Clinical Laboratory Science Program
Student Handbook

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Professional Objectives:

After reading the Piedmont Augusta Clinical Laboratory Science (PAG-CLS) Student Handbook and receiving appropriate instruction, CLS students are expected to:

- Conform and abide by Piedmont Augusta and Laboratory policies and procedures.
- Conform and abide by Piedmont Augusta and Laboratory Code of Conduct.
- Conform and abide by Piedmont Augusta Confidentiality and Network Access Agreement.
- Maintain and respect patient confidentiality.
- Abide by all of the student conduct policies outlined in the University of South Carolina Aiken student handbook.
- Abide by the PAG-CLS and USCA Honor Code.
- Conform and abide by the safety policies and procedures outlined in the PAG-CLS Student Handbook.
- Abide by the incident reporting policy.
- Follow written and oral instructions without distraction.
- Effectively manage time and resources wisely.
- Actively participate in the educational process by displaying preparedness and engagement in the clinical learning environments.
- Display an appropriate level of imitative and motivation in all performances by completing assigned and unsolicited tasks satisfactorily.
- Demonstrate an understanding of clinical laboratory science theory, policies and procedures.
- Complete and submit assignments on time.
- Diligently work through problem solving opportunities.
- Cooperatively work with instructors, students, lab team members and clients.
- Communicate clearly, concisely and with understanding both written and orally.
- Demonstrate the ability to maintain intellectual and emotional stability and maturity under stress.
- Display an appropriate professional/workplace decorum by complying with the guidance, instruction and direction of the PAG-CLS faculty.
- Perform honest laboratory testing and comply with the hospital and laboratory policies.
- Maintain a blemish free attendance and punctuality record by reporting to assigned areas on time, appropriately notifying instructors when absences are anticipated and when deadline conflicts may occur.
- Respond to constructive criticism in a positive manner.

Program Overview

Our Clinical Laboratory Science (CLS) program is offered in collaboration with the University of South Carolina Aiken (USCA) and Piedmont Augusta Hospital (PAG) in Augusta, Georgia, where the professional clinical component of the program is offered. The CLS program is a regional professional program for USC Aiken students who are interested in an allied health career in a medical/clinical laboratory setting. Clinical laboratory scientists perform, develop, evaluate, correlate and assure accuracy and validity of laboratory information, direct and supervise clinical laboratory resources and operations and collaborate in the diagnosis and treatment of patients. Upon successful completion of the CLS program students will be awarded a certificate of completion from Piedmont Augusta Laboratory that will afford them the opportunity to become certified Clinical Laboratory Scientists. Additionally, undergraduate biology majors who successfully complete the CLS program have the opportunity to secure a Bachelor's degree in Clinical Laboratory Science (BS-CLS) from the University of South Carolina-Aiken and Piedmont Augusta Clinical Laboratory Science Program partnership, please visit Piedmont Augusta's CLS program page.

Program Accreditation

The Piedmont Augusta Clinical Laboratory program is accredited by the following:

National Accrediting Agency for Clinical Laboratory Sciences (NAACLS)
5600 N, River Rd., Suite 720
Rosemont, IL 60018-5119
Telephone: 773-714-8880
Website: http://www.naacls.org

Program Mission

The mission of the Piedmont Augusta Clinical Laboratory Science (PAG-CLS) program is to graduate students with exceptional education, training, knowledge, and skills necessary to become responsible, competent, entry-level clinical laboratory science professionals.

Career Entry-Level Competencies

The ultimate goal of the CLS Program is to prepare students for career entry positions as clinical laboratory scientists. Therefore, specific professional competencies dictated by NAACLS are the goals for each graduate. The program strives, through its educational methods, to incorporate all facets of quality laboratory practice into the professional development of students. The curriculum is designed to prepare graduates in various testing and analysis skills with the following career entry-level competencies in mind:

- Collect and safely handle biological specimens for analysis.
- Perform laboratory testing with accuracy.
- Evaluate and interpret laboratory test data.
- Identify problems and take corrective actions.
- Utilize quality assurance to monitor procedures, equipment and technical competency.
- Operate equipment properly and perform preventive and corrective maintenance.
- Comply with established laboratory safety regulations.
- Utilize computers and laboratory software effectively.
- Evaluate the efficacy of new procedures and instrumentation for a given setting.
- Demonstrate ethical behavior and maintain confidentiality of patient results.
- Interact professionally with patients and other health care personnel.
- Apply principles of education methodology.
- Apply principles of management.

Program Goals

The goals of Piedmont Augusta Clinical Laboratory Science program are as follows:

- To provide students with a quality education in accordance with the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS) standards for a Clinical Laboratory Science program.
- To provide students with a comprehensive education and clinical experience necessary to obtain national CLS certification.
- To effectively prepare graduates of the CLS program with a strong theoretical and practical foundation of clinical laboratory science, strong communication and interpersonal skills and laboratory competencies needed to secure an entry-level position as a clinical laboratory scientist.
- To effectively prepare competent, flexible clinical laboratory scientists who accept and fulfill the roles of health care professional in diverse clinical laboratory settings or other related vocations.
- To foster the development of positive attitudes, behavior and a philosophy of continual professional development and education.
- To promote professional respect, interaction, and communication among fellow health care professionals.
- To develop clinical laboratory scientists who perform the highest quality laboratory services in the most optimal time frame, while maintaining a safe working environment and remaining within compliance of regulatory and accrediting agencies.
- To develop clinical laboratory scientists who maintain superior professional standards, and zeal.

Program Advisement

The CLS program is designed to prepare students for work in a clinical laboratory setting, which includes clinical hematology, hemostasis, urinalysis, immunology, chemistry, microbiology, mycology, parasitology, phlebotomy, flow cytometry, molecular diagnostics and blood bank (immunohematology). Additionally, the program provides graduates with a marketable degree along with a career opportunity to help people while enjoying the hands-on and investigative aspects of laboratory medicine. For further information about the BSCLS degree or CLS program, you can contact either of the USCA program's faculty advisors or PAG-CLS program director respectively:

Dr. William Jackson	Dr. Suchreet Mander	Yvonne Banks, MHA, CLS (ASCP)
USCA Program Faculty Advisor	USCA Program Faculty Advisor	PAG Program Director & Faculty Advisor
BillJ@usca.edu	SuchreetM@usca.edu	Yvonne.Banks@piedmont.org
803-641-3601	803-641-3371	706-481-7487

Each student is solely responsible for observing and following the policies, procedures, requirements and regulations as outlined by USCA and PAG-CLS program. Although the PAG-CLS program director and faculty will gladly assist students with the details of the program, academic status, this does not relieve students of their responsibility for meeting the program requirements and regulations of USCA and PAG-CLS. Student advisement is impartial and confidential.

Admissions

The CLS program is a 47-learning week program tailored to give up to 6 admitted students a comprehensive educational experience in laboratory medicine. Enrollment into the CLS program is a two-step admission process for student who are on a 3+1 and/or 4+1 undergraduate degree track. Enrollment includes regular admission to USCA and a separate competitive admission into the CLS Program clinical component with Piedmont Augusta. **Note**: USCA admission does not guarantee acceptance to the CLS Program, nor does it guarantee employment with PAG upon completion of the program. Only the qualifying USCA students who have fulfilled the necessary requirements may apply for the CLS Program clinical component. For more information about USCA admission requirements visit the USCA Admissions Office website.

To apply to the program, see the PAG-CLS program application on USCA website. Piedmont Augusta is an equal opportunity employer and the PAG-CLS program is committed to equal opportunity as well. The PAG-CLS program gives no regards to race, creed, national origin, ancestry, gender, age, veteran status or disability regarding program applicants. The PAG-CLS program will provide reasonable accommodations to qualified students with disabilities. Applicants will be considered for the CLS program on the basis of overall cumulative GPA, science GPA, 2 recommendations and personal interview. ****Post Baccalaureate degree holders please contact the Program Director for requirements. ****

The following are required in order to obtain admission to the CLS program clinical component through USCA:

- Minimum cumulative and science grade point average of 2.75 on a 4.0 scale.
- Prerequisite college coursework to include 16 semester hours of chemistry that includes organic chemistry and biochemistry.
- Prerequisite college coursework to include 16 semester hours of biology to include microbiology and immunology.
- Prerequisite college coursework to include 3 hours of college-level math.
- The highly recommended courses (but not required) are genetics, molecular biology, statics and computer science.
- Non-academic essential functions.
- Two recommendations from a non-family member college professors/instructor, advisors and/or employers.
- College transcript(s).
- Applicants whose first language is not English must have a minimum TOEFL score of 80 on file at USCA.

The CLS Program clinical component admissions process is administered by the CLS program director. There are no regards given to race, creed, national origin, ancestry, gender, age, veteran status or disability during the admission process. The CLS Program clinical component admission process is as follows:

- Applications and recommendations submitted between the 1st Tuesday in February to the 3rd Tuesday in March.
- Application material is reviewed by the Admissions Committee.
- Selected applicants are scheduled for a personal interview with the Admission Committee by the 1st Tuesday in April.
- Personal interviews to begin by 2nd Tuesday in April.
- Applicant selections are made by the Admissions committee.
- The CLS program director will send acceptance notification to each applicant via email by the last Friday in May.
- Accepted applicants complete and return the acceptance form by the 1st Tuesday in June.

- Confirmed acceptance applicants complete a background check, drug screen, TB skin testing, Hepatitis B vaccination, Influenza (FLU) vaccine and other required up to date immunization records.
- Complete enrollment in contingent upon a negative drug scree, TB test, completed Hepatitis B vaccination, up to date immunization records and an acceptable background check.
- The first day of the CLS program will be on the first day of the Fall semester as noted in the USC-Aiken academic calendar. All holidays, recesses, and final exams scheduled will apply throughout the fall and spring semesters. Clinical/practicum days are scheduled through PAG-CLS program.

Disability Policy

Students who have a physical, psychological, and/or learning disability that might affect their performance in the PAG-CLS program should contact the Office of Disability Services, B&E 134, (803) 643-6816, as soon as possible. The Office of Disability Services will determine appropriate accommodations based on documentation.

Tuition Cost

The PAG-CLS program tuition cost is paid directly to USCA. For the most up to date tuition and fees visit the USCA Office of Business Services website. The PAG-CLS program include on-campus lecturers, labs and clinical rotations. All cost associated with the PAG-CLS program including tuition, lodging, transportation, textbooks and supplies, living expenses and meals are the sole responsibility of the student.

Refund and Withdrawal Policy

For the most up to date refund and withdrawal policy visit the USCA Office of the Registrar website.

Teach-Out Plan

In the event of program closure, Piedmont Augusta School of Clinical Laboratory Teach Out Plan is as follows:

1. If closure is due to exceptional or uncontrollable circumstances, such as natural disaster, and the college will reopen the program within 30 days, then the students will reenter the program and progress as previously planned.

2. If closure is due to exceptional or uncontrollable circumstances, such as natural disaster, and the hospital's program will not reopen, efforts will be made to contact CLS Programs within the Georgia and South Carolina College System to request students be transferred into other programs.

