

De Anza College  
Medical Laboratory Technician (MLT) Program  
Acknowledgements

This handbook could not have been produced without the help and support of the following individuals. Both Susan Singer and Mara Williams graciously allowed me to adapt some of their material from the Hartnell College Handbook and from the San Jose State University CLS Handbook for use in this document.

I would also like to acknowledge the unwavering support of Pat Hassel and Dr. Stephanie Sherman throughout the implementation of the MLT Program at De Anza College.

To Our New Students,

On behalf of the Clinical Affiliates, Faculty and Staff associated with the Medical Laboratory Technician (MLT) program at De Anza College, I would like to welcome you. You have chosen to pursue an exciting and rewarding career. This program is designed to prepare students for employment in medical, clinical, research and public health laboratories. As a Medical Laboratory Technician you will have the opportunity to contribute greatly to the quality of patient care as part of the health care team.

The MLT profession will demand concentration, effort and professionalism. The educational process you have chosen to experience will allow you to grow intellectually and expand your view of our community. As a trainee you will be taught basic techniques and knowledge required for entry into the Medical Laboratory Technician profession. I hope that you will find a sense of accomplishment mastering new skill sets and acquiring the information you need to contribute to patient care.

The Medical Laboratory Technician program is designed to prepare you to be a safe and effective practitioner of laboratory testing. As a MLT, you will be expected to stay current with new developments in the field of laboratory science. In this program, you will learn the skills to become “a life long learner” who increases their expertise through continuing education and study. The major responsibility for your learning rests with you, but the instructors and staff are eager to assist and guide you as you work toward your goal.

The Student Handbook contains the policies and procedures relevant to the MLT Program. They are meant to augment the policies established by De Anza College, the Clinical Affiliates, and NAACLS and complement the information provided in the De Anza general catalog.

Please know that I am a resource for you and will be happy to assist you in any during your course of study.

Sincerely,

Debbie Wagner, MT (ASCP), CLS  
MLT Program Coordinator  
De Anza College

<b>Part 1. Introduction to the Medical Laboratory Technician (MLT) Program</b>	<b>7</b>
<b>A. Purpose of the MLT Student Handbook .....</b>	<b>7</b>
<b>B. Program Philosophy .....</b>	<b>7</b>
<b>C. Program Mission Statement.....</b>	<b>7</b>
<b>D. Program Overview.....</b>	<b>8</b>
<b>E. Program Goals .....</b>	<b>8</b>
<b>F. Academic College .....</b>	<b>9</b>
<b>G. Clinical Affiliates.....</b>	<b>9</b>
<b>H. Learning Objectives.....</b>	<b>10</b>
<b>I. Competency Checklists.....</b>	<b>10</b>
<b>J. Enrollment and Courses of the MLT Program.....</b>	<b>10</b>
<b>K. Course Descriptions .....</b>	<b>11</b>
<b>L. Clinical Practica .....</b>	<b>11</b>
<b>M. Fees .....</b>	<b>12</b>
<b>N. Faculty and Staff.....</b>	<b>12</b>
<b>O. Program Contact Information.....</b>	<b>12</b>
<b>P. On-campus Resources .....</b>	<b>13</b>
<b>Q. New Program Approval and NAACLS Accreditation .....</b>	<b>13</b>
<b>Part 2. MLT Program Policies and Procedures</b>	<b>14</b>
<b>A. MLT Admission Requirements .....</b>	<b>15</b>
1. Admission to the MLT Program as an Advanced Standing Student .....	15
<b>B. Examinations and Grading .....</b>	<b>16</b>
<b>C. Criteria for Successful Completion of the MLT Program .....</b>	<b>18</b>
<b>D. Student Evaluations of the MLT Program.....</b>	<b>18</b>
<b>E. MLT Student Conduct .....</b>	<b>18</b>
1. Attendance Requirement (didactic training).....	18
2. Attendance Requirement (Clinical Practica) .....	18
3. Professional Behavior and Misconduct .....	19
4. Ethics.....	21
5. Accountability.....	22
6. Confidentiality .....	22

- 7. Safety ..... 23
- 8. Dress Code ..... 24
- 9. Legal Responsibilities ..... 26
- 10. Photographs..... 26
  
- F. Student Records ..... 26**
  
- G. Health Policy..... 26**
  
- H. Advising and Guidance ..... 27**
  
- I. Causes for Dismissal ..... 27**
  
- J. Appeals..... 28**
  
- K. Student Grievance..... 28**
  
- L. Trainee Withdrawal/Reinstatement/Leaves of Absence ..... 28**
  - 1. Withdrawal/Reinstatement..... 28
  - 2. Leave of Absence..... 28

De Anza College  
Medical Laboratory Technician (MLT) Program  
Student Handbook  
**Forms**

<b>Form</b>	<b>Topic</b>
<b>Form 1</b>	<b>Request for Clinical Rotation</b>
<b>Form 2</b>	<b>Patient Confidentiality Form</b>
<b>Form 3</b>	<b>Blood Borne Pathogen Form</b>
<b>Form 4</b>	<b>Hepatitis Form</b>
<b>Form 5</b>	<b>Acknowledgement of Dress Code Policy</b>
<b>Form 6</b>	<b>Photo Release Form</b>
<b>Form 7</b>	<b>Statement of General Health</b>
<b>Form 8</b>	<b>Clinical Rotation Evaluation Form</b>
<b>Form 9</b>	<b>Receipt of Student Handbook Form</b>
<b>Form 10</b>	<b>Technical Skills Form</b>
<b>Form 11</b>	<b>Student Evaluation of Clinical Site Form</b>

De Anza College  
Medical Laboratory Technician (MLT) Program  
Student Handbook  
**Appendix**

<b>Appendix</b>	<b>Topic</b>
<b>Appendix 1</b>	<b>Class Planner</b>
<b>Appendix 2</b>	<b>Clinical Affiliate Contact Information</b>
<b>Appendix 3</b>	<b>MLT Core Course Objectives</b>
<b>Appendix 4</b>	<b>MLT Technical Skills/Skills Competency List</b>
<b>Appendix 5</b>	<b>MLT Core Course Descriptions</b>
<b>Appendix 6</b>	<b>Service Work Policy</b>
<b>Appendix 7</b>	<b>Student Contact Record</b>
<b>Appendix 8</b>	<b>Code of Ethics</b>
<b>Appendix 9</b>	<b>Blood Borne Pathogens</b>
<b>Appendix 10</b>	<b>Hepatitis</b>
<b>Appendix 11</b>	<b>Licensure and Professional Organizations</b>
<b>Appendix 12A</b>	<b>Program Costs</b>
<b>Appendix 12B</b>	<b>Current Textbooks</b>
<b>Appendix 13</b>	<b>Program Checklist</b>
<b>Appendix 14</b>	<b>Evaluations</b>
<b>Appendix 15</b>	<b>ASCP Standards</b>
<b>Appendix 16</b>	<b>NCA Standards</b>

De Anza College  
Medical Laboratory Technician (MLT) Program  
Student Handbook

## **Part 1. Introduction to the Medical Laboratory Technician (MLT) Program**

### **A. Purpose of the MLT Student Handbook**

A copy of the De Anza College MLT Student Handbook is provided to each student admitted to the De Anza College MLT Program. The handbook contains information specific to De Anza College's MLT Program. Part One of the MLT Student Handbook is an introduction to the De Anza College MLT Program. Part Two provides the student with De Anza College's MLT Program Policies and Procedures. Forms, Part 3, contains a copy of all forms requiring the student's signature. The Appendix, Part 4, contains information addressing licensure and professional organizations, checklists, evaluations and miscellaneous information. This handbook is designed as a supplement to the current De Anza College Catalog. Students should always refer to the current De Anza College Catalog if any questions arise about school policy.

Organization of the handbook has been made to allow the student to find general areas that might be of interest.

### **B. Program Philosophy**

The philosophy of De Anza College's Medical Laboratory Technician program is to provide a quality educational program that complies with the established essentials and guidelines of an accredited educational program for the Medical Laboratory Technician. The college recognizes that to achieve this, the student must be able to grasp technical and theoretical knowledge and to successfully apply this knowledge in a clinical setting.

The program philosophy recognizes the importance of professional standards, morals, and ethical obligations to the community while committing itself to an educational program. Development of professional competence, personal growth and effective patient care will be major areas of concentration in providing the community and the profession with entry level Medical Laboratory Technicians.

It is the policy of the Foothill-De Anza Community College District that no person shall be discriminated against in any classroom admission or employment procedure on the basis of race, color, national origin, ancestry, religion, gender, sexual orientation, age, marital status, status as a Vietnam veteran, or disability.

### **C. Program Mission Statement**

The mission of the De Anza College Medical Laboratory Technician Program is to provide students with the technical skills and knowledge needed to perform routine clinical laboratory testing in all major areas of the laboratory. In addition, we hope to give students the desire for lifelong learning and to be a vital part of the community.

## D. Program Overview

This MLT program was designed and created in order to address the needs of students, the community and the laboratory-related industry by providing a resource for competent, skilled, and knowledgeable Medical Laboratory Technicians. These technicians will be working along side and under the direction of the licensed Clinical Laboratory Scientist.

Our program's genesis was a concern, addressed by local Laboratory Managers, to continue to be competitive in the health care industry, provide cost effective testing yet maintain high standards of testing. The program was developed as a unique partnership between community colleges and Hospital clinical affiliates.

The first year of studies typically prepare students in areas of general biology, chemistry, microbiology, and phlebotomy while also completing the general education requirements for the Associate of Arts in Medical Laboratory Technology (AA) degree.

The second year courses are lectures, student laboratories and clinical rotations coordinated by the Program Coordinator and Clinical Coordinator. Classes provide specific theoretical and laboratory experiences in Clinical Chemistry, Immunology/Serology, Microbiology, Hematology, Coagulation, Immunohematology, Specimen Processing/Receiving and Body Fluids.

Also during the second year, students participate in a 21-week clinical rotation in local laboratories. During these clinical rotations, students learn to apply theoretical knowledge, learn testing procedures and gain practical exposure to laboratory operations. These 21 weeks are divided into three 216 hour rotations and one 180 hour rotation.

Upon successful completion of all De Anza College general education requirements and all courses specific to the Medical Laboratory Technician program, the student will be granted an Associate of Arts degree in Medical Laboratory Technology after petitioning for a degree with admissions and records. See the De Anza College catalogue for specific directions. Students already possessing an Associates Degree or higher will receive a Certificate of Proficiency. The MLT Program is in the process of applying for approval as a new program by the State of California. Students completing the MLT Program curriculum at De Anza College are eligible to sit for the national certification examination for MLT's.

An example of a two-year class planner can be found in **Appendix 1**.

## E. Program Goals

1. To provide students with the necessary academic instruction and professional training in the field of laboratory medicine, to meet employment needs of the local health care industry and surrounding communities.
2. To produce a skilled clinical laboratory worker who has a competent working knowledge of the principles pertinent to the laboratory tests they are performing.
3. To prepare students to become accurate and reliable members of the health care team.
4. To help students perceive their role in the delivery of health care to the patient.
5. To develop positive student attitudes in the areas of professionalism and commitment to delivering excellent health care.



6. To prepare students who are well qualified in medical laboratory practices to perform competent lab procedures for the patient.
7. To carry out the education of each student in a manner which encourages further education, participation in community service, maintenance of special interests, and development of leadership qualities in the field.
8. To achieve and maintain accreditation of the MLT program through the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS).
9. To produce graduates eligible to take and pass a nationally recognized certification examination upon completion of the program.
10. To produce graduates who have met all the requirements for a certificate or the Associate of Arts degree in Medical Laboratory Technology from De Anza College.
11. To maintain high academic and professional standards both in the program and in its students.

## **F. Academic College**

De Anza College  
21250 Stevens Creek Blvd.  
Cupertino, CA 95014  
408-864-8790

## **G. Clinical Affiliates**

(Contact information for each of the clinical affiliates can be found in **Appendix 2**)

- Community Hospital of Los Gatos
- El Camino Hospital
- Good Samaritan Hospital
- Kaiser Permanente Santa Clara Medical Center
- Kaiser Permanent Santa Teresa Medical Center
- Lucile Packard Children's Hospital
- O'Connor Hospital
- Santa Clara Valley Medical Center
- Sequoia Hospital
- Stanford Hospitals and Clinics

\* Not all of the clinical affiliates train students

## H. Learning Objectives

After successful completion of the Medical Laboratory Technician program graduates will be able to:

- A. Collect and process biological specimens for analysis. Store or transport samples for analysis using appropriate preservation methods.
- B. Perform analytical testing in Chemistry, Microbiology, Hematology, Immunohematology, and related areas.
- C. Identify and correct procedural errors or results in laboratory testing, within predetermined limits.
- D. Conduct quality control procedures on analytical tests, equipment, reagents and media.
- E. Operate and maintain laboratory equipment and instrumentation.
- F. Practice established safety procedures.
- G. Communicate effectively and behave professionally with patients, laboratory personnel and other members of the health care team
- H. Demonstrate professional awareness and responsibility expected of a medical laboratory professional.
- I. Correlate laboratory test results with common diseases or conditions.
- J. Apply basic scientific knowledge in learning new procedures.
- K. Recognize the need for and participate in continuing education activities in order to maintain and grow in professional competencies.

Objectives for MLT Core Courses can be found in **Appendix 3**

## I. Competency Checklists

Competency checklists for each MLT Core Course can be found in **Appendix 4**. These represent the minimum competencies required of each student by the De Anza College MLT Program. Individual Clinical Affiliates may develop their own checklists to reflect the diversity of tests offered at their institution. These individually prepared checklists must meet the minimum standards of the De Anza College program but may exceed those standards. These checklists address the student's performance in technical areas. Other aspects of the student's performance (in addition to their technical skill) will be evaluated using the Clinical Rotation form. (See Forms)

## J. Enrollment and Courses of the MLT Program

After successfully completing the required prerequisite courses and gaining acceptance in to De Anza College MLT Program, MLT students are required to be admitted and register for all MLT classes as students of De Anza College ([www.deanza.edu](http://www.deanza.edu)).

