalking and will provide students, faculty, and staff with necessary information regarding prevention, policies, procedures, and resources.

Any student, or other member of the college community, who believes that they have been a victim of sexual harassment, domestic violence, dating violence, sexual assault, or stalking may file a report with the college's Title IX Coordinator or campus law enforcement*.

*Faculty and Staff are required to report these incidents to the Title IX Coordinator when involving students. The only HGTC employees exempt from mandatory reporting are licensed mental health professionals (only as part of their job description such as counseling services).

For more information, contact Tamatha Sells, Title IX Coordinator, Conway Campus, Building 1100C, Room 107B, 843-349-5218, tamatha.sells@hgtc.edu.

PREGNANCY ACCOMMODATIONS

Under Title IX, colleges must not exclude a pregnant student from participating in any part of an educational program. Horry-Georgetown Technical College is committed to ensuring that pregnant students receive reasonable accommodations to ensure access to our educational programs.

Students should advise the Title IX Coordinator of a potential need for accommodations as soon as they know they are pregnant. It is extremely important that communication between student, instructors, and the Title IX Coordinator begin as soon as possible. Each situation is unique and will be addressed individually.

Title IX accommodations DO NOT apply to Financial Aid. Financial Aid regulations do not give the College any discretion in terms of Financial Aid eligibility.

Certain educational programs may have strict certification requirements or requirements mandated by outside regulatory agencies. Therefore, in some programs, the application of Title IX accommodations may be limited.

To request pregnancy accommodations, please complete the [Pregnancy Intake Form](#).