3. If the closure is due to the hospital's decision to no longer offer the program, then all enrolled students will progress as planned. No new student cohorts will be admitted to start the program. PAG-CLS would continue to provide the necessary resources and support to allow enrolled program students the opportunity to complete program requirements.

4. In the event the clinical site closes and is unable to complete the clinical experience for the student, the student will be moved to another clinical site. Moving the student to another site is typically feasible as we have a number of clinical sites in our area and our clinical site preceptors understand the importance of the clinical experience. The program will also provide an alternative on-campus clinical experience if needed.

Program Time Limit

All PAG-CLS students are expected to complete the program within the 47 learning weeks' time period. If a student cannot complete the program as scheduled, the student must submit a written extension request along with a detailed program completion plan. Program extensions cannot exceed an additional 14 months.

Essential Functions

To ensure each student's success in the PAG CLS, each student must possess the essential functions for both the CLS program academic/didactic and clinical practicum settings that are listed below. The PAG-CLS program will implement all reasonable accommodations for students with temporary and permanent disabilities or pregnancy complications. However, to complete the requirements for the program, students must be able to perform the essential functions with or without reasonable accommodations.

Ethical Standards

- Adherence to patient confidentiality, PAG laboratory standard of operation, PAG compliance standards, USCA and PAG academic and professional code of ethics.
- Maintain an orderly, clean and safe working environment according to state, institutional and department safety regulations.

Visual Acuity

- Normal/Corrected vision to ensure safe and accurate laboratory testing (pre-analytical, analytical and post analytical).
- Ability to recognize, discriminate and characterize color, shading, microscopic components, specimen viscosity, reagents and chemical reactions.
- Ability to read text, numbers, graphs electronically and in print.

Manual Dexterity

- Good hand-eye coordination and fine motor skills coordination are needed to perform venipuncture and laboratory testing sufficiently and safely.

Effective Communication

- Ability to effectively read, comprehend, write, speak and understand English.

Intellectual and Cognitive Abilities

- Ability to reason, judge, analyze, comprehend, make calculations and report lab results under normal and stressful situations.

Initiative and Responsibility

- Ability to work independently and as a member of a team
- Display suitable initiative and motivation.
- Actively participate in the learning process by displaying active engagement.
- Willingness to accept and seek instructional direction as needed.

Attendance

- Develop and maintain a valued appreciation for having a compliant attendance and punctuality recorded in the academic and clinical practicum setting.

Demeanor

- Display appropriate professional decorum.
- Exhibit a cooperative, respectful and collegial demeanor in all interactions.
- Respond to constructive criticism in a positive manner.
- Develop positive strategies for coping with stressful situations and unpredictable situations and unexpected changes.

Stamina

- Ability to keep up with the fast-paced environment.
- Ability to stand or walk for a prolonged period of time.
- Ability to lift 30lbs.
- Ability to reach, bend, kneel or crouch as needed.

Piedmont Augusta Student Requirements

Before students can participate in the PAG-CLS program, the following Piedmont Augusta guidelines for students must be met with 14 business days before the first day of class or clinical rotation:

- Up to date immunization record on file with the USCA and/or the PAG-CLS program.
- Hepatitis B vaccination.
- Criminal background check via PreCheck or Castle Branch. If the PreCheck or Castle Branck programs are not available then you must ensure that the background check is a Level 1 screening which includes a State and Federal check plus, criminal background and sex offender registry checks. Please grant Piedmont Augusta access to view your results. You must provide a copy of results through confidential email to PAG-CLS Program Director to be forwarded on to the PAG Student Coordinator and HR for review. Results of the criminal background check are handled confidentially on a "need to know" basis only.
- Negative Drug screen for amphetamines, barbiturates, benzodiazepines, THC, cocaine, opiates, PCP and methadone.
- Negative TB skin test/PPD.
- Influenza (Flu) vaccination if students will be on campus during Flu season from October to March. If so, students are required to receive the vaccination by December 31st of each year. The influenza vaccination will be given free of charge to students on campus. Piedmont Augusta Human Resources will evaluate all students requesting a Flu vaccination exemption. Unvaccinated students will be required to sign a declination form by December 31st and are required to wear a procedure type ear loop mask in locations where patient and staff interactions/exposure may occur during Flu season. Flu season is from the first Monday in November through March 31st. Masks are not required to be worn in the following locations:
    - Break room/cafeteria
    - Outside of the facility
    - Entrances, exits
    - Public hallways where exposure is unlikely
    - Public hallways where exposure is no more likely than in the community
    - Non-clinical or office settings, or where there is spatial distancing (greater than 6 feet)

- Complete the PAG-CLS Student Orientation and test.
- Complete the PAG-CLS Confidentiality and Network Access Agreement Form.
- Complete the PAG CLS Clinical Agreement Form
- Complete the PAG-CLS Code of Conduct/Behavior of Standards Form.

Note: The background check, drug screen, TB skin test and influenza vaccination are good for 12 months. If a student program time is extended for whatever reason beyond 12 months, these items are required to be updated in order for a student to continue the program.

Influenza and Coronavirus Mask Guidelines

When wearing a procedural mask, it is important to ensure that the mask is donned (put on) and doffed (taken off) correctly. When using procedural masks, follow these guidelines:

- Donning: Putting on masks
  - Perform hand hygiene.
  - Place mask over nose, mouth and chin.
  - Fit flexible nose piece over bridge of nose.
  - Secure on head with elastic ear loops.
  - Adjust to fit. Mask must be securely fitted, covering nose, mouth and chin the entire time it is
  - required to be worn.
- Doffing: Taking off masks
  - If wearing gloves, remove gloves prior to removing mask.
  - For ear loop masks, place a finger between the ear and the elastic.
  - Remove mask by pulling mask away from face.
  - Discard in regular waste.
  - Perform hand hygiene.
- Change masks when
  - When visibly soiled, damp/humid (wet), torn or otherwise compromised or at least every 2 hours.
  - When contaminated or potentially contaminated with blood, body fluids, secretions or excretions.
  - After leaving the room of or caring for a patient in isolation.
  - Before performing invasive procedures, such as IV or line placement or entering an OR suite or
  - Cath Lab, changing central line or other dressings or performing procedures that involve the central nervous system, such as an epidural or spinal tap.
- Mask disposal
  - Avoid touching the outside of the mask to prevent contamination of hands/gloves
  - Do not reuse the mask after removal.

Parking

Students should park in front of the hospital at the Summerville campus. A designated parking garage will be identified for parking during clinicals.

Clinical Laboratory Science Course Descriptions

BIOL A441 Introduction to Clinical Laboratory Science, Phlebotomy, and Point of Care Testing (1 Credit)

The fundamentals of Clinical Laboratory Science (CLS), principles and concepts of phlebotomy, and Point of Care Testing (POCT). CLS topics include laboratory safety, regulatory requirements, basics of quality control and assurance, standards of behavior, professionalism, ethics, compliance, specimen handling procedures, laboratory equipment, education methods, effective communication and team building. An introduction to phlebotomist duties, universal precautions, factors to be considered in venipuncture sites, equipment and supplies needed to collect blood, the proper order of draw and specimen collection techniques, adverse effects of improper venipuncture technique and documentation procedures. An overview of the emerging specialty of point of care testing (POCT) through discussions on the history and utility of POCT, various aspects of analytical performance, regulatory requirements, and laboratory hospital management.

BIOL A442 Clinical Immunology (Serology) (3 Credits)

A study of the principles of clinical immunology relative to antigen/antibody structure and function, disease states and clinical serologic testing methodologies.

BIOL A443 Clinical Hematology and Hemostasis (4 Credits)

A study of the principles of clinical hematology, cellular components, and hemostasis (coagulation) relative to disease states and clinical testing methodologies.

BIOL A444 Clinical Immunohematology (Blood Bank) (4 Credits)

A study of the principles of clinical immunohematology (blood bank) relative to the ABO and Rh blood group system, various other erythrocyte antigen systems, ABO discrepancies, antibody screening, antibody identification, compatibility testing, donor requirements, preparation of blood components relative to transfusion medicine, disease states and clinical testing methodologies.

BIOL A445 Urinalysis and Body Fluids (2 Credits)

A study of the principles of the physical, chemical and microscopic analysis of urine and non-blood body fluids relative to disease states and their clinical testing methodologies.

BIOL A451 Clinical Laboratory Operations & Management; Introduction to Anatomic Pathology & Cytopathology (2 Credits)

A study of the principles of laboratory operations and management, and an introduction to anatomic pathology and resource management, principles of financial management and laboratory process improvement and research design. An overview of anatomical pathology and cytopathology, basic specimen preparation and processing, and pathological diagnosis.

BIOL A452 Clinical Chemistry (4 Credits)

A study of the principles of clinical chemistry relative to qualitative and quantitative analysis of blood and other body fluids, disease states and their clinical testing methodologies. Discussion and identification of the quantitative and qualitative analyses of body fluids that includes the study of acid-base, electrolytes, carbohydrates, lipids, proteins, enzymes, nitrogen-containing compounds, vitamins, endocrinology, as well as toxicology and therapeutic drug monitoring.

BIOL A453 Clinical Microbiology (6 Credits)

A study of the principles of clinical microbiology relative to disease states and clinical testing methodologies. The course will focus on the discussion and identification of bacterial, mycobacterial, parasitic, viral and fungal human pathogens and their pathogenesis, epidemiology, clinical manifestations, infectious diseases and antimicrobial agents.

CLS Program Practicum (Biology CLS USCA 599)

Course Description and Objective.

The Clinical Practicum Rotation completes the final component of the student's professional phase of the study. The practicum's purpose is designed to enhance the student's application of clinical laboratory science theories and practical skills including the pre-analytical, analytical and post analytical processes. Each clinical rotation is designed to enhance the student's entry level discipline specific competencies. The clinical practicum rotations constitute the following disciplines:

Clinical Chemistry/Immunology (Serology): The theoretical and practical applications of analytes and antibodies testing including, but not limited to carbohydrates, lipids, proteins, nitrogen containing compounds, electrolytes, enzymes and immune disease antibodies. Students will be introduced to automated, as well manual methods used to analyze the previous analytes and antibodies. This rotation is 120 hours.

Clinical Hematology, Hemostasis/Coagulation, Urinalysis and Body Fluids: The study of human blood cellularity and the testing used to determine hematological disease states and conditions. Practical and theoretical concepts will be utilized in the clinical setting by automated and manual methodologies. Also, relative to the previous, study and focus will include material and exercises in hemostasis and urinalysis. This rotation is 160 hours.

Clinical Immunohematology: A hybrid of hematological and immunological concepts included in testing for used in transfusion medicine. Students will be exposed to the manual blood banking methodologies including, but not limited to (a) tube testing, (b) gel card technology, and (c) blood component irradiation. This rotation is 160 hours.

Clinical Microbiology: An amalgam of bacteriology, virology, parasitology, and mycology, the microbiology rotation will introduce students to methodologies used to isolate and identify organisms typically associated with and cause pathological conditions of infection. Conventional and current modes of analysis including (a) plate reading, (c) MICs, and (c) PCR will enable students to distinguish between species and aid in performing assigned unknowns. This rotation is 160 hours.

For more information, click here to view the USCA bulletin.