**Tape Recordings:** Tape recording of classes in the Medical Laboratory Technician program by students is not allowed.

## K. Course Descriptions

**Appendix 5** contains Course Descriptions for MLT Core Courses.

## L. Clinical Practica

Clinical Practica will be performed on site with the Clinical Affiliates. The duration of each practicum is as follows:

<u>Subject</u>	<u>Duration</u>
Chemistry	216 hours
Hematology, Coagulation, Urinalysis	216 hours
Microbiology	216 hours
Immunology/Immunochemistry	180 hours

**Student Service Work (during clinical practica):** Students will not be used to substitute for regular employees as part of their training. Service work by students in clinical settings outside of academic hours must be noncompulsory. Refer to De Anza College MLT Program Student Service Work Policy, **Appendix 6**, of this handbook.

## M. Fees

Students will be expected to pay fees for the classes registered for at De Anza College. Refer to the current De Anza College catalogue for an updated fee schedule. Students are responsible for providing their own uniforms, lab coats, safety glasses, and gloves. Transportation to classes at De Anza College as well as transportation to the clinical sites is the responsibility of the student.

Textbooks for the 2<sup>nd</sup> year of study are approximated to be around \$500.00. Textbook lists will be available through the College's Bookstore. Textbooks will be available in the bookstore or other sources such as amazon.com or barnesandnoble.com. Consult the college course catalog for the specific course title for the required textbooks. See **Appendix 12A**, Program Costs and **Appendix 12B**, Current Textbooks.

Refer to the respective current college catalogue for information, school policy and deadlines for refund of fees.

**Health Insurance:** California Community Colleges do not pay for a Student Medical Insurance Plan. MLT students may be able to purchase their own insurance coverage.

**Liability Insurance:** Students attending De Anza College are covered for liability insurance through the college.

## N. Faculty and Staff

### De Anza College Faculty

Debbie Wagner, MT (ASCP), CLS  
MLT Program Coordinator  
De Anza College  
S54A  
[wagnerdebbie@fhda.edu](mailto:wagnerdebbie@fhda.edu)  
(408) 864-8790

Faculty office hours are posted. Appointments are recommended. Individual instructors for classes will provide students with contact information such as phone numbers or e-mail addresses. De Anza College's Biological, Health and Environmental Sciences Division office is open 9-12 and 1:30 -4:00PM, Monday - Friday.

## O. Program Contact Information

Debbie Wagner, MT (ASCP), CLS  
MLT Program Coordinator  
De Anza College  
S54A  
[wagnerdebbie@fhda.edu](mailto:wagnerdebbie@fhda.edu)  
(408) 864-8790

Doris Spangord, MA, CLS, (ASCP)  
Chair, Biology Department  
MLT Program Director  
De Anza College  
SC1218  
[spangorddoris@fhda.edu](mailto:spangorddoris@fhda.edu)  
408-864-8341

**P. On-campus Resources**

Refer to the most current De Anza College catalogue for information on services offered by and hours of operation for:

- Career Center
- Computer Lab
- Library

**Q. New Program Approval and NAACLS Accreditation**

The MLT Program at De Anza College is in the process of applying for approval as a new program by the State of California as well as accreditation by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS) 8410 W. Bryn Mawr Ave, Chicago, IL 60631 (773) 714-8880. We will make every attempt to achieve serious applicant status by September 30, 2006 so that the students admitted in the fall 2005 will be able to sit for MLT exams shortly after graduation.

Additional information concerning the accreditation process can be found on the NAACLS website: [www.naacls.org](http://www.naacls.org).

## **Part 2. MLT Program Policies and Procedures**

This section contains the official policies of the De Anza College MLT Program. The policies will be enforced in addition to those of De Anza College and the Clinical Affiliates. However, if there is a difference between the program policy and the De Anza College policy or the Clinical Affiliate's policy, the program policies will supercede all other policies.

### **De Anza College Policies**

All Medical Laboratory Technician students must comply with the policies and procedures as stated in the De Anza College Catalog.

### **Biological, Health & Environmental Sciences Division Student Handbook**

This handbook expresses the common practices and procedures within the Biological, Health & Environmental Sciences Division. This handbook is in addition to any and all vocational program handbooks. It does not replace any other handbook. This student handbook can be downloaded from the Biology website: <http://bhs.deanza.edu>.

### **Medical Laboratory Technology Program Policies**

All Medical Laboratory Technician program students must comply with the policies and procedures as stated in this Medical Laboratory Technician Student Handbook. The regulations in this handbook are based upon present conditions and are subject to change without notice. De Anza College and the Medical Laboratory Technician program reserve the right to modify any statement in accordance with unforeseen conditions and to update and make policy and procedure changes when necessary. This Student Handbook does not constitute a contract between students and De Anza College.

### **Clinical Facilities and Clinical Rotations**

The student is an ambassador of De Anza College and, because of our involvement with the health care facilities in the community, all Medical Laboratory Technician students must comply with the policies and procedures as stated in the guidelines of the clinical facility to which he/she is assigned. The student may be assigned to a number of different clinical sites during their rotations. There is no guarantee that the student will spend their entire rotation at one clinical facility. The student must be willing and able to adapt to different environments and circumstances.

## A. MLT Admission Requirements

Students desiring to apply for admission to De Anza College MLT Program must have on file with MLT Program Coordinator the following:

1. A completed application for admission to De Anza College MLT Program.
2. Proof, via college transcript, of successful completion (“C” or better) of the following courses:
  - Chemistry with lab
  - Human Anatomy and Physiology or Biology for Biology Majors
  - Microbiology with lab
3. In addition to the above required coursework, the student will be required to have the following certifications and completed forms on file with the MLT Program Coordinator:
  - CPR for Health Care Providers certification-current
  - CA Certified Phlebotomy Technician I or II certification
  - Physician statement of general health
  - Current TB testing – two step or chest X-ray
  - Hepatitis B vaccination
  - Patient confidentiality
  - Dress Code Policy
  - Clinical rotation policy
  - Acknowledgement of receipt of student handbook
  - Technical Standards Form
4. Before participating in the clinical practica, the student will be required to have the following certifications and completed forms on file with the MLT Program Coordinator (if required by the clinical facility):
  - Tetanus or Diphtheria/Tetanus (within 10 years)
  - MMR (Measles, Mumps, Rubella vaccination or titer)
  - Varicella (Chicken pox) titer
  - Signed checklist

### 1. Admission to the MLT Program as an Advanced Standing Student

Request for admittance to the MLT Program as an advanced student should be in writing. The MLT Coordinator should receive a letter expressing your intent by December 1 for a spring admission and by July 1 for a fall admission. Depending upon the last date of your college attendance, portions of the application process may be waived. Contact the MLT Program Coordinator for details.

An advanced standing student is defined as someone with previous Medical Laboratory Technician education.

You will be responsible for reading the De Anza College Catalog to determine if there are any new requirements for admission. All applicants for admission with advanced standing will be admitted on a space available basis. If there are more applicants than places in the program for advanced standing applicants, they will be admitted on a "space available basis". The following guidelines, describing priority, will apply:

1. Students who have withdrawn from the program with a "C" or better in all medical laboratory technician courses;
2. Transfer students whose prior education is adequate to proceed in our curriculum pattern;
3. Students who at the time of withdrawal from a medical laboratory technician course ("W") had earned a passing grade.
4. Students who have received a grade of "D" or "F" in the same medical laboratory technician course they wish to repeat, or who were failing the course at the time of withdrawal, and;
5. Students who, at the time of withdrawal, had earned a grade of "D" or "F" in either the theory or clinical component of the course;
6. Students who have received a "D" or "F" in a course, or who have withdrawn from a course twice may be required to meet with a committee of faculty to determine if the circumstances causing their failures have been remediate.

## B. Examinations and Grading

### MLT CORE LECTURE AND STUDENT LABORATORY CLASSES

In order to receive a passing grade in your Medical Laboratory Technician program you will be expected to achieve a grade of seventy-five percent (75%) or better in the theoretical component of the course **as well as** in the laboratory component.

#### LETTER GRADE DISTRIBUTION

A	= 90-100%
B	= 80-89%
C	= 75-79%
D	= 65-74%
F	= below 64%

1. The individual instructor determines the weighting of quizzes/exams.
2. Unit examinations are kept in the individual student's permanent file. After grading, the student may make an appointment with the MLT Program Coordinator to review completed exams.
3. Examinations used for Challenge Tests will be kept in the Medical Laboratory Technician Office.
4. The ability to make up a missed test and/or quiz is left to the instructor's discretion. Any quiz or exam taken late may result in a ten percent (10%) penalty. In the case of extreme necessity, and following full faculty consideration, modification of the above penalty may occur.
5. The ability to turn in required assignments at a date later than the due date is left to the instructor's discretion. Students allowed submit assignments after the due date may also suffer a 10% (or higher) penalty on their earned grade. This will be up to instructor discretion.



## CLINICAL PRACTICA GRADING

Clinical rotation courses are graded and include written examinations, practical examinations, and evaluations for each department of the laboratory in which the student is assigned.

Each student will be graded at the clinical site in four areas:

1.	Lab Skills	40%
2.	Knowledge	20%
3.	Learning Skills	20%
4.	Professional Characteristics	<u>20%</u>
		Total 100 %

At the beginning of the clinical rotation in each laboratory department each student will receive a laboratory manual that will include a skills list, schedules, worksheets and evaluations. The skills lists detail the laboratory procedures to be performed. Some tests may require a minimal performance standard or only an awareness of the principles and techniques. Each student is responsible for having the skills lists signed by the clinical site instructor once a performance has been satisfactorily completed. Each student **MUST KEEP** a logbook and a current record of the clinical tests, which they have observed, assisted or performed. In addition, all attendance must be maintained and signed by the clinical site instructor on a daily basis. Failure to maintain an **up-to-date** logbook may impact your completion of your skills list.

The skills list, **Appendix 4**, will be your guideline during the clinical rotation as you are learning clinical and technical skills. Your clinical site instructors are a resource when you have questions about your performance.

Your clinical rotation is a guided, supervised experience; you are coached and counseled so you will continually grow in your ability to carry out safe, professional medical laboratory tests and procedures. Completed skills list will be submitted to Admissions and Records with your grade as an illustration of tasks completed. Students **must** perform the minimum amount of tests or procedures as stated in the skills list and achieve an acceptable level of performance per skill to "pass" a clinical rotation.

Near the end of each rotation, your clinical competency will be evaluated. You will be asked to perform the important skills you have been introduced to and used during the rotation in the hospital setting. Your performance on these competency examinations will influence your grade for the course. Opportunities will be provided for you to become proficient in the skills in which you will be tested. For additional time or experience to practice skills outside the clinical rotation contact the MLT Program Coordinator.

Each student will receive a clinical rotation **evaluation** by the clinical site instructor(s); these will account for a percentage of the student's grade. The student will also be evaluated by the clinical instructor on non-technical performance; both the student and the clinical instructor will sign each evaluation. A passing grade must be achieved in both areas of the course. Areas of disagreement may be included on your evaluation sheet and placed in your student file. These evaluations will take place on the last day of the rotation.

Once a rotation and all associated graded items have been completed, the clinical instructor calculates the final grades based on your achievement of the clinical performance objectives as stated in your course outlines and, where applicable, the clinical competency examination, reviews the forms with the student, and retains these records in the student's file at the appropriate College. The completed skills list is also included in each student's permanent file.

These lists are also turned into admission and records as an illustration of activity during their clinical rotations.

### C. Criteria for Successful Completion of the MLT Program

To successfully complete the MLT Program, trainees must have a complete program transcript, which includes:

- Documentation of an acceptable level of performance on the exams given during lecture, student laboratory and clinical practica.
- Documentation of an acceptable level of performance on practical examinations given during student laboratories and clinical practica.
- Documentation of an acceptable level of professionalism in their interaction with co-workers, patients, and other customers of the laboratory (nurses, doctors, administrators). Documentation of effective communication skills, productivity, aptitude for problem solving and initiative. Documentation that the student is punctual and conforms to the schedule given to him or her by the clinical affiliate and De Anza College. The student's performance in these areas at the clinical affiliate will be evaluated by the Education Coordinator (with assistance of the clinical laboratory scientists training the student) at least once each rotation using the MLT Student Clinical Laboratory Non-technical Evaluation form. The Program Coordinator using the Lecture/Lab Training Evaluation form will evaluate student performance in these areas during the didactic training. A copy of each of these evaluation forms will be reviewed and signed by the student and placed in their file.

When the student has passed all the required courses and practica, they will be awarded a certificate of proficiency or an AA degree from De Anza College.\* The student is not required to pass state or national license exams to graduate from the program.

\*The MLT Program at De Anza College is in the process of applying for approval as a new program in the State of California.

### D. Student Evaluations of the MLT Program

Clinical Rotations: At the end of each rotation, students will be asked to complete the Student Evaluation of Clinical Site form. The form can be found in **Part 3** of this handbook, Forms.

### E. MLT Student Conduct

#### 1. Attendance Requirement (didactic training)

The MLT Program student must meet the established attendance requirements of De Anza College. Please refer to the most current De Anza College catalogue for specific information.

#### 2. Attendance Requirement (Clinical Practica)

The Medical Laboratory Technician student will attend all clinical rotations as assigned, except in the case of personal illness, death in the immediate family, and/or at the discretion of the clinical instructor and the Medical Laboratory Technician Program Coordinator. Transportation is the responsibility of each student; lack of transportation **does not** constitute a reason for absence.

Students are expected to attend all clinical days. It is the student's responsibility to notify their assigned clinical instructor and MLT Program Coordinator, prior to the start of a clinical day, if

the student is going to be absent or late. Failure to telephone the clinical instructor and the Program Coordinator will weigh heavily on the clinical rotation evaluation.

Clinical time is highly structured; therefore, there will be NO MAKE-UP time for clinical practica. Absences may result in dropping a particular rotation; resulting in enrollment at another time, as space is available.