Clinical Practicum Placement

Students will be scheduled for the clinical practicum/clinical rotation experience after successful completion of both Biol A440 CLS Internship I and Biol A450 CLS Internship II. Students will be scheduled at the following Piedmont Augusta clinical laboratory sites:

Piedmont Augusta-Main
Laboratory-3rd Floor
1350 Walton Way
Augusta, GA 30901

In the unlikely event that the clinical rotation cannot be scheduled at one of the current clinical laboratory sites, the program director or coordinator will reschedule the rotation for a subsequent semester or establish a new clinical laboratory site. **Note:** Unexpected changes in the availability of a clinical laboratory site can affect students' program completion and graduation date. Changes in clinical laboratory availability, however, will not affect students' ability to complete the clinical practicum.

Student Employee/Service Work

Each clinical practicum/clinical rotation experience will foster the student's comprehension and competence in laboratory theory and practical skills. All testing performed by students will be done under the supervision of a certified CLS instructor or staff member. Competent students cannot perform laboratory testing or report laboratory results without oversight by a certified CLS or staff member. If students are employed at the clinical site, scheduled rotation times must be separate from regular work schedules. Working opportunities are optional in which students are considered to be employees during working hours. Working in the clinical laboratory outside of the scheduled academic hours is non-compulsory for students.

During clinical rotations, students are not considered to be employees of the institution. Therefore, students are not especially during the clinical rotation experience. Additionally, employed students should not use their employee access to the computer systems and the likes during their clinical rotation. All student activities in the clinical laboratory setting are for educational purposes only.

Clinical Faculty

The CLS faculty consists of Piedmont Augusta infectious disease doctors, lab directors, lab managers, lab coordinators, lab techs (CLS and MLT) and lab community leaders. To ensure quality instruction for the students, only those individuals who meet the College of American Pathologist (CAP) and state guidelines to work in a clinical laboratory and licensed medical doctors are allowed to be considered for didactic and clinical faculty position in the CLS program or guest lecturer. No regards are given to race, creed, national origin, ancestry, gender, age, veteran status or disability in regard to the selection of PAG-CLS program faculty and clinical instructors. The PAG-CLS program will provide reasonable accommodations to qualified faculty and clinical instructors with disabilities. The following individuals are the main instructors for the following online and/or on campus teaching disciplines:

BIOL A441 Introduction to Clinical Laboratory Science, Phlebotomy, and Point of Care Testing
Yvonne Banks, MHA, CLS (ASCP), Program Director (D)*

BIOL A442 Clinical Immunology (Serology)
Kristin Ayers, CLS (ASCP), Instructor (D)*

BIOL A443 Clinical Hematology and Hemostasis
Yvonne Banks, MHA, CLS (ASCP), Program Director (D)*

BIOL A444 Clinical Immunohematology (Blood Bank)
Kristin Ayers, CLS (ASCP), Instructor (D)*

BIOL A445 Urinalysis and Body Fluids
Yvonne Banks, MHA, CLS (ASCP), Program Director (D)*

BIOL A451 Clinical Laboratory Operations & Management
Kristin Ayers, CLS (ASCP), Instructor (D)*
Yvonne Banks, MHA, CLS (ASCP), Program Director (D)

BIOL A452 Clinical Chemistry
Kristin Ayers, CLS (ASCP), Instructor (D)*

BIOL A453 Clinical Microbiology
Yvonne Banks, MHA, CLS (ASCP), Program Director (D)
Stephanie Huffman-Wiggins, CLS(AMT) (D)*
Notations Above: D=Didactic Instructor, *=Primary Instructor

Certificate of Completion

Once students have successfully completed the PAG-CLS program, they will receive a certificate of completion from the PAG-CLS program and an official copy of their transcript. Once the certificate of completion is submitted to USCA, students on the 3+1track will be eligible to graduate from USCA with the Bachelor of Science in Clinical Laboratory Science. Students are responsible for submitting a copy of the certificate of completion to Dr. Bill Jackson at BillJ@usca.edu.

Certification Exam

Once students have successfully completed the PAG-CLS program, they will be prepared to take the ASCP or equivalent national certification exam in clinical laboratory science (i.e. medical laboratory science). **Note:** Successful completion of the PAG-CLS program does not guarantee a passing performance on the certification exam. Students are strongly encouraged to study for the certification exam and to take it as soon as possible after completing the program. Certification is a voluntary process, and it is up to each student to determine when and which certification exam is right for them. Please visit the ASCP Board of Certification website for additional certification information.

Methods of Presentation

Information will be presented through lectures, tutorials, computer-assisted materials, case studies/projects, performance of laboratory tests, demonstration, continuing education programs, study guides, class discussion using appropriate visual aids and other resources.

Grading and Evaluation

Professional attitudes and actions as outlined in the professional objectives and academic standards are essential standards for preparing students who will strive to deliver superior quality health care and service. Students who display any deficiency in academic standards and affective professional behavior may not be able to continue the program.

Students who are evaluated frequently are encouraged to discuss any academic or professional behavioral concerns with the CLS faculty and program director as needed. Students receiving unsatisfactory notification about academic or professional behavior concern should make an appointment with either the CLS faculty member or program director as soon as possible to discuss options to correct the deficiency or issue.

The PAG-CLS program grading scale is as follows:

- A: 90-100%
- B: 80-89%
- C: 70-79%
- F: Equal to or Below 69%
- Pass/Fail (Professionalism and Clinical Rotation)
- Incomplete (Clinical Rotation)
- Does Not Meet Expectations/Meets Expectations/Exceed Expectations (Clinical Competency Checklist)

Note: A grade of "F" will be assigned to all missing and incomplete grades. For a student to successfully pass any course, students must attain and maintain an average minimal grade of 70% on all work. Additionally, students must receive a grade of pass for Professionalism and be in good standing in accordance with the attendance policy. Lastly, students must receive a minimum passing score of 70% on the Cumulative Exit Exam.

For the Clinical Rotation: a final grade of **Pass or Fail** will be given. For a student to successfully pass the Clinical Practicum students must attain and maintain an average minimal grade of 70% on all work. Additionally, students must receive a grade of pass for Professionalism **and** be in good standing in accordance with the attendance policy. Lastly, students must obtain a minimum grade of Meets Expectations on all clinical competency checklists and receive a minimum passing score of 70% on the Cumulative Exit Exam.

If there are any academic or professionalism deficiencies noted an action plan will be used to remediate any deficiencies. Academic courses can be repeated within 1 year of beginning the program. However, all academic courses must be completed before a student is allowed to participate in the Clinical Practicum. Clinical rotations that need to be repeated will be at the convenience of the clinical site. **Note:** There is no guarantee that a clinical

rotation can be repeated in the same semester in order to make graduation deadlines. Students are responsible for knowing what the course requirements are needed to graduate. Additionally, students are responsible for knowing and meeting USC-Aiken application for graduation deadline.

Each clinical rotation will be evaluated as follows:

- Hematology, Coagulation and Urinalysis
    - 2 Hematology Tests and 1 Coagulation Test (20% each)
    - Lab Assignments/Clinical Competency Checklists (15%)
    - Hematology Case Study Oral Presentation (15%)
    - Urinalysis Study Guide and Case Studies (10%)
    - Professionalism-Affective Professional Behavior (Pass/Fail)
- Immunohematology
    - 4 Immunohematology Tests (15 % each)
    - Lab Assignments/Clinical Competency Checklists (20%)
    - Immunohematology Case Study Oral Presentation (20%)
    - Professionalism-Affective Professional Behavior (Pass/Fail)
- Chemistry and Immunology
    - 2 Chemistry Tests and 1 Immunology Tests (20 % each)
    - Lab Assignments/Clinical Competency Checklists (20%)
    - Study Guides (10% each)
    - Professionalism-Affective Professional Behavior (Pass/Fail)
- Microbiology
    - 2 Microbiology Tests (20 % each)
    - Lab Assignments/Clinical Competency Checklists (20%)
    - 2 Study Guides (10% each)
    - 1 Quizlet Project (20%)
    - Professionalism-Affective Professional Behavior (Pass/Fail)
- Cumulative Exit Exam
    - 1 Exam (2 Attempts: Minimum passing score of 70%)

Affective Professional Behavior

During the clinical rotations, students are expected to perform and behave in a professional manner. Students are to respect and adhere to departmental rules and policies, as well as the policies of USC-Aiken at all times. Students will be evaluated based on the Affective Professional Behavior characteristic guideline. Behavior that does not meet the established criteria will be interpreted as not having satisfactorily completed the requirements and expectation of the clinical practicum. All ratings must be accompanied by supporting statements on the evaluations form. All failures to meet the established criteria will be subject to constructive mediation counseling sessions. The established Affective Professional Behavior guidelines are as follows:

- **Compliance**
    - Maintain an orderly, clean and safe laboratory work environment while adhering to federal, state, institutional and department safety regulations.
    - Perform tasks according to laboratory procedures as instructed by the clinical instructor.
    - Adhere to the policies, procedures and guidelines of the CLS program, clinical institution and department.
- **Attendance**

    - Maintain a blemish free attendance and punctuality record by reporting to assigned areas on time, appropriately notifying instructors when absences are anticipated and when deadline conflicts may occur.
- **Initiative**
    - Display an appropriate level of imitative and motivation in all performances by completing assigned and unsolicited tasks satisfactorily.
    - Offer assistance to other departmental personnel as needed.
    - Use time wisely during downtime to study, complete projects and/or read procedure manuals. If you have completed all assignments from your current clinical rotation, you are permitted to work on assignments from the remaining clinical rotations.
- **Responsibility**
    - Actively participate in the educational process by displaying preparedness and engagement in the clinical learning environments.
    - Willingly accept instructional direction, appropriately adapting to the clinical learning environment, and completing assignments on time.
    - When needed, seek guidance from the clinical instructor and/or other members of the clinical team.
- **Reliability**
    - Maintain intellectual and emotional stability and maturity under stress, by producing results that meet appropriate performance standards.
    - Effectively demonstration an appreciation of procedural consistency and technical accuracy and precision.
- **Demeanor**
    - Display appropriate professional/workplace decorum the clinical practicum by complying with the guidance, instructions, and direction outlined by the clinical instructors.
    - Exhibit a cooperative, respectful, and collegial demeanor in all interactions.
    - Respond the constructive criticism in a positive manner.
    - Develop positive strategies for coping with stressful situations.
    - Cooperate with clinical instructors and other clinical lab team members to create a positive and efficient work environment.
- **Integrity**
    - Perform honest laboratory testing and comply with institutional and departmental policies relative to reporting results.
    - Maintain and respect patient confidentiality.
    - Report and maintain complete and accurate clinical documentation.
    - Comply with clinical institution and department, PAG-CLS program as well as USC-Aiken's Honor Code.
- **Confidentiality**
    - During your clinical rotation experiences, you will have access to private patient information and patient laboratory results. Although you may be excited that you are now able to correlate laboratory results to certain conditions; **remember names, laboratory results and suggested diagnoses are STRICTLY CONFIDENTIAL.** You cannot interpret or discuss laboratory results with the person who had the test performed. In addition, laboratory results and information for patients should not be discussed outside of the laboratory (e.g., cafeteria, home).

Academic Integrity

The guiding principle of all aspects of the educational process is academic integrity which is defined as having respect for one's own work and that of others. As a student of USCA and PAG-CLS program, each person is

required to abide by this academic code of conduct. As a commitment to the academic code of conduct, each student will be required to sign by real signature or electronic and date the honor pledge on all assignments, quizzes, tests, examinations or bodies of work. The honor pledge is as follows:

On my honor as a student of University of South Carolina and Piedmont Augusta Clinical Laboratory Science program student, I have completed my work according to the principle of Academic Integrity. I have neither given nor received any unauthorized aid on this assignment/examination/body of work.

For more information on academic integrity visit the Academic Code of Conduct website or pages 29-33 in the USCA Student Handbook.

Portable Electronic Devices Policy

The use of any portable electronic devices, including cell phones, pagers, MP3 players, iPods, etc., during class is not allowed for any reason unless prior approval has been given to a student from the instructor or unless required for the course. If you are planning to have any of these devices in class, they must be turned off and stowed away for the duration of the class period. If you use a portable electronic device during a test, quiz, or other assessment, you are eligible to receive a failing grade on that assignment. Cell phones must be stowed during exams.

Attendance Policy

Daily attendance is mandatory. An "F" may be assigned for absences in excess of 3 regularly scheduled class meetings. Absences, ***neither excused nor unexcused***, absolve the student from meeting class assignments. Exam make-up will only be allowed for ***documented, excusable reasons*****.** Quizzes cannot be made up.

Clinical Rotation Hours

Student attendance in all areas of the clinical rotation is required. Students must be present five (5) days a week and eight (8) hours a day. Daily attendance is mandatory. The actual scheduled hours will vary depending on the clinical rotation site. The conventional time for the clinical laboratory science education is between 7:30 a.m. and 4:00 p.m., however, other scheduled times may be included for the different clinical rotation sites. Specifics of the schedule for each clinical rotation will be determined by the Program Director. Each clinical rotation site will be assigned. Students must receive instruction from the Clinical Instructor before leaving the clinical testing area. During each rotation, students will be expected to arrive at their station on time.

Late arrival times for each rotation will have cumulative consequences such as the following:

- Scheduled tasks missed will have to be made up on the student's personal time.
- The number of times a student is late will be assessed in multiple of threes. Examples are as follows: Late 3 times = 1 absence, 6 = 2 absences, 9 = 3 absences etc.

Tardiness is defined as reporting to the clinical rotation station (1) minute or more beyond designated start time. Students must notify their clinical instructor or clinical site area if they are going to be more than 15 minutes late.

Absences are designated "excused" or "unexcused" by the program's director and at his/her discretion. Absences which are generally excused result from serious illness, death of a close family member, and holidays designated by the program director.

If an absence cannot be avoided, the student must contact the clinical instructor and the program director as soon as possible and no later than 8:30 a.m. If the clinical instructor is not available, the absence should be reported to the shift supervisor or lead tech of their clinical rotation. An absence, which is not reported, will be designated "unexcused." If a student has not reported to the clinical site or called in to report absence for two consecutive

days, it is presumed to be clinical site abandonment. Clinical site abandonment will be documented in the student's personnel record as a voluntary quit which will result in failure of the clinical practicum.

Absences and tardiness that occur during the clinical rotation may warrant a remediation plan. The need for a remediation plan is at the discretion of the program director. The time options for remedial work may include unscheduled days including weekends and school breaks and altered schedules. Failure to make up for missed time will result in an incomplete grade for the clinical practicum and possible degree deferment. **Absences greater than 3 may warrant repeating a specific clinical rotation the following year, thus delaying graduation.** All absences will be made up at the discretion of the Program Director.

Inclement Weather

Inclement weather is defined as any weather conditions (snow, sleet, flooding, etc.) which may adversely affect a students' mobility to the clinical rotation sites. Students are expected to be present at the rotation site if the University is having classes. If the University is closed, the students should contact the Clinical Coordinator/Instructor and the Program Director about attending the clinical rotation site. Student safety is a priority, and students will not be required to attend class or the clinical laboratory experience if travel conditions are unsafe. Students are also responsible for all make-up materials during the absent days.

Program Dismissal

Academic

The CLS faculty reviews the academic record for each student on an ongoing basis and at the end of each semester. Students not meeting the academic standard are considered for dismissal from the program. The academic standard states that students must attain and maintain an average minimal grade of 70% on all work. Students failing to meet the academic standard may have a privilege to undertake remedial work. Note: Remedial work/plan is not automatically or always granted. The following will be considered in determining whether or not a remediation plan is an option:

- Student overall performance
- Availability of faculty
- Availability of time, course sequence and laboratory resources

After considering the above factors, the faculty will decide whether a student will be offered a remediation plan or will be dismissed from the program. Students will be notified of the dismissal or remediation decision via email. If the faculty decides to offer the student a remedial plan, the student will have 10 days to notify the program director of his/her decision to accept the remediation plan. Note: The remedial work will not change or substitute for the original course grade.

If a remediation is not plausible, if the student rejects the remediation plan or if the remediation plan does not work, the student will be dismissed from the program immediately.

The School of Clinical Laboratory Sciences reserves the right to dismiss a student from the program for any of the following:

1. Cheating in reference to test evaluation, homework assignments, clinical objectives.
2. Falsification of records including but not limited to time records, expense reports, medical records, billing records, making false entries or altering any hospital records or reports.
3. Unprofessional conduct:
    · Excessive absenteeism and tardiness.
    · Engaging in abusive conduct toward faculty, physicians, peers or customers
    · Accessing or revealing confidential patient information

· Removing hospital property from the hospital premises without permission
· Theft, destruction, defacement, or misuse of hospital property or property of another student, employee or customer
· Using, selling, dispensing, possessing alcoholic beverages and/or illegal drugs on hospital property.
· Reporting to school or clinic under the influence of alcohol and/or drugs
· Possessing firearms or other weapons on hospital property
· Engaging in other behavior resulting in loss of confidence and trust
· Engaging in any form of sexual harassment
· Demeanor unbecoming of a professional care giver

4. Insubordination, refusal by a student to follow instructions of a supervisor or anyone in an authority position.
5. Failure to obtain a "C" or better on any program course.
6. Failure to satisfy clinical probation deficiencies within a specified time frame.
7. Obtaining two incompletes (I) whether didactically or clinically within the school year.
8. Student being placed on probation 3 or more times throughout the duration of the program.

Grievance Policy and Procedure

Grievance Policy and Procedure

1. Students desiring to voice complaints regarding grades, courses, faculty or the educational process should submit their complaint in writing to the Program Director. If the complaint involves the Program Director, the student should submit it to the Allied Health Director who is a member of the Advisory Board.

Step One:

Within 2 business days

The Program Director will review the complaint with the student and personnel involved for validity of circumstances. If the complaint cannot be resolved, or if the student requests, the complaint is forwarded to a Grievance Committee within 5 business days of filing.

Step Two:

Within 5 business days of filing

The Grievance Committee, consisting of three members of the Advisory Committee and Allied Health Department is appointed as needed. They will review the case and make recommendations and/or a decision within 48 hours.

Professional Standards

The CLS faculty evaluate the professional behavior of each student on an ongoing basis and at the end of each semester. Students should adhere to the Professional Objectives noted above and the Affective Professional Standards outlined in the student clinical practicum handbook. Behavior problems are documented on the Affective Professional Behavior evaluation form. Documented professional behavior issues may include but are not limited to the following:

- Repeated tardiness and/or absences
- Failure to prepare for class, assignments or clinical rotation
- Dress code violation
- Safety violation
- Patient confidentiality violation
- Network access and door access violation
- Disruptive or combative behavior

Each student will have an opportunity to review and make comments on the Affective Professional Behavior evaluation before it is placed in their file. Depending on the severity of the behavior violation, a behavioral remediation plan may be offered. However, students who demonstrate serious professional behavior issue or partake in criminal activity will be dismissed from the program immediately.

Any USCA affiliated student who wishes to appeal a PAG-CLS program grade and/or decision should follow the outlined Grievance Procedure on the USCA Judicial Affairs website and a Satisfactory Academic Policy on the USCA Financial Aid website or the PAG-CLS Grievance policy under the Program Dismissal section here in the handbook.

Safety

Although a career in clinical laboratory science is rewarding, it is not without some risk to exposure to infectious, toxic chemicals and other hazards. To ensure the health and safety of each student, faculty and instructor, each individual is required to receive annual safety training. Additionally, each individual is required to participate in annual exit fire drills. Furthermore, to ensure safety, the laboratory is a restricted access location in which only those who have badge access can enter or those who are escorted by laboratory personnel. All Piedmont Augusta lab employees, students and guests must adhere to the health and safety guidelines outlined by Piedmont Healthcare System and laboratory. Although the CLS program goes to great lengths to ensure that each student, faculty and instructors' safety, safety is ultimately up to each individual. Each individual must proactively take the initiative to learn, understand and follow the safety procedures taught. Additionally, if a student has any safety questions or concerns, they should see their faculty/clinical instructor or the program director.

Dress Code

Each student is encouraged to present a professional appearance at all times. Students must adhere to the dress code devised by the PAG-CLS Program. The following constitutes the established dress code requirements:

- Teal colored scrub pants and white colored scrub top are the accepted and mandated attire for USCA/PAGS CLS students. Scrubs should be clean, neat, in good repair and of the proper size and fit. Tops or shirts worn under the scrub top must be either solid white, teal or black in color.
- The PAGS laboratory will provide the necessary personal protective equipment (PPE) for each student, including (a) lab coats, (b) protective facial shields, and (c) gloves, which must be worn at all times at the bench.
- Identification badges will be worn at all times. Badges should be worn on the shoulder area of the upper torso. The ID picture and name must be clearly visible at all times. No other items (i.e. pins, stickers) are permitted on the ID badge.
- Hair, including facial hair, should be clean and well groomed. Hair below the shoulder must be tied back or up with a proper hair piece. All hairstyles should be in compliance with the appropriate health and safety requirements.
- Cosmetics should be used in moderation.
- Tobacco products (i.e. cigarettes, vapes) are not visibly permitted during the clinical rotation except during breaks in the permitted tobacco use areas.
- Closed toe shoes (i.e. athletic/tennis shoes) must be worn at all times.
- Jewelry not permitted includes (a) earrings that dangle below the ear (b) long necklaces and/or bracelets, and (c) body piercings other than the earlobes. Tattoos will be covered at all times.
- While in class and the laboratory, pager/cell phone usage will be prohibited.
- The lab is a scent free zone. Therefore, the use of colognes, perfumes, body sprays and scented lotions are not acceptable.
- Lab coats must be worn during lab. They serve to protect your clothes from contamination due to splashing and staining.

- Safety goggles and face shields should be worn/used when working when chemical or biological splashes are likely to occur.
- Gloves must be worn when handling blood, biological specimens and hazardous chemicals or agents.