**IN THE EVENT OF A CLINICAL ABSENCE THE STUDENT MUST:**

1. Contact the clinical faculty-before the clinical starting time. **THIS IS YOUR #1 PRIORITY!** Asking a fellow student to inform the instructor of the absence is not acceptable. The student must inform the instructor personally.
2. When a student is absent from clinical rotations due to illness, the instructor may request a written approval from the student's physician before the student returns to the clinical area.
3. Contact the MLT Program Coordinator, at her/his office, (408) 864-8790. Leave a message on voice-mail. Call no later than one hour after the scheduled starting time for your scheduled shift.
4. In the event of a catastrophic situation (death in the immediate family, hospitalization, etc), and you can not attend clinicals, the Program Coordinator must be notified immediately, so that the clinical time can be used effectively by another student.
5. No scheduled personal appointments are to be made during clinical hours.

**FACTS CONCERNING CLINICAL FACILITY ROTATION:**

1. **Starting a clinical rotation is required within 9 months of the students' successful completion of the appropriate academic class(s) instruction for that specific clinical rotation. An exception will be made if the MLT Program Coordinator is unable to secure a clinical rotation within this time period.**
2. Request for a clinical rotation is recommended as soon as passing scores for MLT core courses currently enrolled has been achieved (or there is reasonable expectation of passing.) Requests for any clinical rotation may or maynot be granted if any MLT core course grade's (current or past) are failing. (this will be determined on a case-by-case basis). See Request for Clinical Rotation Form, Part 3 Forms, of handbook.
3. Students are enrolled in a clinical training **ONLY** after mutual agreement between student, coordinator, and facility.
4. Student's individual choices relative to time and facility are considered first come first serve, but are not guaranteed.

**UNDERSTANDING BETWEEN THE MLT PROGRAM AND DE ANZA CLINICAL AFFILIATES**

1. Generally, no more than one student at a time per department.
2. No more than one student will be assigned to a facility until all facilities have a student.
3. Orientation to safety and confidentiality issues occur with the clinical facility's education department prior to or soon after a clinical rotation begins. Laboratory safety policies are reviewed by laboratory personnel on the students first day of rotation.

**3. Professional Behavior and Misconduct**

As a student, you will be expected to act with the highest degree of integrity, honesty and trust. De Anza College has certain established rules of conduct, which serve as guidelines for student behavior at on-campus and off-campus functions supervised or sponsored by the College. Student misconduct is subject to disciplinary sanctions administered by the College. The College has identified the following rules of misconduct. The usual and customary definition of these applies; specific examples for medical laboratory technicians have been added, not as an exclusive list, but to serve as a guide for your behavior. **NOTE: Misconduct, therefore is to include but not be limited to these examples.**

1. Dishonesty, such as cheating, plagiarism, knowingly furnishing false information to the College.  
**Example:** Copying from another student's paper; recording results for a procedure that was not actually done; giving false information about absences or attendance at clinical sites; giving a false address or personal information.
2. Forgery, alteration, or misuse of College documents, records, or identification.  
**Example:** Signing someone else's initials on a laboratory requisition; changing information on an official transcript; misrepresentation of material used for admission or graduation.
3. Obstruction or disruption of instruction, administrative process, College activities.  
**Example:** Loud, argumentative, boisterous behavior in the classroom or clinical site; verbal abuse of patients and/or their families, college and/or clinical site staff or peers.
4. Physical abuse of any person or conduct, which threatens or endangers the health or safety of such person.  
**Example:** Restraining a patient against his/her will; unwelcome sexual advances to patients, staff or peers.
5. Theft of, or non-accidental damage to College or clinical site property or of any member of the College or clinical site community.  
**Example:** Removing hospital property for your own use; taking materials from the College laboratories.
6. Unauthorized entry to and use of College or clinical site property.  
**Example:** Using the College or clinical site laboratories at unofficial times without instructor approval and using equipment for personal testing or use.
7. On campus property, the sale, use, possession or distribution of drugs and/or alcohol, except as permitted by law.  
**Example:** Drinking of alcoholic beverages before or during assigned College classes or clinical rotations; use of narcotics without Doctor's written authorization; suspicion of drug use or sale of drugs; coming to the classroom or clinical site with the smell of alcohol on your breath.
8. Violation of College policies or campus regulations concerning the registration of student organizations, the use of College facilities, or the time, place and manner of public expression.  
**Example:** Use of facilities when not authorized; not complying with established guidelines for use of facility, e.g., alcoholic beverages on campus or at clinical site.
9. Failure to comply with the directions of College officials acting in performance of their duties.  
**Example:** Failure to adhere to faculty directions regarding agency rules governing parking, use of facilities, dress code, laboratory duties.

10. Gambling on College or clinical site property.  
**Example:** Card playing for profit or gain in any area of College or clinical site.
11. Conduct off campus detrimental or degrading to the welfare and well being of the College community.  
**Example:** Misconduct at an off-campus activity; defamation involving faculty, clinical staff or patients; breach of trust regarding the use of confidential information about patients.

Extracted from: Title 5 – California Code of Regulations

12. Evidence of impairment by alcohol, drug use or emotional distress.  
**Example:** If an instructor encounters such evidence, the faculty member has the immediate responsibility of removing the student from the clinical area, and to offer appropriate assistance, either directly or by referral. The faculty believes that alcoholism, drug abuse, or emotional illnesses are diseases, and should be treated as such. Even though these diseases may render a student temporarily incapable of providing safe patient care, students who have these diseases can be helped to recover. If the faculty identifies evidence of such diseases in a student, it is the student's responsibility to voluntarily seek diagnosis and treatment.

You will be expected to abide by these rules when you are on campus or off-campus at functions supervised or sponsored by the College. The clinical setting, whether it is the hospital or a community agency, is considered an extended campus and all College policies apply.

Patients have the right to be cared for by competent practitioners. If student work is unsafe, and a potential for patient jeopardy exists, the faculty will remove the student from the clinical setting. The student is entitled to know what is unsafe, to present his/her own view of the unsafe performance, and to develop a learning contract with faculty to improve performance.

In the event of suspected drug/alcohol use, alleged abuse to patients, their families, clinical and/or college staff, the department's policy and procedures for misconduct would be followed. Depending on the nature and frequency of the incident(s), a recommendation may be made by the faculty for withdrawal from the program.

#### 4. Ethics

##### **Code of Ethics is included in Appendix 8.**

The purpose of the code of ethics policy is to ensure professional behavior in all students participating in the Medical Laboratory Technician program. The standard of ethics and conduct for the Medical Laboratory Technician student is dictated by those moral and personal qualities inherent in the profession.

##### **Ethic Responsibility**

A Medical Laboratory Technician student is expected to:

1. Be prepared for all clinical rotations.
2. Consider all information obtained regarding the patient's status as **STRICTLY CONFIDENTIAL**, and not to be discussed with anyone except the instructors, peers, and hospital personnel responsible for an assigned patient's care. Learning experiences in the clinical rotation are to be shared only during pre-and post-conferences and other related professional sessions.

3. Use patient's initials when submitting reports on patients to instructor, never the patient's full name.
4. Consult your instructor if you feel that circumstances regarding the patient will prevent you from giving effective care (e.g., personal friend).
5. Maintain a professional attitude at all times when dealing with patients.
6. Channel any criticism of any clinical affiliate or individual through the instructor and/or Program Director.
7. Recognize that ethics\* are a part of professional behavior.
8. If you have a problem, complaint with a peer, or member of the college or hospital staff, you are urged to make every effort to resolve these differences while they are small and manageable. We are here to assist you with this kind of problem solving. Use your energy in a positive and constructive manner.

**\*ETHICS DEFINED:** A formal process for making logical and consistent decisions based upon moral beliefs.

## 5. Accountability

Accountability is a key element in the life of any professional person. It is an extremely important concept for the profession of medical laboratory technology. This means that you are responsible or accountable for the services or tests you perform on patients.

In day-to-day practice this requires you to be prepared for your clinical rotation. Should you have questions, or should a situation arise that is new or confusing, you have an obligation and responsibility to inform your instructor and to seek further guidance and direction. You will be expected to alert your instructor when you are in doubt. In the event of an unexpected occurrence, you are to contact your instructor immediately.

Accountability also requires a positive attitude about one's role in delivering quality medical care and a willingness on the part of the student to learn and practice laboratory procedures with the highest ideals.

It is important to share ideas, learning experiences and knowledge gained. This sharing and assisting each other in the classroom and laboratory accomplishes a common goal for all: **high quality care for the patient.**

Students must ensure that they perform all first-time and new skills under the supervision of the clinical instructor until they are released to do them on their own.

## 6. Confidentiality

The Health Insurance Portability and Accountability Act of 1996 (HIPPA) is a federal law that defines patients' rights to privacy and to control how their personal healthcare information is used. The law specifies who can access patients' protected, identifiable health information and when disclosure of this information is permitted. At each of the Clinical Affiliate facilities, every student will be required to review, understand and practice the confidentiality and privacy of every patient as prescribed by the law.

Students will be oriented to facility policies and will observe all procedures related to patient confidentiality and release of information during clinical rotations. Students are also cautioned to maintain the confidentiality of their peers, instructors, clinical staff, and clinical facilities. Students will keep personal beliefs and opinions a private matter. Disclosure of patient information may be cause for immediate dismissal. A breach in the confidentiality policy may be cause for immediate dismissal from the program.

During the process of training, a variety of patient information will be disclosed to the MLT student. This will be done solely for the purpose of enhancing the MLT students' knowledge and understanding of disease processes and correlating that information with disease processes. Furthermore, it will be shared with the MLT student only on a "Need-to-Know" basis as it applies to laboratory support of patient care. The MLT student understands that this information is shared with them in the strictest of confidence and HIPPA regulations must be adhered to without exception.

The MLT student will adhere to the above statements as well as the Patient Confidentiality Policies of all Clinical Affiliates. Any disclosure of patient information by the MLT student beyond the context of enhancing knowledge and understanding in a professional manner will result in **immediate dismissal** from the MLT program with no recourse. The MLT student will also be subject to actions brought against them by the patient for any breach of confidence as allowed by state and federal laws with support from De Anza College.

Guidelines for avoiding violation of Patient Confidentiality:

1. Do not discuss any patient information unless it has direct application to the material being studied.
2. Familiarize yourself with the Clinical Affiliates policy concerning Patient Confidentiality. Discuss it with the Lab Supervisor until you have a thorough understanding of the policy and how to avoid violation of their policy.
3. Avoid those laboratory employees who tend to discuss patient information out of context of patient care or in public areas. Report this behavior to the Department head, Lab Supervisor or MLT Program Coordinator as appropriate.
4. Do not provide patient information to anyone except supervisors or as instructed by supervisors. Not even the patient, their spouse, children, parents, etc.
5. Refer to a patient as "the patient" and not by their name or any other information that could identify that patient.
6. Treat all patient information as if it were your own.

Students are required to sign the Patient Confidentiality Form indicating that they have read, understand and will abide by the rules of confidentiality. This form is included in Part 3: Forms.

## 7. Safety

Laboratory personnel must constantly be aware of the potential that they have for spreading and contracting infectious diseases. Adherence to strict infection control procedures helps to prevent contracting infectious diseases in the laboratory environment. Strict adherence to "Standard and Universal Precautions" will be followed in all student laboratory courses and clinical practica. In addition, all classes will be conducted in a manner that adheres to the mandates of Occupational Safety and Health Association (OSHA).

Information on Blood Borne pathogens and Hepatitis B is provided to the MLT student for their review and understanding in **Appendix 9** and **10** of this student handbook. By signing the Blood Borne Pathogen Release form and the Hepatitis Vaccination form (Part 3 of this handbook) you are acknowledging that you are familiar with and understand this safety policy.

**Accidents or illness occurring during clinical rotation:** All Clinical Affiliates will provide health care to any student who becomes sick or injured by conditions arising out of or in the course of said student's participating in the experience at the clinical facility. Charges if any, will

be borne by the student. If a student is injured (i.e., needle stick) or becomes ill while in the clinical area, the following procedure must be followed:

1. The student will report the nature of the illness or injury to the clinical instructor who will then determine the action to be taken.
2. When immediate treatment is necessary, (e.g., needle stick injury), the instructor will follow the hospital policy as defined by each respective agency. Arrange for student to be seen by a physician.
3. Any De Anza College student experiencing a puncture wound must be seen by De Anza College Health Services within 24 hours of the incident.
4. When immediate treatment is not necessary, the student will be advised to consult his or her own physician and will be excused from clinical rotation at the discretion of the instructor.
5. Fill out incident notification form required by the clinical facility.
6. Fill out Non-Employee Accident form and return it to the MLT Program Coordinator or appropriate supervisor at the Academic Affiliate within twenty-four (24) hours.
7. Take the accident form to Student Services who will provide the insurance information sheet.
8. Return the copies of the insurance information sheet to the MLT Program Coordinator.
9. All forms must be filled out immediately and submitted promptly.
10. The student will report the physician's findings and expected length of absence to the instructor immediately.

## 8. Dress Code

The purpose of the dress code policy is to clarify prudent professional dress behavior and specify clinical dress requirements. These standards are the minimum. If a clinical site chooses to have more stringent requirements, the student is obligated to comply. If the clinical site is less stringent, the student will comply as stated below.

The Medical Laboratory Technician student is a representative of De Anza College and a guest in the clinical site. Each student is expected to demonstrate professionalism through appropriate attitude, personal appearance, and performance of clinical responsibilities.

A student arriving to class or lab dressed improperly will be asked to leave until such time as they meet the dress standards. Absences due to improper dress are an unexcused absence.

### GENERAL REGULATIONS AT CLINICAL SITES

1. **CLOTHES**– Clean and unwrinkled pants/skirts/dress with shirt/blouse covered with a white lab coat.