Laboratory Safety

Students are expected to adhere to all of the safety regulations and guidelines for each clinical rotation site, both institutional and departmental. Student must adhere, but are not limited to the following:

- Refrain from horseplay in the clinical laboratory areas.
- Be aware of your surroundings and potential safety hazards (i.e. frayed cords, boxes stored in walkways, faulty equipment or instruments). Notify your instructor of any potential unsafe conditions.
- Dispose of sharps, chemical, biohazardous and general waste appropriately.
- Do not eat, drink, store food or apply cosmetics in the laboratory.
- Place soiled lab coats in the appropriate bins. **Do not take lab coats home to launder.** Disposable lab coats are available upon request.
- Know the location of fire extinguishers, fire blankets, eyewashes, showers, and how to use them properly.
- Know your safety exit routes in case of a fire.
- Know the locations of the Safety Data Sheets (SDS) sheets for each clinical rotation area.
- Clean up spills promptly and appropriately for the type of spill according to the SDS and/or laboratory procedure.
- Report all accidents (i.e. chemical or biological spill, needlestick injury, mucosal exposure to blood or body fluids) to the clinical instructor or supervisor immediately and follow the clinical site accident reporting and follow-up protocol.
- Clean your lab work area with the appropriate disinfectant (i.e. 10% bleach, germicidal wipes) after each laboratory session or shift.
- Follow the manufacturer's instructions for operating equipment and instruments as well as the outline for laboratory procedures when performing tests.
- When in the lab, **store your personal items in the designated area**.
- If you have an allergic reaction, speak to your clinical instructor and/or the program director about any medical condition you might have which would affect your performance in lab.
- Wash your hands before and after laboratory procedures, before putting on and after taking off gloves and before leaving the laboratory.
- Small body lesions should be cleaned and appropriately covered with a Band-Aid or dressing to prevent infection.
- Students must have the current Influenza and Hepatitis B vaccines before starting clinical rotations.
- Do not invite or allow individuals not registered in the clinical practicum into the laboratory area without the express permission of your clinical instructor and/or program director. Student visitors are prohibited.
- Refrain from being under the influence of illegal drugs, un-prescribed controlled drugs, alcohol or inhalants while in the clinical setting.
- Refrain from any act of negligence that could cause harm to someone including yourself.

Incident Report

In the event of any laboratory accident, students should notify the CLS faculty/instructor. The instructor will assist the student in determining what level of medical attention is needed. Additionally, the CLS faculty/instructor will help the student complete an incident report. All incident reports must be forwarded to Employee Health and the program director as soon as possible. A copy of the incident report will be placed in the student file. For any potential blood borne pathogen exposure, the following guidelines should be followed:

1. Immediately stop what you are doing and seek assistance.
2. For percutaneous injuries, briefly induce bleeding from the wound and remove any foreign materials. For any exposure, promptly wash hands or wash/rinse/flush the anatomical area involved.
3. For eye exposures, go to the nearest eye washing station and flush your eyes while open for at least 15 minutes.
4. Notify your immediate CLS faculty/instructor.
5. Go to Employee Health promptly.
6. If Employee Health is closed, page the Administrative Supervisor or dial 0 for the operator.
7. Complete the required incident report and fax the report to 706-774-5935 and submit the incident report to the program director.
8. Following a significant exposure, the source patient's blood is tested for HBsAg, and HCV antibody.
9. If the student is to be tested, HIV testing is done. Note: The test results assist in determining the need for continued intervention. However, the test results are usually not available at the time of exposure to assist with the initial risk assessment. At the time of exposure, risk assessment relies primarily on the existing knowledge available of the patient's status and a careful evaluation of the incident.
    a. Significant exposure is defined as:
        i. Percutaneous injuries such as skin punctures from contaminated sharp objects (i.e. needles, lancets).
        ii. Non-intact skin, mucous membranes (i.e. mouth, nose) or conjunctival (eye) contact with blood, body fluids or other potentially infectious material.
        iii. A list of the body substances of concern is located in the Occupational Exposure to Blood borne Pathogens, Exposure Control Plan.
10. All students are responsible for reporting to Employee Health to complete the exposure evaluation as soon as possible but within 72 hours post-incident.
11. Following each potentially significant occupational exposure, Piedmont Augusta Employee Health provides post exposure immediate clinical evaluation, testing and provision of PPE for students at no charge. Students are responsible for any further requirements from their Student Health or primary care provider.
12. HIV evaluation should occur within 1-2 hours after exposure for the following reasons:
    a. To establish HIV baseline status at the time of exposure.
    b. If the source person is seronegative for HIV, student baseline testing is normally not necessary and further follow-up may not be required.
    c. Post Exposure Prophylaxis (PEP) for HIV is potentially toxic. Therefore, PEP use must be scrutinized for exposures that pose a negligible risk for HIV transmission.
    d. The time following a potential exposure to HIV is stressful and may make decision making difficult. Therefore, it is strongly recommended that students discuss potential HIV and other blood borne pathogen exposure with their personal physician before an exposure incident occurs and have a plan regarding antiviral prophylaxis. A delay in PEP treatment can interfere with the potential benefits of the prophylaxis.

Hematology and Coagulation Clinical Rotations Objectives and Procedures

Upon completion of the Hematology clinical rotation, the CLS student will be able to:

Specimen Handling and Processing

- Comply with the standard operating procedure for specimen handling and distribution.
- Following departmental protocol, demonstrate safe work practices by:
    - Wearing personal protective equipment (PPE) as required.
    - Handling and disposing of contaminated materials according to standard precautions.

    - Handling chemicals according to safety procedures.
- Accept specimens that meet laboratory standards.
- Describe corrective measures for samples that are lipemic, icteric or contain cold agglutinins.
- Describe corrective measures for samples rejected, as a result of the following:
    - Insufficient quantity, wrong anticoagulant/preservative/tube, clotted, hemolysis, and mislabeling.

Quality Control, Quality Assurance, Regulatory Issues

- Evaluate quality control results according to criteria established for each test.
- For each piece of instrumentation/equipment used during clinical rotations: describe the daily, weekly, monthly, and periodic maintenance routines.
- Document instrument maintenance and quality control.
- Complete all work within established turn-around-time parameters.
- Report critical and discrepant results to clinical instructor/supervisor
- State the confidentiality policy of the facility during testing procedures and reporting according to HIPPA guidelines.
- Describe the process used to implement a new lot number of control material.

Technical Procedure for Hematology

- Operate automated hematology instrumentation and perform manual hematology testing with minimal supervision, making sure results are acceptable for release.
- Using the automated hematology analyzer, perform, CBCs and differentials
- Recognize abnormal flags on automated instrumentation.
- Report all critical values and/or discrepant results.
- Identify the corrective actions necessary for abnormal automated results.
- Differentiate between normal and abnormal scatter gram patterns.
- Identify normal values for the following routine tests:
    - WBC count
    - RBC indices
    - RBC count
    - Platelet count
    - Hemoglobin
    - Sedimentation rate
    - Hematocrit
    - Reticulocyte count
- Demonstrate proper technique in preparing peripheral smears for microscopic examination (peripheral blood smears for acceptable cellular distribution and staining).
- Perform normal and abnormal peripheral smears with 95% proficiency.
- Prepare platelets estimates that agree within 20% of an automated result.
- Identify abnormal red cell morphologies including, (a) microcytes, (b) macrocytes, (c) ovalocytes, (d) spherocytes, (e) target cells, (f) sickle cells, (g) schistocytes, (h) burr cells, (i) teardrops, (j) acanthocytes, (k) elliptocytes, (l) and rouleaux.
- Grade abnormal red cell morphologies according to laboratory guidelines.
- Identify white cell inclusions including toxic granulation, toxic vacuolization, Dohle bodies, Auer rods, and organisms (bacteria, yeast, parasites).
- Identify red cell inclusions including Howell Jolly bodies, Pappenheimer bodies (siderotic granules), basophilic stippling, possible Heinz bodies, malarial and Babesia parasites, and hemoglobin C and SC crystals.

- Grade hypochromia and polychromasia according to laboratory guidelines.
- Given a peripheral smear or pictorial representation, identify the stages of immature white cells.
- Given a peripheral smear or pictorial representation, identify the stages of immature red blood cells.
- Correct the WBC count for nucleated red blood cells according to laboratory guidelines.
- Given a peripheral smear or pictorial representation, recognize, but not speciate, malarial forms.
- Recognize abnormal platelet morphology.
- Perform or discuss reticulocyte counts. If performed, the results should be within 20% of technologist-recorded result.
- Explain the principle of the ESR and factors which might interfere with results.
- Perform an ESR with minimum supervision and within QC guidelines.
- Describe, perform, and interpret a sickle cell screen (solubility test).
- Associate abnormal hematological results with possible pathologies.
- Given electrophoretic patterns, recognize the normal and abnormal hemoglobin patterns on electrophoresis at pH 8.6 (A, F, S, C, A 2, E, H, Barts and Lepore).
- Assist in the proper preparation, staining, and review of bone marrow aspirate.
- Discuss the use of cytochemistry for classification of acute leukemias.
- Discuss the use of flow cytometry in the classification of acute leukemias.
- Compare and contrast chronic and acute leukemias in terms of onset and major cell type.
- Discuss the myeloproliferative and myelodysplastic disorders with reference to FAB and WHO classification, and hematologic lab findings.
- Perform at least two (2) body fluid manual cell count and differential according to standard operating procedures.
- Recognize cells specific to each body fluid type to include:
    - Histiocytes
    - Mesothelial cells
    - Malignant cells
    - Macrophages with inclusions
    - Crystals
    - Bacteria
    - Yeast

Technical Procedures for Coagulation

- Perform Prothrombin times and Partial thromboplastin times.
- Discuss the principles of the following procedures and the reagents used:
    - PT
    - PTT
    - Thrombin time
    - Fibrinogen
    - D-dimer and fibrin-split-products (FSP)
- Describe or perform:
    - Fibrinogen
    - Thrombin time
    - FSP
    - D-dimer matching technologist results.
- Describe the laboratory testing used to monitor anticoagulant therapy.
- Describe possible pathologic complications of anticoagulant therapy.
- Describe the intrinsic, extrinsic, and common coagulation pathways.

- Propose appropriate laboratory test(s) to identify factor deficiencies.
- Perform minor troubleshooting procedures of available coagulation reagent.
- Identify common pre-analytic variables that may adversely impact patient results, including:
    - storage
    - type of anticoagulant
    - volume
    - clotted sample
    - Hematocrit >55
    - Lipemia
    - hemolysis
    - Icteric
- Describe possible pathologic complications of anticoagulant therapy, including LMWH, heparin, coumadin, and other market available anticoagulants.
- When given patient history and coagulation test results, correlate thrombotic disorders with available patient history and coagulation test results.
- In addition to the procedures listed above, discuss the principle, clinical significance, and reagents used for the following coagulation tests:
    - Factor assays
    - Mixing studies
    - Lupus anticoagulant (anticardiolipin assay)
    - Factor 5 Leiden
    - Protein S
    - Protein C
    - Antithrombin assay
- Describe possible pathologic complications of anticoagulant therapy.

Urinalysis and Body Fluids Clinical Rotations Objectives and Procedures

Upon completion of the urinalysis rotation the CLS student will be able to:

Specimen Handling and Processing

- Following departmental protocol, demonstrate safe work practices by:
    - Wearing personal protective equipment (PPE) as required.
    - Handling and disposing of contaminated materials according to standard precautions.
    - Handling chemicals according to safety procedures.
- Explain the importance of proper collection and transport of specimens.
- List criteria for evaluating specimen quality and corrective actions to resolve problems.

Quality Assurance and Quality Control

- Perform quality control analysis in the urinalysis laboratory.
- Evaluate, with 100% accuracy, quality control results from a minimum of 10 days of testing.
- Perform or discuss corrective action needed to be taken if quality control values are not within established limits.
- Report or record quality control results according to the standard operating procedures of the laboratory with 100% accuracy.
- List substances that will cause false negative and false positive results in a routine urinalysis.
- Summarize the advantages and disadvantages of commonly used urine preservatives.

- State the confidentiality policy of the facility during testing procedure and reporting in accordance with HIPAA guidelines.
- Observe basic computer applications where relevant.
- Report all divergent or discordant results between quantitative and microscopic data to the clinical instructor.
- Recognize all critical values and report these findings to the clinical instructor.

Technical Procedures

- Urine specimens with 95% accuracy:
    - Describe the physical appearance.
    - Perform specific gravity analysis using the refractometer and/or dipstick methods.
    - Perform chemical analysis of the urine specimens.
    - Interpret results obtained from chemical analysis.
    - Where applicable, confirm abnormal results with appropriate confirmatory tests for a different abnormal urine specimen.
    - Interpret the confirmatory test results.
    - Perform microscopic analysis on urine specimens according to the standard operating procedure of the laboratory.
- Given a specimen or Kodachrome, identify normal and abnormal constituents in a microscopic analysis of urine specimens with 95% accuracy. These constituents include:
    - Erythrocytes
    - Leukocytes
    - Epithelial cells: squamous, transitional, renal
    - Bacteria
    - Yeast
    - Casts: hyaline, fine and coarse granular, RBC, WBC, waxy
    - Crystals: uric acid, calcium oxalate, triple phosphate, tyrosine, cystine, ammonium biurate
    - Oval fat bodies
    - Contaminants: fibers, talc, glass, etc.
- Correlate the origin and significance of the chemical constituents usually found in urine by the multi-test reagent strip methodology to include:
    - pH
    - Blood
    - Protein
    - Nitrite
    - Glucose
    - Urobilinogen
    - Ketone
    - Specific gravity
    - Bilirubin
- Explain the principle and methodology limitations of each test on the multitest reagent strip.
- Discuss the significance of the confirmatory tests used in the chemical analysis of urine, i.e., ictotest, sulfosalicylic acid, clinitest, acetest.
- Explain the principle and methodology limitations of each of the following confirmatory tests: ictotest, sulfosalicylic acid, clinitest, acetest.
- Explain the principle and methodology limitations of refractometry for urine specific gravity.
- State the reference (normal) values for all routine assays performed in the urinalysis laboratory.
- With 95% accuracy, correlate quantitative data with microscopic data.

- Correlate abnormal results with associated common disease states.
- Explain the principles of bright field, phase contrast, and polarized microscopy.
- Operate automated dipstick readers with 100% accuracy.
- Explain the physiological role of the components of the urinary system.
- For the following procedures, it is essential that the student receive hands-on experience and perform with 95% accuracy in whichever department the procedure is performed:
    - Cerebrospinal fluid analysis to include cell count, differential, chemistry
    - Fecal occult blood
    - Urine/serum pregnancy test
- Recognize cells specific to each body fluid type to include histiocytes, mesothelial cells, malignant cells, macrophage with inclusions, crystals, yeast, bacteria and others.
- Discuss or perform body fluid analysis on synovial, serous, and other fluids.
- Interpret the results obtained from performing body fluid analysis on synovial, serous, and other fluids.

Immunohematology (Blood Bank) Clinical Rotations Objectives and Procedures

Upon completion of the Blood Bank rotation, the CLS student will be able to:

Specimen Handling and Processing

- Following departmental protocol and demonstrate safe work practices by:
    - Wearing personal protective equipment (PPE) as required.
    - Handling and disposing of contaminated materials according to standard precautions.
    - Handling chemicals according to safety procedures.
- Identify the types of blood samples and collection tubes appropriate for routine testing in the blood bank.
- Determine the acceptability of a sample for compatibility testing based on sample age, sample appearance, volume, and institutional policy.
- List the information required for blood bank sample labeling.

Quality Assurance/Quality Control and Regulatory Issues

- Perform daily quality control for routine testing according to the operating procedures of the laboratory with 100% accuracy.
- Recognize discrepant results in routine ABO, Rh, and antibody screen testing with 100% accuracy.
- Report all discrepant results to the clinical instructor.
- List the quality control activities that are performed monthly, quarterly, bi-annually and annually.
- Perform or observe basic laboratory computer applications where relevant.
- State the patient confidentiality policy of the facility that complies with HIPPA guidelines for testing and reporting procedures.
- List the accrediting and inspection agencies that monitor blood banks and transfusion services.

Routine Technical Procedures - ABO/Rh, Ab Screen and DAT

- Using a “0 to 4+” scale, grade macroscopic agglutination reactions within +/- 1 agglutination grade of the instructor or staff member.
- Perform Ortho gel testing for antibody screens and interpret reactions according to parameters established by the manufacturer. Interpretations much fall between +/- 1 grade of instructor or staff member results.
- Prepare a 3-5% red cell suspension as needed for tube testing.
- Label test tubes for routine testing according to laboratory procedure without error.
- Perform ABO and Rh testing on samples with 100% accuracy.

- Interpret the results of ABO and Rh testing without error.
- Perform weak D testing on adult patient samples, if available, as well cord bloods.
- Perform ABO confirmatory testing on donor segments with 100% accuracy.
- Suggest a plan of action for the preliminary investigation of the following ABO discrepancies:
    - Hypogammaglobulinemia
    - Cold reacting alloantibody
    - Cold reacting autoantibody
    - Subgroup of A with anti-A1
    - Mixed field agglutination
    - Rouleaux
- Explain the concept of mixed field agglutination.
- Perform antibody screening on samples to the satisfaction of the clinical instructor.
- Explain probable steps taken in investigating positive antibody screens.
- Compare and contrast direct and indirect antiglobulin testing in regard to principle, procedure, and application.
- Identify sources of false negative and false positive error in antiglobulin testing.
- Perform DAT on a minimum of 2 samples.
- Discuss alternative methodologies to routine testing.
- Explain the dosage phenomenon, as well list the antigen systems most likely to demonstrate its occurrence.
- Describe possible discrepancies in forward and reverse testing and offer solutions.

Routine Technical Procedures - Cross Matching and Transfusion Management

- Label test tubes for routine compatibility testing according to laboratory protocol without error.
- Perform the appropriate cross match procedure, immediate spin (IS) or Full (IAT), on samples when given the relevant patient information and the policy of the laboratory.
- Discuss the criteria and policies of electronic cross match.
- Select the most appropriate donor units to cross match with a patient when ABO specific red cells are available and when not available.
- Select the most appropriate donor units when the patient presents with:
    - single alloantibody
    - multiple alloantibodies
    - Interpret the results of cross matching with 100% accuracy.
    - Explain possible causes of an incompatible cross match.
    - Discuss the policies for emergency release and massive transfusion.
    - Discuss special transfusion donor units to include:
        - Sickle cell
        - Irradiated
        - CMV Negative
        - Washed
- Distinguish ABO and Rh-related HDN according to clinical and serologic presentation.
- Perform or discuss the prenatal (mother) and postnatal (mother and newborn) serologic workups for managing cases of HDN.
- Observe or discuss the procedures for RhIg administration including candidate selection, FMH screening, and dosage determination.

- Compare and contrast the following adverse reactions to transfusion with regard to cause, classic signs & symptoms, and serologic investigation (if applicable):
    - Immediate Hemolytic
    - Urticarial
    - Delayed Hemolytic
    - Anaphylactic
    - Febrile Non-hemolytic
    - Bacterial sepsis
    - TRALI (optional)
    - Volume Overload (optional)
- Recommend approaches for future transfusion in patients who have experienced the transfusion reactions listed above.
- Perform or describe a minimum of 1 transfusion reaction work-up.
- Compare and contrast warm and cold reacting autoantibodies with regard to serologic presentation, related testing and transfusion approaches.

Reference Procedures

1. Perform routine antibody identification panels on a minimum of 5 samples according to the acceptable precision of the laboratory.
2. Interpret the results of routine and selected cell panels to determine the specificity of single and multiple antibodies (simple).
3. Perform or discuss the following reference techniques to assist in antibody identification.
    - Selected cell panel
    - Red cell (antigen) phenotyping
    - Enhancement media/Potentiator (Bovine Albumin, LISS, and PEG)
    - Elution
    - Pre-warm
    - Enzyme treatment
    - Neutralization
    - Adsorption
    - Saline replacement
4. Compare and contrast the serologic characteristics of antibodies specific for their respective blood group antigens:
    - Rh System Kell
    - Kidd Duffy
    - MNSs Lewis
    - Lutheran I
    - P1
5. Give 5 examples of low and high incidence antigens.

Donor /Components/Product Disposition

- Discuss the physical and medical criteria used in the selection of the following blood donors:
    - Allogeneic
    - Autologous
    - Directed
    - Therapeutic (optional)
- Describe, and, if available, perform the processing of a donor to include:
    - Donor history

    - Physical exam
    - Donor acceptability
    - Proper unit collection and handling
- Identify the blood bank serology and viral marker testing required on all allogeneic, autologous and directed units.
- Explain the preparation of the following components from whole blood:
    - Packed red blood cells
    - Fresh frozen plasma
    - Random platelets
    - Cryoprecipitate
- Identify the shelf life, storage requirements and therapeutic use of:
    - Packed red blood cells
    - Fresh frozen plasma
    - Platelets (random & single donor)
    - Cryoprecipitate
    - Frozen red blood cells
    - Leuko reduced red blood cells
    - Irradiated red blood cells
    - Washed red blood cells
    - Factor VIII & IX concentrates
    - Rh Immune globulin
- Review the daily inventory and inspection of blood products.
- Issue or observe the issue (release) of blood products for administration.

Clinical Chemistry: Clinical Rotations, Objectives and Procedures

Upon completion of the Clinical Chemistry rotation the student will be able to:

Laboratory Safety

- Comply with the standard operating procedure (SOP) for specimen handling distribution, and storage including correct triage of specimen for in house and send out laboratory testing.
- Demonstrate safe work practices following departmental protocol by the following:
    - Wearing personal protective equipment (PPE) as required.
    - Handling and disposing of contaminated materials according to standard precautions.
    - Handling chemicals according to safety procedures.
    - Dispose of waste according to laboratory protocol.
    - Describe the evacuation plan for the laboratory.

Specimen Handling

- Check for correct identification/labeling of specimens according to the current National Patient Standard from JCAHO.
- Identify specimens that may be unsuitable for analysis due to incorrect anticoagulant used hemolysis, lipemia, icteric, clot, and/or air bubbles present.
- Evaluate specimens for appropriate anticoagulant, collection time, and site of collection.
- Explain corrective measures for unacceptable specimens.
- Prepare specimens for analysis by centrifugation and separation of cells from serum/plasma.
- Describe the process for archiving and retrieving patient specimens including the correct specimen storage requirements for each analyte.