2. **LAB COAT** – A white lab coat and nametag must be worn at all times in the laboratory. A lab coat or surgical gown from the testing area should remain in the testing area. Lab coats may leave the testing site only to be laundered (if the hospital does not provide a laundry service).
3. **NAMETAGS** - Nametags should be worn at all times when the student is at the clinical site. When students are not at an activity sponsored by De Anza College MLT Program, they should not represent themselves as De Anza College MLT students by wearing their name badges.
4. **SHOES** - Sandals or open toe shoes are not permitted. White shoes with soft white soles to prevent slips/falls on hard surface floors are recommended.
5. **COSMETICS** – Facial cosmetics may be used with discretion.
6. **NAILS** – Nails should be kept short and clean. Clear or lightly tinted nail polish only.
7. **HAIR** – Hair should be clean and neat. Hair that is longer than shoulder length must be pulled back and secured so that it does not interfere with or become a hazard while working. Beards and mustaches must be neat and well trimmed. Men without beards or mustaches must be clean-shaven. At no time should the hair interfere with or obstruct the students' ability to see clearly (regardless of length).
8. **PERFUME** – Heavy (strong) perfume or cologne is not permitted; it is recommended that no fragrances be used.
9. **SMOKING** – Smoking is not permitted in any of the clinical sites, student labs or classrooms.
10. **JEWELRY** – Wedding bands, wristwatches, ear studs or small hoops (maximum of 2 per ear) for pierced ears are acceptable. No long decorative chains, necklaces or bracelets. Obvious piercing of body parts, other than ear lobes, is considered outside our programs dress code and is not allowed in the clinical setting. Piercing due to religious beliefs is dealt with individually.
11. **STANDARD PRECAUTIONS:** Gloves must be worn at all times when working with biological materials. Protective eyewear, if glasses are not worn, will be worn at all times when working with any procedure or equipment that could create an aerosol.
12. **HYGIENE** – Good personal hygiene is expected and encouraged at all times. Please use deodorant or antiperspirant daily. Special attention should be paid to breath odor.

Students are required to sign the Acknowledgement of Dress Code Policy form in Part 3 of this student handbook.

## 9. Legal Responsibilities

While you are carrying out your Medical Laboratory Technician activities, you are expected to act as a reasonably prudent Registered Medical Laboratory Technician would act, under the circumstances, based on the level of education and experience which you have had at the time.

The prudent person is one whose actions are governed by discipline, reason, skill, and good judgment in the use of resources. Your assignments are made by your instructor and are consistent with your level of preparation. You are not to exceed these expectations or your own limitations. This is not to discourage you from growing and learning. It means that **WHEN YOU ARE IN DOUBT, YOU ARE TO STOP WHAT YOU ARE DOING AND SEEK FURTHER GUIDANCE AND DIRECTION.** Except in a life-threatening emergency, you are not to accept direction or guidance from anyone except your instructor. You are to question, when in doubt, and not to proceed beyond what you reasonably believe you are capable of accomplishing in a safe manner. There are no “dumb” questions; only questions for which we seek answers.

Student Medical Laboratory Technicians are expected to provide the same level of care as graduate medical laboratory technicians for the task that they perform. The faculty will assure that you are safe and competent to implement laboratory procedures in the hospital by documenting your performance.

Students will be expected to prepare carefully and in advance for clinical rotations. Students may be removed from the clinical setting if found to be unprepared to perform specific tasks or skills required by the course or the clinical affiliate.

## 10. Photographs

Students who sign the photo release form may expect to appear in photographs or media (Internet included) presentations as part of their educational experience. A photo release statement will be presented to the student before participation in the MLT Program. (See Part 3, Forms)

## F. Student Records

The purpose of the confidentiality policy is to ensure student privacy and safety. The information concerning student records, maintained by De Anza College, is provided in compliance with the Federal Education Rights and Privacy Act of 1974. The student may refer to the De Anza College catalog for the specifics on this Act.

The student's file, which is kept in the De Anza College MLT Program Coordinator's office, is available for your review. The file can be reviewed but not removed from the office. Please make an appointment with the MLT Program Coordinator if you want to review your file.

## G. Health Policy

The purpose of this policy is to clarify health requirements. Progression through the MLT program, in good standing, depends in part on the maintenance of satisfactory sensory, psychosocial, and cognitive health. A student may be asked to withdraw from the MLT program if there is documented evidence to suggest the safety of the student, peers, patients, or faculty may be threatened by the clinical or technical performance of the student.

Students are asked to sign a statement of health to safely perform the essential skills of a Medical Laboratory Technician student. Falsification or omission of information requested on the student's health statement is grounds for dismissal from the MLT program. Signatures indicate that the student accepts responsibility and liability for his/her own condition.

## H. Advising and Guidance

The Program Coordinator and Education Coordinators are available to meet with students for advising. Advising sessions will be documented by the Education Coordinator/Program Coordinator using the Student Contact Form. Refer to **Appendix 7** for an example of the Student Contact Form.

## I. Causes for Dismissal

A student may be dismissed from the program for a variety of reasons including, student misconduct, attendance, failure to achieve sufficient technical skill, failure to perform adequately academically or other reasons described in this document. The program Coordinator is responsible for initiating formal dismissal procedures for trainees in the De Anza College MLT Program.

See the De Anza College Catalog catalogue for any questions about the proper procedure to follow.

Examples of Student Misconduct specific to the Medical Laboratory Technician Program are as follows:

### I. REGULATING:

Examples:

1. Gross negligence in standard of care.
2. Incompetence.

### II. ETHICAL:

Examples:

1. Performs procedure with inadequate or insufficient supervision.
2. Not holding information entrusted to him/her in confidence.
3. Cheating during written or clinical performance examinations.

### III. BIOLOGICAL, PSYCHOLOGICAL, SOCIAL, CULTURAL:

Examples:

1. Unable to function well while under stress.
2. Renders self unfit to perform due to drugs or alcohol.
3. Refuses to work with another based on racial or cultural basis.
4. Demonstrates consistent lack of compassion or caring for patients.

### IV. ACCOUNTABILITY:

Examples:

1. Recording a test result that was not done.
2. Not recording a test that was performed, resulting in the test having to be repeated.
3. Valid evidence of lack of theoretical and/or clinical knowledge.
4. Carries out procedures without validating written orders.
5. Blames others for own mistakes.

### V. HUMAN RIGHTS: (shows respect for individual including client, faculty, staff, self)

Examples:

1. Is discriminatory in his/her care and treatment of patients, i.e., refuses to deal with patients on the basis of race, sex, ethnic origin, religion, handicap, or sexual preference.  
EXCEPTION: Where the students' beliefs prevent them from participating in care.
2. Is verbally or physically abusive to client, peer, faculty, staff or physician (e.g., restrains a patient against his/her will when it is not an issue of safety).

## **J. Appeals**

A student may appeal actions of the De Anza College MLT Program via the policies and procedures outlined in Sections 41301 through 41304 of Title 5, Education, California Code of Regulations. Decisions made by the De Anza College MLT Program can also be appealed using the NAACLS Complaint Procedure. Refer to the NAACLS website: [www.naacls.org](http://www.naacls.org) for information.

## **K. Student Grievance**

The student is urged to consult with their Program Coordinator or Education Coordinator concerning any problems or grievances that they might have while in the course of their training. The Program Coordinator will attempt to ameliorate any problems or mediate disputes that occur. If the Program Coordinator is unable to address the issue to the satisfaction of the student, the student may speak to: the Program Director, Health Technology Chair or the Dean of Biological Health & Sciences. However, if the student is not satisfied with these attempts to mediate the dispute, De Anza College has set up the Student Grievance Procedure. For information on this process, refer to the current De Anza College catalogue.

## **L. Trainee Withdrawal/Reinstatement/Leaves of Absence**

### **1. Withdrawal/Reinstatement**

Students who wish to withdraw from the Medical Laboratory Technician program are asked to seek the assistance of a faculty member, a counselor, and/or the MLT Program Coordinator. Consult the De Anza College catalog for the proper procedure so that you will not be penalized academically. (Ordinarily, if neither the first or second attempts to complete the program are successful, a third opportunity is not offered).

We suggest you to have an exit interview with the MLT Program Coordinator, so that the procedures and policies governing re-admission can be discussed with you.

Students who withdraw from the first semester of the program and who wish to return to the program may re-apply to the program and will compete with subsequent applicants. Otherwise, readmission will be on a **space available** basis.

### **2. Leave of Absence**

The Program Coordinator will explore the circumstances surrounding the need for a leave of absence on an individual basis for each student. This action will be taken only in extreme circumstances. The time the trainee is absent must be made up.

## Part 3: Forms

### Form 1: Request for Clinical Rotation

I, \_\_\_\_\_, have completed the following prerequisites and request a clinical rotation in the following department at the following clinical site:

Prerequisites:

I have taken the following prerequisites required for this rotation as follows:

Class	Semester completed/date	Grade

I have noted the following clinical site as “preferred” and stated the dates and hours of rotation. List first, second, third choice.

- Dates \_\_\_\_\_ Hours/day – Circle: 6, 8, or 10 hours
- Dates \_\_\_\_\_ Hours/day – Circle: 6, 8, or 10 hours
- Dates \_\_\_\_\_ Hours/day – Circle: 6, 8, or 10 hours
- Dates \_\_\_\_\_ Hours/day – Circle: 6, 8, or 10 hours
- Dates \_\_\_\_\_ Hours/day – Circle: 6, 8, or 10 hours

I understand it is the objective of the program to provide the best training by considering the student and the clinical site specifications. I also understand my first choice may not be possible and other students may have seniority over my request as outlined in the student manual.

\_\_\_\_\_ Date \_\_\_\_\_  
**Student**

\_\_\_\_\_ Date Rec'd \_\_\_\_\_  
**Program Coordinator**

**Notes:**

Contacted facility: \_\_\_\_\_ Date/Contact person: \_\_\_\_\_

Recommended changes: \_\_\_\_\_

Confirmed with student rotation dates and location \_\_\_\_\_ Date

## Form 2: Patient Confidentiality Form

After reading the information on Patient Confidentiality, in Part 2 of this student handbook please sign the form below.

I, \_\_\_\_\_, have read the above guidelines regarding Patient Confidentiality and agree to abide by all the stated guidelines. I understand that if I violate these guidelines I could be subject to dismissal from the MLT program.

Signature \_\_\_\_\_ Date \_\_\_\_\_

Witness \_\_\_\_\_ Date \_\_\_\_\_

**Form 3: Blood Borne Pathogens**

I, \_\_\_\_\_, have read and understand the Blood borne Pathogens information. I realize that I will be dealing with biological, pathological and surgical hazards that could be capable of transmitting infection. I also realize that I must practice **UNIVERSAL PRECAUTIONS** at all times when dealing with specimens and patients.

---

Student Signature

Date

Witness \_\_\_\_\_

---

**Form 4: Hepatitis Form**

I, \_\_\_\_\_, have read and understand the information on the Hepatitis B Virus. I have obtained and completed a series of Hepatitis B Vaccinations. I have attached a signed copy of the verification of obtaining the series of injections.

They were given by: \_\_\_\_\_

Name of Facility

\_\_\_\_\_

Address

City

State

\_\_\_\_\_

Phone

Dates given: 1<sup>st</sup> dose: \_\_\_\_\_ 2<sup>nd</sup> dose: \_\_\_\_\_ 3<sup>rd</sup> dose: \_\_\_\_\_

Vaccine Brand: \_\_\_\_\_ Lot #: \_\_\_\_\_ Exp. Date: \_\_\_\_\_

Student Signature \_\_\_\_\_ Date \_\_\_\_\_

Witness \_\_\_\_\_ Date \_\_\_\_\_

Physician Signature \_\_\_\_\_ Date \_\_\_\_\_

Printed Name: \_\_\_\_\_



**Form 5: Acknowledgement of Dress Code Policy**

I, \_\_\_\_\_, have reviewed and understand that while attending clinical rotations at the Clinical Affiliates and attending De Anza College, I must abide by the dress code policies established by the individual Clinical Affiliates and De Anza College as stated in the MLT Student Handbook. I understand that the dress code policies may vary according to the Clinical Affiliates where I am assigned. I also understand that I am representing De Anza College in the Medical Laboratory Technician program while at the Clinical Affiliates and must conduct myself according to the policies established in the Student Handbook.

Student Signature \_\_\_\_\_ Date \_\_\_\_\_

Witness \_\_\_\_\_ Date \_\_\_\_\_

## Form 6: Photo Release Form

I, \_\_\_\_\_ hereby grant authority to De Anza College to use my portrait/likeness, biological, educational, and any other information provided by me for all purposes related to the creation, development, and maintenance of the De Anza College Internet Web Site. This authority is granted without charge and is limited for use on the De Anza College Internet Web Site only.

I understand that De Anza College is not responsible for any unauthorized uses by unauthorized parties of the information or images provided.

Authority granted this \_\_\_\_\_ day of \_\_\_\_\_ month of the year \_\_\_\_\_.

I am 19 years of age or older.

Student Signature \_\_\_\_\_ Date \_\_\_\_\_

## Form 7: Statement of General Health

We request a statement of your general health from your medical health care provider (physician, physician assistant, or nurse practitioner).

Please have your medical health care provider complete this form and **return it to the MLT Program Coordinator** within six (6) months of beginning an MLT core course which has a student lab component. This statement will become part of your permanent school record. Thank you for your immediate attention to fulfilling this requirement.

Student's Name:

\_\_\_\_\_

(Print) (Signature)

Special considerations beyond the need for good general health:

Is the student capable of the required manual dexterity inherent in the performance of clinical laboratory tests (pipetting, manipulating large & small objects, computer keyboard) and does the student have the visual ability to distinguish between color reactions, read small numbers, and distinguish between clear, opaque and particulate solutions? Please list all medications currently being taken by student.

Health Care Provider's Statement of General Health:

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Are there any known physical or mental health problems that may affect progress in the educational program for Medical Laboratory Technician or participation in the clinical activities, both as a student and upon graduation for employment?