- Observe a flow path for specimen collection and processing (manual method will used if total automation is present).

Quality Assurance

- Explain the purpose of the quality control program.
- Document results of calibration, performance, and maintenance checks, malfunctions and corrections without error.
- Observe basic LIS computer applications where relevant.
- Comply with regulatory issues.
- State the confidentiality policy of the facility during testing procedures and reporting according to HIPAA guidelines.
- Explain the components of total quality management of the clinical laboratory.
- Write a procedure for an analyte according to the NCCLS guidelines.

Performance of Procedures

Analytical Principles

- Observe the sample path or flow in a minimum of 2 instruments.
- Discuss the theoretical principle for each analytical methodology.
- Recognize interfering substances for each procedure performed.
- Recognize common malfunctions of the instrument.
- Describe the effect of interfering substances for each procedure performed.
- Classify 20 different assays to their methodologies
- Define the following methodologies:
    - End-point spectrophotometry
    - Kinetic spectrophotometry
    - Ion-selective electrodes
    - Osmometry
    - Electrophoresis
    - Chemiluminesecence
    - Immunoassay
    - Fluorescent polarization

Maintenance

- Perform routine maintenance checks.
- Describe the various periodic maintenance procedures for the different instruments and maintenance sheets.

Reagent Preparation

- Prepare reagents, calibrators, and control material within the acceptable Q & A limits for 10 different assays.
- Pipet reagents and samples correctly.

Quality Control and Calibration

- Perform calibrations.
- Evaluate the validity of the standardization/calibration of the instrument.
- With 100% accuracy, identify all control results that are not within the accepted quality control limits.

- State possible reasons, if QC results are not within the limits (e.g., outside instrument limitations).
- Discuss appropriate actions for unacceptable control results.
- Observe documentation of corrective actions for unacceptable control values.

Testing of Samples

- Prepare dilutions with 100% accuracy.
- Perform testing for the equivalent amount of time for one work shift at a minimum with acceptable results and within the laboratory's timeframe specified for stat and/or routine turnaround time.
- Demonstrate the ability to organize workflow.
- Describe or demonstrate basis trouble-shooting skills for the common malfunctions.

Interpretation and Reporting of Results

- Recognize reference serum intervals and critical values for the following tests:
    - Glucose
    - Blood urea nitrogen
    - Total protein
    - Creatinine
    - Sodium
    - Total bilirubin
    - Potassium
    - Cholesterol
    - Chloride
    - Blood gases
- Identify all patient values that are significantly different (e.g. risk values, critical values, analytical errors)
- and bring these to the attention of the technologist immediately.
- According to laboratory protocol document investigative and corrective action for discrepant results.
- Determine need for repeat analysis on unacceptable reportable ranges.
- Determine whether results fit the expected pattern with respect to previously obtained results on same test or other test results on same patient.
- Evaluate patient results according to laboratory protocol.
- Perform and interpret routine calculations to include dilutions, anion gap, 24-hour urine, creatinine clearance, and LDL with 100% accuracy.
- Correlate laboratory data with clinical implications with 70% accuracy. This includes:
    - Cardiac enzymes
    - Creatinine
    - Liver enzymes
    - Blood gases
    - Bilirubin
    - Iron
    - Protein
    - Lipids
    - Glucose
    - Endocrine function
    - Electrolytes
    - Blood urea nitrogen
    - Tumor markers
    - Therapeutic Drugs

    - Drugs of Abuse
- State the difference between the analytical measurement range (AMR) and clinically reportable range (CRR).
- Correlate abnormal results to possible disease states with 80% accuracy.

Clinical Immunology: Clinical Rotations Objectives and Procedures

Upon completion of the Immunology rotation, the student will be able to:

Specimen Handling and Processing

- Following departmental protocol, demonstrate safe work practices by:
    - Wearing personal protective equipment (PPE) as required.
    - Handling and disposing of contaminated materials according to standard precautions.
    - Handling chemicals according to safety procedures.
- State the specimen collection and handling requirements for each immunologic test.
- Evaluate patient specimens for acceptability, using laboratory policy.
- If patient specimens are determined to be unacceptable, state the resolution.

Quality Control and Quality Assurance

- Prepare controls and reagents within acceptable QA limits.
- Using established criteria, determine whether or not available controls and reagents are acceptable for use according to lab protocol.
- Recognize all critical values obtained during patient testing as abnormal.
- Report critical values immediately to clinical instructor.
- State the confidentiality policy of the facility during testing procedure and reporting in accordance with HIPAA guidelines.
- Observe basic laboratory computer applications where relevant.
- Review quality control data for a minimum of 3 immunology tests performed in the laboratory.
- Evaluate quality control data according to established laboratory guidelines.
- Discuss appropriate actions for unacceptable control results.

Core Knowledge and Skills

- Demonstrate pipetting technique using all available types of pipettes.
- Pipette reagents and samples accurately.
- Calculate all specimen dilution concentrations with 100% accuracy.
- To the satisfaction of the clinical instructor:
    - Explain how to correctly calculate both serial and non-serial dilutions.
    - Explain the concept of lattice theory in antigen/antibody reactions: prozone, equivalence, postzone (and how that might impact patient test results).
    - Determine corrective action when prozone occurs.
    - Discuss the five classes of human immunoglobulins in terms of physical structure, biological activity and location(s).
    - Compare and contrast primary and secondary immune responses
    - Define the functions of the following cell types in regard to their role(s) in the humoral or cellular immune systems: neutrophil, monocyte, macrophage, eosinophil, basophil, B lymphocyte, TH lymphocyte, TC lymphocytes and NK cells.
    - Compare and contrast sensitivity and specificity.

Immunology Assay Methodologies/Instruments

- Discuss the theories/principles of operation of the following assays:
    - Latex agglutination
    - Hemagglutination
    - Immunodiffusion
    - Direct immunofluorescence
    - Indirect immunofluorescence
    - ELISA (EIA) sandwich technique
        - Western blot
        - FPIA
        - RIA
        - Flow cytometry
- Identify the common immunological application of the: fluorometer, chemiluminometer, photometer, and nephelometer.
- Perform if available, the following assays to the satisfaction of the clinical instructor: Latex agglutination, Hemagglutination, EIA.
- Observe, if available on site, the following assays: Immunodiffusion, Direct and indirect immunofluorescence, FPIA, RIA, Flow cytometry.

Bacterial Serology: Non treponemal (VDRL, RPR) Treponemal (FTA-ABS), Streptozyme, Lyme Disease

- Discuss the theory/principle of each test.
- Correlate the disease manifestations with expected test results for each assay.
- Explain the significance of reactive, weakly reactive and non-reactive results in the RPR test.
- Discuss, instances where false positive and false negative RPR and FTA-ABS reactions might be expected to occur.
- Perform RPR assay QC/calibration techniques (temperature, needle, rotator) according to lab protocol.
- Interpret with 100% accuracy a minimum of 10 RPR screening tests.
- Perform a minimum of 2 RPR titers on previously reactive specimens, matching the technologist's results within +/- one dilution factor.
- Compare & contrast the RPR and FTA-ABS assays for syphilis in terms of sensitivity, specificity, use in diagnosis, and use in monitoring therapy.
- Discuss or perform the Streptozyme assay on a minimum of 2 specimens.
- Discuss or perform the screening and/or confirmatory western blot for
- Lyme Disease on a minimum of two (2) specimens.

Viral Serology - Hepatitis A-C, EBV, HIV, Rubella, CMV

- Correlate viral markers with clinical disease for the following: Hepatitis A, B, C; EBV; HIV; Rubella; CMV.
- List the viral markers used to screen blood donor units.
- Discuss or perform a hepatitis assay.
- Explain the theory/principle of screening tests for infectious mononucleosis.
- Perform a screening test for infectious mononucleosis, matching the technologist's results with 100% accuracy.
- Observe or discuss an HIV antibody screen.
- Discuss how ELISA and Western blot tests are used to diagnose HIV infection.
- Discuss the TORCH panel with regard to its use and clinical significance.

Autoimmunity Assays - ANA, CRP, C3, C4, RF, Thyroid antibodies

- Observe, perform or discuss the following:
    - ANA assay (both fluorescence and enzyme methods)
    - CRP
    - C3
    - C4
    - RF
    - Thyroid antibodies
- When given a Kodachrome or slide, identify the following ANA patterns: homogeneous, speckled, nucleolar, and centromere.
- When given a Kodachrome or slide, correlate the patterns with the following disease states: SLE, Sjorgens syndrome, Myasthenia gravis.
- If available on site, resolve technical, instrument, and/or physiologic causes of problems or unexpected test results for each assay performed to the satisfaction of the clinical instructor.

Clinical Microbiology: Clinical Rotation Policies and Procedures

Upon completion of the Clinical Microbiology rotation, the MT student will be able to:

Specimen Handling and Processing

- Following departmental protocol, demonstrate safe work practices by:
    - Wearing personal protective equipment (PPE) as required
    - Handling and disposing of contaminated materials according to standard precautions
    - Handling chemicals according to safety procedures
    - Properly using the biological safety cabinet when processing specimen
- List criteria for evaluating specimens and requisitions for acceptability using laboratory-defined criteria.
- Apply proper specimen handling to microbiological specimens to the satisfaction of the clinical instructor in regards to:
    - Timeliness
    - Appropriateness of specimen submitted for analysis requested
    - Safety and security of collection system
    - Completeness of essential patient information
- Document rejected specimens according to laboratory's procedures for specimen rejection.
- Given any routine specimen for culture:
    - State the collection system, storage conditions, and acceptable length of storage.
    - Explain the selection and use of appropriate primary culture media for initial plating.
    - State the proper incubation temperature and atmosphere conditions for each medium.
- Given plating instructions and media selection criteria:
    - Process bacterial specimens of different types and prepare smears for Gram stain (if appropriate), to the satisfaction of the clinical instructor.
    - Demonstrate proper aseptic technique and streaking method, obtaining isolated colonies.

Quality control, Quality Assurance and Regulatory Issues

- State the purpose of quality control in the microbiology laboratory.
- Perform or state the daily or weekly maintenance checks on equipment (e.g. refrigerators, incubators, heating blocks, room temperature, water baths, and instruments) with 100% accuracy.

- Perform quality control procedures (e.g. stains, media, biochemical tests, antisera, and susceptibility tests) with 100% accuracy.
- Record all QC results with 100% accuracy.
- Report divergent results to instructor and suggest corrective actions.
- Observe basic laboratory computer operations where relevant.
- State the patient confidentiality policy of the facility during testing procedures and reporting, according to HIPAA guidelines.