Yes \_\_\_\_\_ No \_\_\_\_\_ If yes, explain below.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Name of Health Care Provider (print or type)

\_\_\_\_\_  
 Address City State Zip

\_\_\_\_\_  
 Health Care Provider's Signature Date

**Form 8: Clinical Rotation Evaluation****Pg. 1 of 2**

STUDENT: \_\_\_\_\_

CLINICAL SITE INSTRUCTOR: \_\_\_\_\_

CLINICAL AFFILIATE: \_\_\_\_\_

ASSIGNED DATES OF ROTATION: \_\_\_\_\_

Place a check before each statement that best reflects the **overall** performance of the student.**A. Laboratory Skills: 40% (20+10+10)****Overall**, the student demonstrated skills that: (20%)

- \_\_\_\_\_ 5. Exceed minimum requirements  
 \_\_\_\_\_ 4. Fully meet minimum requirements  
 \_\_\_\_\_ 3. Meet minimum requirements  
 \_\_\_\_\_ 2. Need improvement to meet minimum requirements  
 \_\_\_\_\_ 1. Do not meet minimum requirements

**UPON COMPLETION** of the clinical rotation the student:

I. Operated a bench or work station with appropriate supervision (10%)

- \_\_\_\_\_ 5. Always competently (used time effectively, prioritizes work, handled stress.)  
 \_\_\_\_\_ 4. Usually competently (used time effectively, prioritizes work, handled stress.)  
 \_\_\_\_\_ 3. Often needed help to prioritize and complete work.  
 \_\_\_\_\_ 2. More times than expected, made repetitive errors -Note examples\*\*  
 \_\_\_\_\_ 1. Student requires more time in this area - See explanation below\*

II. Properly followed all laboratory quality control and safety procedures (10%)

- \_\_\_\_\_ 5. Always followed procedures, after initial instruction  
 \_\_\_\_\_ 4. Rare errors, more than acceptable for level of training.  
 \_\_\_\_\_ 3. Few errors, acceptable level for level of training.  
 \_\_\_\_\_ 2. Many repetitive errors, more than acceptable -examples\*  
 \_\_\_\_\_ 1. Frequently performed unsafe acts and quality control was not understood

**B. Knowledge: 20%****UPON COMPLETION** of the rotation the student: The student demonstrated knowledge of the theory and principle of procedures by:

- \_\_\_\_\_ 5. Recognizing, understanding, and able to discuss every (90%) procedure and its' relationship to the patient.  
 \_\_\_\_\_ 4. Recognizing, understanding, and able to discuss most (80%) of the procedures and their relationship to the patient.  
 \_\_\_\_\_ 3. Recognizing, understanding, and able to discuss some (70%) of the procedures and their relationship to the patient.  
 \_\_\_\_\_ 2. Recognizing, only after prompting, unable to grasp the basis of procedure and relationship to patient.  
 \_\_\_\_\_ 1. Cannot recognize or understand basis of procedures and their relationship to patient.

**Pg 2 of 2****A. Learning Skills: 20%**

- \_\_\_5. Student was an active learner, asked pertinent questions, sought out additional information, and accepted guidance and constructive criticism.
- \_\_\_4. Student was active learner, asked pertinent questions as necessary, accepted guidance and constructive criticism.
- \_\_\_3. Student performed tasks as directed, occasionally asked questions and read procedures for each test performed.
- \_\_\_2. Student performed tasks as directed but rarely asked questions or read procedures as expected.
- \_\_\_1. Student appeared distracted or bored, and was unwilling to do more than minimally necessary.

**B. Professional Characteristics: 20%**

Check the appropriate responses:

**Interaction 5%**

- \_\_\_5. Relates very well with instructors, patients, and other hospital staff in a cooperative and courteous manner. Frequently exceeded expectations.
- \_\_\_4. Relates well with instructors, patients, and other hospital staff in a cooperative and courteous manner.
- \_\_\_3. Rarely had interpersonal conflicts.
- \_\_\_2. Occasionally had interpersonal conflicts. (More than once) State examples\*
- \_\_\_1. Frequently had interpersonal conflicts. (More than twice) State examples\*

**Punctuality 5%**

- \_\_\_5. Always punctual
- \_\_\_4. Usually punctual (1-2 days late with valid reason)
- \_\_\_3. Occasionally late (more than twice)
- \_\_\_2. Frequently late (more than five times)
- \_\_\_1. Always late.

**Reliability 5%**

- \_\_\_5. Student always informed instructors when he/she would be away from the lab
- \_\_\_4. Instructor rarely had difficulty locating student
- \_\_\_3. Instructor sometimes had difficulty locating student.
- \_\_\_2. Instructor frequently had difficulty locating student.
- \_\_\_1. Instructor always had difficulty locating student

**Appearance 5%**

- \_\_\_5. Always met published dress code for trainees.
- \_\_\_4. Usually met published dress code for trainees.
- \_\_\_3. Rarely did not meet published dress code for trainees.
- \_\_\_2. Had to be sent home to meet dress code once.
- \_\_\_1. Had to be sent home to meet dress code more than once.

\*Examples from above (Use additional paper if necessary):

Additional comments: Please cite specific examples of student's strengths or weaknesses. (Use additional paper if necessary.)

**Form 8 con't**

Student Signature \_\_\_\_\_ Date \_\_\_\_\_

Instructor Signature \_\_\_\_\_ Date \_\_\_\_\_

Program Director \_\_\_\_\_ Overall Score \_\_\_\_\_

I, \_\_\_\_\_, have reviewed and understand that while attending clinical rotations at the Clinical Affiliates, I must abide by the rules and policies established by the individual Clinical Affiliates. These rules and policies may vary according to the Clinical Affiliate where I am assigned. This pertains to dress code, hours worked, assigned rotation, assigned duties (including required phlebotomy), patient confidentiality, use of hospital computer systems and additional information specific to the Clinical Affiliates. I also understand that I am representing De Anza College and the Medical Laboratory Technician program while at the Clinical Affiliates and must conduct myself according to the policies established in the Student Handbook. I have also discussed with the Program Coordinator the procedure concerning a "the clinical waiting list" and how clinical assignments are made.

Student Signature \_\_\_\_\_ Date \_\_\_\_\_

Witness \_\_\_\_\_ Date \_\_\_\_\_

## Form 9: Acknowledgement of Receipt of Handbook

I, \_\_\_\_\_, have received a copy of the De Anza College Medical Laboratory Technician program Student Handbook. It has been reviewed and explained to me, and I understand its contents and agree to abide by it as indicated by my signature below.

\_\_\_\_\_ Date \_\_\_\_\_  
Student Signature

\_\_\_\_\_ Date \_\_\_\_\_  
Witness

## Form 10: Technical Standards

Technical Standards are the essential non-academic requirements of the program that a student must be able to master in order to successfully participate in the MLT program and become employable. Examples of this program's technical standards are provided below. If you are not sure that you will be able to meet these technical standards, please consult with the MLT Program Director for further information and to discuss your individual situation.

### Visual Skills:

A student in the MLT program must possess sufficient visual skills to accurately perform and aid in the interpretation of laboratory assays, including the ability to:

- Read calibration lines on pipettes and laboratory instruments that are one millimeter apart.
- Distinguish between solutions that are clear, opaque or particulate in test tubes and/or on glass slides.
- Identify stained and unstained cellular components in the range of one-micrometer using a binocular bright-field microscope.
- Differentiate color reactions.
- Be able to easily distinguish between numbers (computer screen and printed)

### Manipulative Skills:

A student in the MLT program must possess adequate manipulative skills to perform a variety of laboratory assays, including the ability to:

- Turn dials, press keyboards, and move switches on laboratory instruments.
- Use a rubber bulb to draw liquid into a marked pipette and then use a gloved finger to control the release of that liquid to within one millimeter of a fixed point on the pipette.
- Isolate bacteria in microbiology by smoothly moving a loop (a 12-inch wire with a looped end) over the surface of an agar (gel) culture plate without tearing the surface of the agar.
- Manipulate and observe large and small objects and biological specimens without endangering the integrity of the object or the health and safety of people.

### Cognitive Skills:

A student in the MLT program must possess skills that enable him/her to coordinate with other persons both in and out of the lab, including the ability to:

- Effectively interface with customers, co-workers, physicians, and administrators: practice good hospitality habits and communication skills.
- Read, write, and communicate effectively.
- Retain a sequence of steps and go through a sequence of steps unassisted.
- Have an awareness of time sequences as determined by timed tests or assays.
- Prioritize actions during an emergency, seek needed assistance and attempt to prevent undesirable secondary effects.
- React WITHOUT impulsiveness, belligerence, and argumentative or intrusive behavior.
- Understand spatial, structural and functional relationships between objects, animate or inanimate.
- Apply principles of quantitative measurements and calculations to real problems.

### Affective:

The student should be able to:

- Maintain honest behavior at all times.
- Respect patients, peers, and faculty.
- Comply with established professional ethics.
- Accept responsibility for own actions.
- Remain receptive to change.
- React to life threatening situations in an appropriate manner and according to established policies and procedures.

The National Accrediting Agency for Clinical Laboratory Science requires specific technical standards to be defined and published for students. Please sign this form to indicate that you have read and understood the program technical standards and believe that you can meet them.

---

Student's Signature

Date



**Form 11: Student Evaluation of Clinical Site**

Site: \_\_\_\_\_

Dates: \_\_\_\_\_ to \_\_\_\_\_

Department: \_\_\_\_\_

Instructor(s): \_\_\_\_\_

Please rate the clinical rotation from 1 to 5 according to the following scale:

1-unacceptable      2-poor      3-average      4-good      5-excellent

Clinical Facility:

1.	Quality of equipment	1	2	3	4	5
2.	Quantity of equipment	1	2	3	4	5
3.	Number of procedures you performed	1	2	3	4	5
4.	Variety of procedures you performed	1	2	3	4	5

Personnel:

1.	Ability to teach	1	2	3	4	5
2.	Knowledge of subject	1	2	3	4	5
3.	Willingness to spend time with student	1	2	3	4	5
4.	Professional attitude	1	2	3	4	5
5.	Sets good example	1	2	3	4	5
6.	Accepts students	1	2	3	4	5

Would you like to be employed in this laboratory? If not, please give explanation. \_\_\_\_\_

Did you feel you were prepared for this clinical rotation? Please be specific. \_\_\_\_\_

\_\_\_\_\_  
Student signature\_\_\_\_\_  
Date

## Appendix 1 De Anza Colleges' Medical Laboratory Technician Class Planner

In order to be accepted into the Professional Year of the MLT program, California Phlebotomy Certification and Health Provider CPR is required.

<b>Course#</b>	<b>Course Title</b>	<b>Units</b>
<b>*General Education Requirements: Must be completed for AA degree</b>		
Language and Rationality		9-14 qtr
Natural Science		4-6 qtr
Arts and Humanities		8-9 qtr
Social & Behavior Science (including 1 course in intercultural studies)		8 qtr
Physical Education		<u>2-5 qtr</u>
		31-42 qtr
<b>Core Requirements/Prerequisites:</b>		
Bio 40A, B, C or	Human Anatomy & Physiology or	15 qtr
Bio 6A	Form and Function in Plants & Animals &	6 qtr
Bio6B	Cell & Molecular Bio &	6 qtr
Bio6C	Evolution, Systematics and Ecology	6 qtr
Bio 26	Microbiology	6 qtr
Chem 30A	Survey of Chem	5 qtr
Chem 30B	Survey of Chem	<u>5 qtr</u>
		31-34 qtr
<b>Professional Year</b>		
<b>Fall Quarter</b>		
HTEC80A	Clinical Hematology Lecture	4.5 qtr
HTEC 80	Clinical Hematology Lab	1.5 qtr
HTEC 85C	Clinical Chemistry I Lecture	4.5 qtr
HTEC 85A	Clinical Chemistry I Lab	1.5 qtr
HTEC 82A	Clinical Coagulation Lecture	1.5 qtr
HTEC 82	Clinical Coagulation Lab	<u>0.75 qtr</u>
		14.25 qtr
<b>Winter Quarter</b>		
HTEC 81A	Clinical Urinalysis Lecture	1.5 qtr
HTEC 81	Clinical Urinalysis Lab	0.75 qtr
HTEC 85D	Clinical ChemistryII Lecture	4.5 qtr
HTEC 85B	Clinical Chemistry II Lab	1.5 qtr
HTEC 84A	Clinical Immunology/Immunoematology Lecture	4.5 qtr
HTEC 84	Clinical Immunology/Immunoematology Lab	<u>1.5 qtr</u>
		14.25
<b>Spring Quarter</b>		
HTEC 83A	Clinical Microbiology Lecture	4.5 qtr
HTEC 83	Clinical Microbiology Lab	1.5 qtr
HTEC 280	Clinical Hematology/Coag/UA Practicum	<u>6.0 qtr</u>
		12.0 qtr
<b>Summer Quarter</b>		
HTEC 283	Clinical Microbiology Practicum	6.0 qtr
HTEC 285	Clinical Chemistry Practicum	6.0 qtr
HTEC 284	Clinical Immunology/Immunoematology Practicum	<u>4.5 qtr</u>
		16.5 qtr

### Total Credits Required 119-133 qtr

\* Graduation requirements also include proficiency in mathematics which may be met by completing MATH 105 (Int. Alg) or equivalent or higher with a grade of "C" or better or achieving a score of 3 or higher on one AP mathematics exam or satisfactory score on the De Anza College Intermediate Algebra Placement test.

Note: Alternative scheduling is available for the part-time student

This Class Planner is for illustration only and does not imply courses will be offered in the specific semesters/quarters stated.

Accreditation of MLT program by NAACLS pending. 8410 Bryn Mawr Avenue, Suite 670, Chicago, IL 60631 (773)714-8880

## Appendix 2

### Contact Information for the Clinical Affiliates

**\*\*Community Hospital of Los Gatos**

815 Pollard Road  
 Los Gatos, CA 95032-1438  
 (408) 378-6131 Fax: 408-378-1848  
[www.communityhospitalg.com](http://www.communityhospitalg.com)

**\*\*El Camino Hospital**

2500 Grant Rd.  
 Mountain View, CA 94039-7025  
 (408) 378-6131 Fax: 408-866-4003  
[www.elcaminohospital.org](http://www.elcaminohospital.org)

**\*\*Good Samaritan Hospital**

2425 Samaritan Drive  
 San Jose, CA 95124-3997  
 (408) 559-2011 Fax: 408-559-2662  
[www.goodsamsj.org](http://www.goodsamsj.org)

**\*\*Santa Clara Valley Medical Center**

751 South Bascom Ave.  
 San Jose, CA 95128-2604  
 (408) 885-5000 Fax: 408-873-1817  
[www.scvmed.org](http://www.scvmed.org)

**\*\*Stanford Hospitals and Clinics**

300 Pasteur Drive  
 Palo Alto, CA 94304-2299  
 (650) 723-4000 Fax: 650-723-0074  
[www.med.stanford.edu/sumc](http://www.med.stanford.edu/sumc)

**\*\*O'Connor Hospital**

2105 Forest Ave.  
 San Jose, CA 95128-1471  
 (408) 947-2500 Fax: 408-995-0117  
[www.dochs.org](http://www.dochs.org)

**Lucille Packard Children's Hospital**

725 Welch Road  
 Palo Alto, CA 94304-1601  
 (650) 497-8000 Fax: 650-497-8612  
[www.packardchildrenshospital.org](http://www.packardchildrenshospital.org)

**\*\*Sequoia Hospital**

170 Alameda de las Pulgas  
 Redwood City, CA 94062-2799  
 (650) 369-5811 Fax: 650-367-5100  
[www.chwbay.org](http://www.chwbay.org)

**\*\*Kaiser Permanente Santa Clara Med Center**

900 Kiely Blvd.  
 Santa Clara, CA 95051-5383  
 (408) 236-6400 Fax: 408-236-4860  
[www.kaiserpermanente.org](http://www.kaiserpermanente.org)

**\*\*Kaiser Permanente Santa Teresa**

250 Hospital Parkway  
 San Jose, CA 95119-1103  
 (408) 972-7000 Fax: 408-972-7156  
[www.kaiserpermanente.org](http://www.kaiserpermanente.org)

\*\* Clinical rotations occur at these locations.

## Appendix 3

### MLT Core Course Objectives

#### Clinical Chemistry I Lecture – HTEC 85C

**A. Demonstrate an understanding of fundamental concepts critical to any analytical procedure.**

1. Solve mathematical conversion problems presented using basic laboratory math skills.
2. Solve mathematical related problems presented using basic laboratory math skills.

**B. Demonstrate the ability to use basic supplies and equipment correctly.**

1. Categorize pipettes according to their description or use.
2. Categorize the various types of and uses for laboratory glassware.
3. Summarize the operation of and uses for laboratory balances.
4. Differentiate the parts of the microscope and summarize its proper care.
5. Compare and contrast basic separation techniques used in the Clinical Chemistry Laboratory.
6. Compare and contrast components of the filter photometer, the absorbance spectrophotometer and the reflectance spectrophotometer.
7. Compare and contrast components of flame emission photometry.
8. Create a chart detailing types of samples used in clinical chemistry, general steps for processing such samples, the proper drawing order for such tubes and the stopper color acceptable for specimen collection.
9. Assemble a chart identifying pre-analytical, analytical and post-analytical variables that can adversely affect laboratory results.

**C. Summarize the use of Standard Precautions as they apply in the Chemistry laboratory according to Occupational Safety and Health Administration (OSHA) mandates.**

1. Choose appropriate personal protective equipment when working in the clinical laboratory.
2. Explain the basic aspects of infection control policies.

**D. Summarize quality control and quality assurance as it applies to the chemistry department of the clinical laboratory.**

1. Differentiate between quality control material used in the chemistry laboratory and standards.
2. Differentiate between primary vs secondary vs reference standard
3. Evaluate the process of choosing control material.

**E. Summarize different basic laboratory methods including the mechanism of measurement and analytical limitations associated with the method.**

1. Colorimetry
2. Enzyme-linked immunassays
3. Electrophoresis
4. Ion specific electrodes
5. Fluorescence
6. Immunodiffusion
7. Polymerase Chain Reaction
8. Automated techniques
  - a) Assess the history of the development of automated analyzers in the clinical laboratory.
  - b) Evaluate three basic approaches to sample analysis used by automated analyzers.

**F. Evaluate basic characteristics of enzyme kinetics and enzyme methods of measurement.**

1. Analyze the chemical composition and properties, and the biological functions of enzymes.
2. Compare the interactions of enzyme, substrate and product.
3. Differentiate first order from zero order kinetics.
4. Calculate the velocity of reaction using the Michaelis-Menten equation, define the parameters of the equation.
5. Create a chart that documents the various factors that affect enzyme activity and expresses the effect of each.
6. Differentiate between competitive, noncompetitive and uncompetitive inhibitors.
7. Categorize enzymes by functional groups according to the reaction they catalyze.
8. Choose proper specimen, proper collection technique and handling for samples to be assayed for enzyme measurements, including interference and reference ranges.
9. Compose a list of the three test conditions that must be adhered to in enzyme measurement.
10. Differentiate endpoint from reaction rate methods for enzyme measurement.
11. Calculate enzyme activity using appropriate reporting units.
12. Categorize reasons for increased enzyme activity in serum.
13. Select enzymes of clinical interest matched with their respective organ source.
14. Evaluate the use of enzymes as reagents.
15. Evaluate the common methods for assaying enzymes of clinical significance.
16. Compare isoenzymes of clinical importance for specific enzymes.
17. Summarize alterations in clinically significant enzymes in cardiac, hepatic, pancreatic, prostatic, muscular, and bone related conditions.

**G. Compare and contrast electrolyte measurement methodologies used in the clinical laboratory and the clinical significance of laboratory results.**

1. Summarize the electrolyte composition of body compartments relative to water content.
2. Categorize the major and minor cations/anions of extracellular and intracellular water including their biological function.
3. Differentiate between electrolyte balance and anion gap and state the significance of each.
4. Evaluate the homeostatic regulation of sodium, potassium, chloride and body water.
5. Compare and contrast the analytical techniques used for testing sodium, potassium, chloride, and bicarbonate concentrations including specimen collection, interferences, reference ranges and clinical significance.
6. Create a chart illustrating causes of increased and decreased electrolyte levels.
7. Calculate osmolality, osmolal gap and an anion gap and discuss the clinical usefulness of each.
8. Diagram the factors controlling fluid movements.
9. Assess the changes in colligative properties as solute is added to solvent.
10. Estimate osmolality using the formula presented.
11. Examine the specimen considerations, interference, and reference ranges for serum and urine osmolality.

12. Assess the clinical use of osmometry and list indications for plasma and urine osmolalities.
13. Evaluate given patient data and correlate the information with a disease state.
14. Evaluate the role of the kidney in electrolyte excretion and conservation in a healthy individual.
15. Examine the usefulness of urine electrolyte results: sodium, potassium, calcium and osmolality.

**H. Examine acid-base balance and the regulatory mechanisms within the body to include the analyte, physiology involved and clinical significance.**

1. Assess acid-base homeostasis by differentiating the analytes measured and noting the difference in reference ranges for venous versus arterial samples.
2. Evaluate the buffering action of the major blood buffer systems and the importance of each toward acid-base control.
3. Diagram cellular respiration of  $O_2$  and  $CO_2$  from the lungs to the cells and back.
4. Calculate pH using the Henderson Hasselbalch equation, identify the respiratory and metabolic components.
5. Analyze acid base regulation by the lungs and kidneys.
6. Summarize the dissociation of oxygen from hemoglobin in RBC and parameters that affect it.
7. Compare and contrast the interrelationship of  $O_2$  saturation,  $PO_2$  and  $P50$ .
8. Compare the principal methods for determining pH,  $PCO_2$ ,  $PO_2$ , bicarbonate, plus various calculated parameters.
9. Choose specimens that have been correctly collected, know interferences and reference ranges.
10. Create a table illustrating acid-base disorders and state a clinical cause of each category.

**I. Examine trace elements and the regulatory mechanisms within the body to include the analyte, physiology involved and clinical significance.**

1. Diagram the homeostatic regulation of the essential trace elements.
2. Distinguish the biologic functions of the essential trace elements.
3. Analyze the clinical significance of trace elements.
4. Assess specimen collection considerations and laboratory determinations.

**Clinical Chemistry I Laboratory – HTEC 85A**  
**Expanded Descriptions: Content and Form**

- 1. Practice the use of Standard Precautions as they apply in the chemistry laboratory according to Occupational Safety and Health Administration (OSHA) mandates.**
  - a. Explain the basic aspects of infection control policies, including how and when to successfully demonstrate, via weekly performance, the first objective by using PPE during all laboratory work with hazardous material.
  - b. Relate the importance of a safety program as defined in the Safety Manual (lab manual for this course) by supplying the correct answer to questions or by demonstration of appropriate actions related to prepared simulations.
  - c. Explain the pre and post exposure prophylactic measures for handling potential occupational transmission of certain pathogens.
  - d. Select proper disinfectants to decontaminate the work area when a hazardous spill has occurred or when beginning or ending a laboratory session.
  - e. Explain the basic steps to first-aid.
  - f. Locate, describe and/or explain the following:
    - a. Evacuation routes
    - b. Biohazardous material
    - c. Blood borne pathogens
    - d. Standard Precautions
    - e. Aerosols
    - f. MSDS (Material Safety Data Sheets)
- 2. Demonstrate safe use and disposal of biohazardous materials.**
  - a. Describe how to properly segregate and dispose of various types of waste products generated in the clinical laboratory, including the use of sharp containers for needles, lancets and/or other sharps.
  - b. Demonstrate, via weekly performance, proper disposal of biological samples, as instructed by procedure or instructor.
- 3. Compare and contrast different types of chemistry laboratory instrumentation.**
  - a. State the mechanism of measurement used with each type of instrumentation noted.
  - b. Discuss advantages/disadvantages of each type of instrumentation noted.
  - c. Compare and contrast the difference between batch analyzers and sequential analyzers.
  - d. State 5 common principles of automated systems.
  - e. Perform the appropriate maintenance on instruments assigned.
  - f. Perform the appropriate calibration and quality control on instruments.
  - g. Describe and state reasons for appropriate action for quality control results outside ranges of 2SD.
  - h. Investigate and present to the class a brief summary of an automated instrument. Include: the test menu, methodology, sample and reagent requirements, and general flow of the reagent in the system.
- 4. Evaluate the difference in specimen types and how they affect chemistry analysis as part of the pre-analytical phase.**
  - a. Patient variables
  - b. Collection sites
  - c. Patient labeling and identification

- d. Sample transportation, processing and storage
  - e. Centrifugation (horizontal vs. fixed angle) and time requirements prior to
  - f. Hemolysis, lipemia, icterus
  - g. Plasma vs. serum
  - h. Whole blood vs. fingerstick
  - i. Venous, arterial, capillary
  - j. Anticoagulant and serum separator tubes
  - k. List laboratory criteria for rejection of specimens
- 5. Demonstrate, by performance, a working knowledge of basic laboratory mathematics necessary to perform tests, make dilutions and prepare solutions.**
- a. Identify, select and properly use glassware as instructed.
  - b. Define and make conversions within the metric system and simple dilutions
  - c. Differentiate the grades of water and reagents in the laboratory.
- d. Describe how to prepare solutions of various concentrations and dilutions.
  - e. Perform correctly, by demonstration, a dilution in a volumetric flask to include correct pipetting technique.
  - f. Correctly calculate mathematical simulations as described.
  - g. Demonstrate correct pipetting techniques and correct dilution techniques with the automatic pipettes provided.
  - h. Accurately perform a serial dilution in that the last tube's concentration is within an acceptable range, determined by the instructor, of a particular compound.
- 6. Explain the principle of spectrophotometry and its applications in clinical chemistry.**
- a. State Beer's law and use it to calculate analyte concentration.
  - b. Discuss the relationship between absorbance, transmittance, and concentration.
  - c. Construct and use a standard curve.
- 7. Define quality assurance and quality control and their interrelationships and differences.**
- a. Define standard and control, their use, and their differences.
  - b. Differentiate primary vs. secondary vs. reference standard.
  - c. List criteria for the selection of control material.
  - d. Construct and chart a Levey-Jennings graph for control ranges as instructed.
  - e. By performance and documentation of corrective action, state which Westgard rules have been violated.
  - f. Determine internal quality control ranges
    - 1) Use raw data to calculate a new control range for each control used in the laboratory exercise.
    - 2) Compare the newly calculated range to the insert and discuss the differences and why they exist.
    - 3) Prepare new Levey-Jennings charts and analyze the difference, if any, in out of control situations.
- 8. Define the responsibilities of the tech assigned to a POC program.**
- a. Demonstrate by discussion and correct answers the principles, procedures, expected results, quality control, sensitivity and specificity of each chemistry method assigned.
  - b. Understand the relationships between finger stick glucose, serum glucose, and whole blood glucose levels.
  - c. Perform linearity checks on one-touch glucose meters or other simple bench instruments provided.
- 9. Describe how a laboratory arrives at normal ranges and control ranges when instrumentation differs.**



- a. Discuss the reasons for the quality control difference a tech will see from one instrument to another and explain how this is managed.
  - b. Compare control ranges from different methods and relate this difference to the method.
  - c. Calculate a simple method comparison and present it to the class.
- 10. Discuss the biochemical and physiologic changes of aging and how these changes affect clinical chemistry testing.**
- a. Identify the age-related changes in clinical chemistry analytes.
  - b. Explain the problems associated with establishing reference intervals for the elderly.
  - c. Describe the effects of medications on clinical chemistry results in the elderly.
  - d. Discuss the effects of exercise and nutrition on chemistry results in the elderly.
  - e. Correlate age-related physiologic changes and laboratory results with pathologic conditions.
- 11. Discuss the adaptive changes that occur upon birth of an infant and how these changes affect clinical chemistry testing.**
- a. Discuss problems associated with blood collection from children.
  - b. Summarize some of the changes that occur in children with regard to electrolyte and water balance, energy metabolism, hormone balance, and humoral and cellular immunity.
  - c. Explain how drug treatment and pharmacokinetics are different in children and adults.
  - d. Relate the procedures used to identify inherited metabolic disorders

## Clinical Chemistry II Lecture – HTEC 85D

### **A. Investigate the proteins assayed in the clinical laboratory, identify their common methods of analysis and relate laboratory results to clinical diagnosis.**

1. Categorize simple and conjugated proteins.
2. Compare and contrast chemical and physical properties of amino acids and proteins.
3. Categorize proteins by their type of structure.
4. Categorize the biological functions of proteins.
5. Differentiate various separation techniques for proteins.
6. Evaluate principal methods for albumin, total protein and urine proteins.
7. Summarize specimen considerations, interference and reference ranges.
8. Evaluate the technique of electrophoresis and clinical application of immunoglobulin results.
9. Compare and contrast the difference in electrophoretic mobility and function relative to electrophoresis methods.
10. Select three examples of diseases that cause hypoproteinemia and hyperproteinemia.
11. Examine the importance of urine and cerebrospinal fluid protein testing.
12. Evaluate the clinical value in quantization of protein in other body fluids.