Bacteriology

- Perform Gram stains, including both direct smears and cultured colonies, following established laboratory procedures.
- Evaluate stained smears for stain quality, according to established criteria.
- Read a Gram smears, with at least 10 being sputum smears and matching the interpretation of the Technologist 80% of the time:
    - Describe Gram reaction and morphology
    - Quantify bacteria and polymorphonuclear cells within +/-1 gradation of the technologist
- Demonstrate the ability to select isolated colonies from a culture plate, streak for isolation, and obtain
- isolated colonies.
- Correlate Gram stain results with isolates on culture plates, to the satisfaction of the clinical instructor.
- List the criteria for an acceptable sputum specimen.
- Screen sputum smears for the quality of the specimen, to the satisfaction of the clinical instructor.
- Recognize alpha (α), beta (β) and gamma (γ) hemolysis with 100% accuracy on culture plates.
- Distinguish between gram-positive and gram-negative organisms using Gram stain characteristics and/or growth on selective media with 100% accuracy.
- Determine the required biochemical tests for a cost-effective identification of the unknown pathogens.
- Inoculate all biochemical media and identification systems used in the laboratory, within a reasonable time limit as determined by the clinical instructor.
- Determine a positive or negative reaction for each test to include (but not limited to or exclusive of) the following, matching the technologist's results:
    - Catalase
    - Hippurate hydrolysis/CAMP
    - Slide & tube coagulase
    - Optochin/bile solubility
    - Novobiocin susceptibility
    - Commercial bacterial ID system(s)
    - Bile esculin/6.5% NaCl
    - Haemophilus ID & Neisseria ID systems
    - PYR/bacitracin/SXT
    - Oxidase
    - Spot indole
    - Streptococci grouping
- Using the information obtained from Gram stain, isolation on select media, and biochemical testing demonstrates the ability to utilize flow charts and coded system to identify the following organisms with a 90% rate of success in identification.

E. coli	*Neisseria gonorrhoeae*
Klebsiella / Enterobacter / Serratia	*N. meningitidis*
Citrobacter spp.	*Moraxella catarrhalis*

Salmonella spp.	*Haemophilus influenzae*
Shigella spp.	*Haemophilus parainfluenzae*
Proteus / Providencia / Morganella	*Campylobacter jejuni*
Yersinia enterocolitica	*Gardnerella vaginalis*
Staphylococcus aureus	*Clostridium perfringens*
Staphylococcus saprophyticus	*Bacteroides fragilis group*
Staphylococcus-coagulase-negative	*Fusobacterium nucleatum*
Group D Streptococcus	*Prevotella spp.*
Enterococcus faecalis / faecium	*Peptostreptococcus*
viridans streptococci	*Acinetobacter baumannii*
Streptococcus pneumonia/Streptococcaceae	*Pseudomonas aeruginosa*
Beta streptococci Gp A / Gp B / others	*Stenotrophomonas maltophilia*
Abiotrophia spp. (NV strept)	*Vibrio spp.*
Listeria monocytogenes	

- Discuss the isolation and identification of the following organisms:
    - *Mycoplasma/Ureaplasma*
    - *Nocardia asteroides*
    - *Actinomyces spp.*
    - *Aeromonas spp.*
    - *Burkholderia cepacia and other NFB*
    - *Pasteurella multocida*
    - *Legionella spp.*
    - *Propionibacterium*

Urine cultures: List common uropathogens.

- Recognize urethral contaminants vs. potential pathogens.
- Differentiate lactose vs. non-lactose-fermenters with 100% accuracy.
- Quantify colony counts according to laboratory protocol, matching the.
- Using laboratory criteria, determine which colony counts/isolates required identification and susceptibility testing.
- Perform/observe appropriate identification and susceptibility tests on significant isolates with 90% accuracy.

Respiratory cultures:

- Recognize normal respiratory flora on a minimum of 10 samples, to the satisfaction of the clinical instructor.
- List the primary pathogens detected in throat vs. sputum cultures.
- Using laboratory criteria, determine which isolates are considered significant for identification and susceptibility tests.
- Rule out group A streptococci in throat cultures with 100% accuracy.
- Explain the principle of rapid group A streptococcal (GAS) antigen test.
- Perform or discuss the test procedure for rapid GAS antigen test.

Genital cultures (vaginal, cervical, urethral, etc.):

- Recognize normal vaginal flora, i.e. lactobacilli.

- Evaluate specimens for the presence of potential pathogens (e.g. Neisseria gonorrhoeae, Gardnerella vaginalis and group B streptococci).
- Perform/observe presumptive identification procedures, confirmatory tests and susceptibility tests on suspected pathogens with 90% accuracy.

Stool cultures:

- List the possible bacterial pathogens for which stool cultures are routinely examined.
- Describe the appearance of each enteric pathogen on selective/differential media used in the laboratory.
- Recognize suspicious colonies of possible enteric pathogens on selective media.
- Perform or discuss appropriate identification tests including serological confirmatory tests.
- State the selective media to isolate the following and describe their appearance on this medium:
    - *Shigella spp.*
    - *E. coli O:157 H:7*
    - *Vibrio spp.*
    - *Salmonella spp.*
    - *Yersinia enterocolitica*
    - *Aeromonas hydrophila*
    - *Campylobacter jejuni*
    - *Plesiomonas spp.*
- State the optimum temperature and atmosphere requirements for C. jejuni and Y. enterocolitica.

Blood cultures:

- Describe the media used for blood cultures and the principle of the blood culture detection system.
- After performing staining of suspicious or positive cultures, detect the presence/ absence of organisms in the smears to the satisfaction of the instructor.
- Using proper sterile techniques, subculture positive cultures to appropriate media, obtaining isolated colonies.
- Using laboratory protocol, perform/observe rapid identification testing, where applicable.

Wound/body fluid cultures:

- List normal flora and possible pathogens isolated from the site.
- Using laboratory criteria, determine which isolates are considered significant for identification and susceptibility tests.
- Perform/observe appropriate identification and susceptibility tests of isolated pathogens, with 90% accuracy.

Anaerobic cultures:

- Compare and contrast the anaerobic jar and anaerobic chamber systems.
- List the types of clinical specimens that are acceptable/ unacceptable for anaerobic culture.
- List the media used for primary isolation of anaerobes and the purpose of each.
- Observe or isolate suspected anaerobic colonies.
- Perform/observe appropriate identification and susceptibility tests (if applicable) of isolated pathogens, with 90% accuracy.

Susceptibility testing:

- Explain the choice of antibiotics in relation to the test organism and clinical source.

- Perform the Kirby-Bauer disk diffusion procedure, according to the procedure manual.
- Measure zone sizes, obtaining results within 1-2 mm of the technologist's results.
- Using CLSI charts, interpret and record results without error.
- Explain potential sources of error in the Kirby-Bauer procedure and appropriate corrective actions.
- Explain the principles of the MIC microdilution procedure and the E-test.
- Perform MICs and/or E-tests to the satisfaction of the clinical instructor.
- Interpret results of MICs, matching the technologist's results.
- Perform and interpret a test for beta-lactamase with 100% accuracy.
- Describe the procedures to identify VRE, MRSA, clindamycin-resistant S. aureus (D-test), penicillin-resistant S. pneumoniae, ESBL and KPC.
- Recognize "typical" susceptibility patterns of commonly isolated organisms.
- Discuss the significance of susceptibility patterns (results) in VRE, MRSA, ESBL, KPC, penicillin-resistant S. pneumoniae, VISA, VRSA and multiply-resistant organisms (MDRs).
- Interpret algorithms for MDR organisms used for reporting purposes.

Mycobacteriology

- Describe or demonstrate the safety precautions to be taken when working with mycobacteriae.
- List the specimens most likely to be received for culture of mycobacteriae and identify which specimens need digestion/decontamination.
- List the media used in the isolation and cultivation of mycobacteriae.
- Explain why the genus *Mycobacterium* is often referred to as "acid-fast bacilli" (AFB).
- Observe, perform or discuss the Ziehl-Neelsen, Kinyoun, or fluorochrome acid-fast stain, where applicable.
- Recognize AFB in clinical or QC stained slides, where applicable.
- State the criteria and proper report format for numbers of acid-fast bacilli observed in stained smears.
- Outline the method used to digest, decontaminate, concentrate, and culture specimens for mycobacteriae.
- Observe the digestion and concentration procedure on culture specimens for mycobacteriae, if performed in lab.
- State the optimal growth requirements (temperature and atmosphere) for M. tuberculosis and NTM (non-tuberculosis mycobacteriae).

Mycology

- Describe or demonstrate the safety precautions to be taken when working with fungal isolates.
- Explain the purpose of each medium used for the isolation of fungi from clinical specimens and the optimum temperature for incubation.
- Recognize yeast vs. filamentous fungi on culture media.
- Identify the presence of Candida albicans using germ tube test, cornmeal agar, CHROMagar, or equivalent rapid test with 100% accuracy.
- Perform the yeast identification system used in the laboratory with 100% accuracy.
- Describe the preparation OR set-up a slide culture for fungal identification.
- Perform latex agglutination test for detection of cryptococcal antigen with 100% accuracy.
- Prepare lacto-phenol cotton blue or lacto-fuchsin and calcofluor/KOH preps, to the satisfaction of the clinical instructor.
- Using prepared slides, colony morphology on fungal media, CD-ROM and/or slides, identify the following molds with 90% success rate:
    - *Rhizopus spp.*

- *Mucor spp.*
- *Penicillium spp.*
- *Aspergillus fumigatus*
- *Microsporum spp.*
- *Trichophyton spp.*
- *Epidermophyton floccosum*
- *Pneumocystis jiroveci*

- Describe the microscopic and macroscopic identifying features of the dimorphic fungi.

Virology

- Discuss or observe specimen collection, handling and processing of viral specimens for direct detection and other viral assays.
- Perform or discuss an RSV antigen detection assay to the satisfaction of the clinical instructor.
- Perform or discuss at least one additional immunoassay viral detection test to the satisfaction of the clinical instructor.
- Perform or discuss viral culture techniques for the isolation and identification of some viruses.

Molecular and Rapid Diagnostic Testing

- Discuss the principles and procedures of molecular testing including GC/Chlamydia, C. difficile toxin detection and Mycobacterium.

Parasitology (Not Part of the Rotation: Student Self-Study)

- State the purpose of each of these techniques used for O&P specimens:
  - Saline direct smear
  - Iodine direct smear
  - Trichrome stain
  - Concentration (formalin ethyl-acetate)
  - Cellophane tape prep
  - Modified acid-fast stain
- If, available, perform the following techniques (if available) to the satisfaction of the clinical instructor:
  - Trichrome stain
  - Concentration (e.g. formalin ethyl-acetate)
- Using reference slides, pictures and/or preserved specimens, identify these parasites:
  - *Ascaris lumbricoides*
  - *Strongyloides stercoralis*
  - *Hookworm*
  - *Enterobius vermicularis*
  - *Hymenolepis nana*
  - *Taenia spp.*
  - *Entamoeba histolytica*
  - *Giardia lamblia*
  - *Entamoeba coli*
  - *Trichuris trichiura*
  - *Plasmodium spp.*
- In addition to the parasites listed in objective #3, identify the following parasites, using reference slides, pictures and/or preserved specimens (where available):
  - *Dientamoeba fragilis*

- *Diphyllobothrium latum*
- *Clonorchis sinensis*
- *Schistosoma spp.*
- *Toxoplasma gondii*