### **B. Examine the non-protein-nitrogen substances (NPNS) commonly analyzed in the clinical laboratory, identify clinically significant results, relate laboratory results to metabolism, chemical and physical properties.**

1. Compare and contrast the principal methodologies of renal function tests.
2. Examine four major physiologic functions that the kidney employs during renal function tests.
3. Diagram kidney function.
4. Summarize specimen considerations, interference and reference ranges.
5. Evaluate the purpose, principle, and technique of creatinine clearance testing.
6. Calculate 24-hour creatinine excretion.
7. Relate urine osmolality, specific gravity, and urinary protein to renal concentrating ability.

### **C. Summarize the carbohydrates assayed in the clinical laboratory, identify their common methods of analysis and relate laboratory results to clinical diagnosis.**

1. Categorize simple and complex carbohydrates.
2. Differentiate the chemical and physical properties of carbohydrates.
3. Categorize biological functions of carbohydrates including the hormonal regulation.
4. Diagram the principle metabolic pathways of glucose.
5. Summarize specimen considerations, interference and reference ranges for glucose and ketones.
6. Correlate glucose levels, glucose tolerance tests, and glycohemoglobin with diabetes mellitus and hypoglycemia.
7. Distinguish the inborn errors of CHO metabolism and how the laboratory generally tests for these.
8. Summarize the lipids assayed in the clinical laboratory, identify methods of analysis and relate laboratory results to clinical diagnosis.
9. Differentiate between the simple and conjugated lipids, lipoproteins, and apolipoproteins.

10. Summarize the chemical and physical properties of lipids.
11. Summarize biological functions and hormonal control of lipids.
12. Relate the systemic and cellular metabolism of lipids and lipoproteins.
13. Compare and contrast principle methods for triglycerides, cholesterol, high-density lipoproteins (HDL), lipid profiles and Apo-lipoproteins.
14. Summarize specimen considerations, interference, and reference ranges for individual lipids.
15. Evaluate the assessment protocol and correlation for coronary heart disease (CHD) risk.
16. Summarize lipoprotein phenotyping and the tests used to classify phenotypes.
17. Correlate lipid abnormality diseases with clinical results.

**D. Distinguish the heme-derivatives commonly analyzed in the clinical laboratory including their clinical significance, metabolism, chemical and physical properties.**

1. Summarize the function and structure of the liver to include anatomic and microscopic characteristics.
2. Summarize the metabolism of bilirubin and urobilinogen.
3. Differentiate the three types of bilirubin.
4. Diagram the classification system for jaundice.
5. Correlate the clinical significance of bilirubin, urobilinogen and urine bilirubin in terms of different types of jaundice.
6. Compare and contrast the different methods for measuring bilirubin, differentiating the types of bilirubin measured.
7. Summarize specimen considerations, interference and reference ranges.
8. Summarize laboratory findings in relation to the pathophysiology of the liver.

**E. Summarize the tests and methods identified as endocrine, including the clinical significance of laboratory results.**

1. Select and identify primary endocrine glands.
2. Differentiate the action of hormones secreted by each gland.
3. Compare and contrast thyroid function tests and relate laboratory results to clinical conditions.
4. Summarize tests that assess ovarian function.
5. Compare and contrast patterns of laboratory results consistent with menopause versus the ovulating female.
6. Summarize the hormonal tests associated with infertility.
7. Relate abnormal results to clinical conditions and the respective clinical management of the conditions.
8. Summarize hormonal tests associated with invitro fertilization.
9. Examine enzymes correlated with liver function and differentiate which are **indicators of inflammation or cell damage.**

**F. Examine the concept and clinical utility of therapeutic drug monitoring (TDM) and clinical utility of toxicology.**

1. Summarize the common reasons that TDM is indicated.
2. Identify the key factors to be taken into consideration when performing TDM.
3. Evaluate the role of the clinical laboratory in performing toxicology testing.

**G. Relate the definitions of specific toxicology terminology.**

1. Differentiate between minimum effective concentration and minimum toxic concentration.
2. Differentiate between a peak and a trough.
3. Summarize criteria for requesting STAT testing.
4. Categorize drugs of abuse
5. Categorize therapeutic drug monitoring.

**H. Categorize the basic steps of pharmacokinetics.**

1. Evaluate therapeutic drug monitoring including the reasons for performing the tests.
2. Differentiate between peak and trough levels and examine the purpose for evaluating them.
3. Categorize the therapeutic drugs.
4. Summarize immunochemical techniques used for therapeutic drug monitoring.
5. Evaluate toxicology testing to include substances assayed and the types of situations warranting toxicological analysis.
6. Examine a methodology for ethanol analysis.
7. Summarize methods, including chromatography, used in screening and confirmation of drugs of abuse.
8. Compare and contrast colorimetric procedures for salicylate and acetaminophen quantitation.

**I. Examine the commonly ordered tumor markers assayed in the clinical laboratory.**

1. Correlate tumor marker test results with clinical diagnosis.
2. Examine the latest technology for tumor marker testing.

## **Clinical Chemistry II Laboratory – HTEC 85B**

### **Expanded Descriptions: Content and Form**

- 1. Practice the use of Standard Precautions as they apply in the chemistry laboratory according to Occupational Health and Safety Administration (OSHA) mandates.**
  - a. Explain the basic aspects of infection control policies, including how and when to use personal protective equipment (PPD) or devices (gown, gloves, and goggles).
  - b. Successfully demonstrate, via weekly performance, the first objective by using PPE during all laboratory work with hazardous material.
  - c. Relate the importance of a safety program as defined in the Safety Manual (lab manual for this course) by supplying the correct answer to questions or by demonstration of appropriate actions related to prepared simulations.
  - d. Explain the pre and post exposure prophylactic measures for handling potential occupational transmission of certain pathogens.
  - e. Select proper disinfectants to decontaminate the work area when a hazardous spill has occurred or when beginning or ending a laboratory session.
  - f. Explain the basic steps to first-aid.
  - g. Locate, describe and/or explain the following:
    - i. Evacuation routes
    - ii. Biohazardous material
    - iii. Blood borne pathogens
    - iv. Standard Precautions
    - v. Aerosols
    - vi. MSDS (Material Safety Data Sheets)
- 2. Demonstrate safe use and disposal of biohazardous materials.**
  - a. Describe how to properly segregate and dispose of various types of waste products generated in the clinical laboratory, including the use of sharp containers for needles, lancets and/or other sharps.
  - b. Demonstrate, via weekly performance, proper disposal of biological samples, as instructed by procedure or instructor.
- 3. Recall through demonstration correct pipetting techniques, dilution preparation and instrument methodologies.**
  - a. Demonstrate, by performance, proper pipetting techniques by doing a serial dilution, two fold – 10 tubes long. State the initial concentration and the concentration of the last tube.
  - b. Perform and 1:3 dilution.
  - c. Describe the operating principles of the instrumentation assigned and state the method of each procedure you perform.
  - d. Record the normal therapeutic range for each assay you perform.
  - e. Replace components of the instrumentation as instructed.
  - f. Successfully troubleshoot the instruments performance.
- 4. Describe the operating principles of the automated instrumentation available in the student laboratory.**
  - a. State the normal value or therapeutic range for each assay you perform.
  - b. Develop charts for recording maintenance and quality control.
  - c. By performance, replace components of student laboratory instrumentation as instructed.
  - d. Identify components of the instrument.
  - e. Demonstrate steps to follow when troubleshooting an instrument.

- f. Demonstrate appropriate documentation after component replacement.
  - g. Describe steps to follow when repair of replacement is unsuccessful.
- 5. Explain the proteins assayed in the clinical lab, their common methods of analysis and clinical significance.**
- a. Describe the technique of electrophoresis and clinical application of immunoglobulin results.
  - b. Define the difference in electrophoretic mobility and function relative to electrophoresis methods studied.
  - c. List the specimen consideration, interference and reference range for the electrophoretic techniques studied.
  - d. List three examples of diseases that cause hypoproteinemia and hyperproteinemia.
- 6. Describe a method of determination of hemoglobin A1c.**
- a. Correlate the clinical significance of HbA1c values with the disease of diabetes.
  - b. State the two types of diabetes and relate the quantitative insulin levels of each.
  - c. Describe the end stage complication of “uncontrolled” diabetes.
  - d. Correlate glucose levels, GTT and glycohemoglobin with diabetes mellitus and hypoglycemia.
- 7. Experience either in the student laboratory or during a field trip to one of the clinical affiliate sites, operation of a large chemistry analyzer.**
- a. State/perform the maintenance procedures outlined in the operator’s manual.
  - b. Describe/perform the proper calibration and quality control procedures associated with the test methods on the instrument.
  - c. Describe/perform the operating sequence of this analyzer and identify its major parts.
  - d. Troubleshoot/or discuss troubleshooting of this instrument.
  - e. Demonstrate appropriate documentation of maintenance or troubleshooting this instrument.
  - f. Describe the methodology of tests run on this analyzer.

## Clinical Chemistry Practicum – HTEC 285

- 1. Practice departmental procedures for safety according to Occupational Safety and Health Administration (OSHA) mandates.**
  - a. Demonstrate the basic aspects of infection control policies, by using personal protective equipment (PPD) or devices (gown, gloves, and goggles).
  - b. Explain evacuation routes
  - c. Locate fire alarms and extinguishers
  - d. Locate eye wash stations and emergency showers
  - e. Locate safety equipment
  - f. Locate spill kits
  - g. Locate MSDS (Material Safety Data Sheets).
- 2. Demonstrate safe use and disposal of biohazardous materials.**
  - a. Demonstrate the proper segregation and disposal of various types of waste products generated in the clinical laboratory, including the use of sharp containers for needles, lancets and/or other sharps.
  - b. Demonstrate proper disposal of biological samples, as instructed by procedure or instructor.
- 3. Explain departmental organization to include specimen processing and handling, criteria for specimen rejection, and use of laboratory information system (LIS).**
  - a. Receive specimens submitted to the Clinical Chemistry Laboratory. Determine if the specimen has been collected, stored and transported to the laboratory appropriately. If proper criteria has been met, process the specimen according to the procedures of the clinical site.
  - b. Site criteria for sample rejection and follow procedure established by the clinical site for specimen rejection if necessary.
  - c. Centrifuge patient samples as required.
  - d. Familiarize self with testing workflow (what tests are performed on what analyzer).
  - e. Identify tests requiring special specimen handling
  - f. Pour off, when applicable, into sample cups appropriate for each test/analyzer.
  - g. Perform dilutions of samples when appropriate with accurate results.
  - h. Proficient in the use of the LIS including: pending worklists, generating worklists, enter and verifying results, access patient result inquiry and maintain patient confidentiality.
- 4. Proficient operation of automated or semi-automated instrumentation.**
  - a. Name the instrumentation used in the laboratory and explain the principle of operation.
  - b. State the advantages of using this specific instrument
  - c. State the disadvantages of using this specific instrument.
  - d. Successfully relate normal values to the appropriate test
  - e. Check reagent inventories and load reagents when necessary.
  - f. Perform daily startup according to clinical sites protocol.
  - g. Analyze quality control products.
  - h. Define the frequency of analyzing QC material
  - i. ii Identify the correct QC material to be run per test
  - j. Record and document the quality control results per clinical site protocol.
  - k. Analyze patient samples
  - l. Recognize abnormal results and troubleshoot accordingly.
    - i. Identify the characteristics required in establishing critical values
    - ii. Follow clinical sites protocol for reporting a critical value

- k. Evaluate and perform acceptable troubleshooting activities relative to quality control or patient results.
  - l. Perform daily shutdown according to clinical sites protocol.
  - m. Perform routine instrument maintenance.
- 5. Summarize test methods and principles learned during this rotation by completing worksheets provided.**
- a. Document daily the procedures performed, including observations.
  - b. Obtain signature from supervising technologist verifying work performed, principles covered, and skills competency.
- 6. Perform and interpret all Chemistry and Special Chemistry tests performed in this department with results acceptable to the supervising Clinical Laboratory Scientist.**
- Testing should include but not be limited to:
- a. Testing for glucose abnormalities
  - b. Testing for electrolytes and electrolyte balance
  - c. Renal function testing, including BUN and Creatinine
  - d. Testing for lipid metabolism
  - e. Bilirubin metabolism and liver function testing
  - f. Tests for pancreatic function
  - g. Tests for arterial blood gases and acid-base balance
  - h. Cardiac function testing
  - i. Thyroid function testing
  - j. Endocrinology testing



## **Clinical Hematology Lecture – HTEC 80A**

- A. Explain the study of hematology and summarize its basic concepts and basic morphologies.**
1. Summarize the role of blood as a transportation system
  2. Describe the three cell types of formed elements of the blood
    - a) Erythrocytes
    - b) Leukocytes
    - c) Thrombocytes
  3. Compare and contrast the staining characteristics of blood cell elements.
    - a) Nuclear to cytoplasm ratio
    - b) Features such as size, nucleus and cytoplasm
- B. Investigate hematopoiesis in the human fetus, newborn and adult.**
1. Identify organs responsible for primary hematopoiesis
  2. Identify organs responsible for secondary hematopoiesis.
- C. Evaluate red blood cell (RBC) metabolism as it relates to the RBC membrane, hemoglobin structure and function, and RBC metabolic pathways.**
1. Examine the structure and function of the red cell including the red cell membrane and its components.
  2. Select the important pathways for red cell metabolism and discuss how these relate to red cell function.
  3. Analyze hemoglobin structure and function as it relates to hemoglobin synthesis.
    - a) Categorize hemoglobinopathies by their amino acid substitution on the globin chain, their clinical impact on the patient and treatment available.
    - b) Summarize laboratory test results for each type of hemoglobinopathy covered.
    - c) Categorize thalassemias by their defective production of the globin chains, their clinical impact on the patient and treatment available.
    - d) Summarize laboratory test results for each type of thalassemia covered.
- D. Compare and contrast erythrocyte maturation in its various stages of normal and abnormal development.**
1. Diagram proper cell maturation sequence of the erythroid series.
  2. Evaluate the importance of red blood cell indices in the diagnosis of hematological disorders.
  3. Diagram megaloblastic cell maturation of the erythroid series.
  4. Design a chart illustrating morphologic alterations in erythrocyte color, size (anisocytosis), shape (poikilocytosis), inclusions, and common artifacts and abnormal distribution patterns.
  5. Create a table summarizing abnormal red cell morphologies and possible disease states.
  6. Categorize red cell dyscrasias other than the anemias.
- E. Distinguish between the various anemias, correlate red blood cell morphology, and laboratory test values for each type.**
1. Summarize the causes, appearance of cells in the peripheral blood smear, and correlated red blood cell indices in hypochromic anemias and iron deficiency anemia.
  2. Summarize the causes, appearance of cells in the peripheral blood smear, and correlated red blood cell indices in megaloblastic anemias.
  3. Summarize the causes, appearance of cells in the peripheral blood smear, and correlated red blood cell indices in aplastic anemia.
  4. Summarize the causes, appearance of cells in the peripheral blood smear, and correlated red blood cell indices in hemolytic anemias.
    - a) Compare and contrast intracorpuscular RBC hereditary defects of the RBC membrane.
    - b) Compare and contrast intracorpuscular RBC enzymes deficiencies.

- c) Compare and contrast acquired intracorpuscular RBC deficiencies.
  - d) Compare and contrast extracorpuscular RBC defects.
  5. Summarize the causes, appearance of cells in the peripheral blood smear, and correlated red blood cell indices in anemias associated with other disorders.
- F. Compare and contrast leukocyte maturation in its various stages of normal and abnormal development.**
1. Differentiate between normal mature blood leukocytes in terms of cell morphology and function.
  2. Interpret the staining characteristics of the cellular components in the major leukocytes and differentiate the cells based on these characteristics.
  3. Diagram stages in leukocyte cell development in the three major leukocyte cell lines.
    - a) Neutrophil
    - b) Lymphocyte
    - c) Monocyte
- G. Examine specific changes in leukocyte morphology, number and function in relation to diagnosis of disease.**
1. Summarize the changes in neutrophil count and morphology that develops in response to infections.
  2. Create a chart listing the quantitative and qualitative disorders of neutrophils correlated with their laboratory findings.
  3. Categorize, in chart form, the disorders that present with lymphocytosis.
  4. Differentiate morphological features of infectious mononucleosis and other reactive lymphocytoses.
- H. Distinguish between the various types of leukemia classifications, correlate cell morphology and laboratory test values for each type.**
1. Compare and contrast acute and chronic leukemia.
  2. Evaluate the risk factors for leukemia.
  3. Create a chart illustrating the different leukemias, their predominate cell morphology and laboratory test results.
  4. Evaluate case studies and pertinent laboratory data.
- I. Compare and contrast various types of lymphomas, myeloproliferative disorders and lipid storage diseases and correlate cell morphology and laboratory test values for each type.**
1. Differentiate diagnostic criteria used to characterize lymphoproliferative disorders.
  2. Differentiate between the three most common myeloproliferative disorders.
  3. Create a chart illustrating lipid storage diseases and their general characteristics
- J. Summarize quality control and quality assurance as it applies to the hematology department of the clinical laboratory.**
1. Differentiate between quality control material used in the hematology laboratory and standards.
  2. Examine the steps involved in a hematology quality assurance program.
  3. Describe components involved in the pre-analytical and post-analytical phases of hematology testing.
  4. Evaluate Westgard rules and identify those violated in case studies presented.

## Clinical Hematology Laboratory – HTEC 80

1. **Practice the use of Standard Precautions as they apply in the clinical hematology laboratory according to Occupational Safety and Health Administration (OSHA) mandates.**
  - a. Explain the basic aspects of infection control policies, including how and when to use personal protective equipment (PPE) or devices (gown, gloves, and goggles).
  - b. Demonstrate, via weekly performance, the first objective by using PPE during all laboratory work with hazardous material.
  - c. Relate the importance of a safety program as defined in the Safety Manual (lab manual for this course) by supplying the correct answer to questions or by demonstration of appropriate actions related to prepared simulations.
  - d. Explain the pre and post exposure prophylactic measures for handling potentially occupational transmission of certain pathogens.
  - e. Select and use proper disinfectants to decontaminate the work area when a hazardous spill has occurred or when beginning or ending a laboratory session.
  - f. Explain the basic steps to first-aid.
  - g. Locate, describe and/or explain the following:
    - i. Evacuation routes
    - ii. Biohazardous material
    - iii. Blood Borne Pathogens
    - iv. Standard Precautions
    - v. Aerosols
    - vi. MSDS (Material Safety Data Sheets)
2. **Demonstrate safe use and disposal of biohazardous materials.**
  - a. Describe how to properly segregate and dispose of various types of waste products generated in the clinical laboratory, including the use of sharp containers for needles, lancets and /or other sharps.
  - b. Demonstrate, via weekly performance, proper disposal of biological samples, as instructed by procedure or instructor.
3. **Demonstrate proper technique in applying differential stains to blood smears.**
  - a. Demonstrate proper technique for making peripheral blood smears by submitting 5 smears to the instructor.
  - b. Demonstrate proper technique for staining peripheral blood smears by successfully staining the above 5 smears.
  - c. List the different types of stains used in the clinical hematology laboratory and explain their uses:
    - i. Wrights-Giemsa
    - ii. Methylene Blue
    - iii. Stains for Bone Marrows
    - iv. Cytospin's
  - d. Describe the staining characteristics of: (referring to the Wrights-Giemsa stain)
    - i. Red blood cells
    - ii. White blood cells
    - iii. Platelets
  - e. Identify the difference between staining characteristics of the formed elements in the blood, then verify staining technique by reviewing slides for proper staining of cellular elements.

- (Referring to the Wrights-Giemsa stain),
- i. Lymphocyte nuclei & cytoplasm
  - ii. Monocyte nuclei & cytoplasm
  - iii. Neutrophil nuclei, cytoplasm & granules
  - iv. Eosinophil nuclei, cytoplasm & granules
  - v. Basophil nuclei, cytoplasm & granules
- f. Describe the importance of pH in the staining process.
- 4. Critique and practice hematocrit testing using both fingerstick and anticoagulated blood samples, compare and contrast normal ranges for adult males and females, and infants.**
- a. Perform five (5) hematocrits (spun) on fingerstick and anticoagulated blood samples and record results.
  - b. Identify the different layers obtained on a spun hematocrit and describe their clinical relevance.
    - i. Plasma
    - ii. Buffy coat
    - iii. Red Blood Cells
  - c. Compare and contrast normal ranges for adult males and females, and infants.
    - i. Adult males: 42-52%
    - ii. Adult females: 37-47%
    - iii. Newborn: 53-65%
    - iv. Infants: 31-43%
  - d. Define and describe the quality control associated with spun hematocrits.
  - e. Categorize common causes of error in manual hematocrit techniques and describe how these errors are corrected or resolved.
    - i. Improper sample collection
    - ii. Incorrect anticoagulant – collect blood sample in tube containing EDTA as an anticoagulant
    - iii. Clotted blood – redraw specimen assuring sample is well mixed after collection
    - iv. Hemolyzed specimen – redraw specimen avoiding unnecessary trauma to the RBC's
    - v. Excess EDTA (inadequate blood for the fixed amount of EDTA in the blood collection tube – redraw specimen ensuring a proper “fill”
  - f. Improper sample processing
    - i. Insufficient centrifugation – follow manufacturer's instructions for the particular microhematocrit centrifuge being used.
    - ii. Insufficient seal – blood sample will be lost during centrifugation if the microhematocrit tube is not sealed completely
- 5. Calculate three RBC indices and interpret the significance of their changes in the various anemias.**
- a. Define the three RBC indices and given values, demonstrate ability to calculate these indices.
    - i. Mean Corpuscular Volume (MCV)
    - ii. Mean Corpuscular Hemoglobin (MCH)
    - iii. Mean Corpuscular Hemoglobin Concentration (MCHC)
  - b. Discuss the clinical significance of RBC indices, interpret results of the calculations and relate these results to physiological conditions.

- c. Define anemia and aplastic anemia and correlate laboratory tests associated with anemia.
    - i. Anemia – a condition in which there is reduced oxygen carrying capacity of the blood and therefore a reduced amount of oxygen reaching the tissues and organs.
    - ii Aplastic anemia – failure of the bone marrow to produce blood cells
    - iii Laboratory tests include: CBC, reticulocyte count, peripheral blood smear, and bone marrow examination.
- 6. Demonstrate the use of an automated hematology analyzer including start-up, routine operation and maintenance.**
- a. Perform daily start-up of the automated hematology analyzer.
  - b. Perform and document daily maintenance on the automated hematology analyzer.
  - c. Perform and document weekly, monthly and as needed maintenance on automated hematology analyzer.
  - d. Analyze patient samples with 95% accuracy, on the automated hematology analyzer.
- 7. Perform, review and critique quality control tests on an automated hematology analyzer.**
- a. Analyze controls.
  - b. Troubleshoot out of control results.
  - c. Document/store results appropriately.
- 8. Set up and read test results from an Erythrocyte Sedimentation Rate (ESR) test, compare and contrast normal ranges for adult males and females.**
- a. Set up and record results for 4 ESR's.
  - b. Categorize and describe the factors that can affect the accuracy of the ESR.
    - i. Improper sample collection
      - a). Use EDTA anticoagulated blood collection tube and obtain a proper “fill”
      - b). Hemolysis affects testing – obtain a blood sample without unnecessary trauma
      - c). Fibrin affects testing – ensure that immediately after collection blood specimen has been properly mixed
    - ii. Technical Factors
      - a). Tube must remain exactly vertical during the one-hour test time
      - b). Test must be read at exactly 60 minutes
      - c). The counter on which the rack is placed must be level and free of vibrations
      - d). Test should be conducted at room temperature
      - e). Tube should not be placed in a draft, and it should not be exposed to direct sunlight
  - c. Describe the QC procedures necessary for ESR's.
  - d. Identify the clinical factors that can increase or decrease an ESR.

- i. Increased ESR
  - a). Bacterial infection
  - b). Acute pelvic inflammatory disease
  - c). Ruptured ectopic pregnancy
  - d). Myocardial infarction
  - e). Rheumatic fever Rheumatoid arthritis
  - f). Pyogenic arthritis
  - g). Increased fibrinogen and immunoglobulin
  - h). Rouleaux formation
  - i). Heparin anticoagulant
  - j). Menstruation and pregnancy
  - k). Multiple myeloma
  - l). Anemia
- ii. Decreased ESR
  - a). Extreme increases in plasma viscosity
  - b). Sickle cell anemia
  - c). Spherocytes
  - d). Microcytes
  - e). Polycythemia

- e. Compare and contrast the normal ranges of the ESR for adult males and females.
  - i. Adult men = 0-15 mm/hr
  - ii. Adult women = 0-20 mm/hr

**9. Set up, interpret test results and discuss the prevalence of sickle cell disease and sickle cell trait among the African and Mediterranean cultures.**

- a. Set up, incubate and interpret results of a sickle cell prep.
- b. Explain the genetic abnormalities that make up sickle cell disease and sickle cell trait
  - i. HbSS vs. HbS
  - ii. Discuss the prevalence of sickle cell disease and sickle cell trait among the African and Mediterranean cultures.
- c. State limitations of the sickle cell prep test and identify ways to correct or resolve.
  - i. Severe anemia can cause false negatives – if total hemoglobin is <8g/dL, double the sample volume to 100uL.
  - ii. Patients with multiple myeloma, cryoglobulinemia and other dysglobulinemias may give false positive results. Wash patient red blood cells in physiologic saline to minimize these problems.
  - iii. Elevated levels of Hemoglobin F can cause false negative results - Do not test infants less than 6 months of age.
  - iv. Recent transfusion can cause false positive or false negative results – ensure patient has not been transfused recently.
  - v. Some rare hemoglobin variants such as Hemoglobin C Harlem or C Georgetown may give a positive reaction.
  - vi. This test is a screening procedure only. All positive or questionable results should be further evaluated with hemoglobin electrophoresis.

**10. Demonstrate proper use of the microscope including routine maintenance.**

- a. Identify and explain the various support systems of the microscope

- i. Frame
    - ii. Stage
    - iii. Light source
    - iv. Condenser
    - v. Diaphragm
    - vi. Body tube
    - vii. Adjustment knobs
  - b. Define and identify the optical system
    - i. Eyepiece (monocular or binocular)
    - ii. Objective lens
    - iii. Low power and high power
    - iv. Oil immersion lens
  - c. Demonstrate, by performance, how to focus on an object under low, high dry and oil immersion lens.
  - d. Demonstrate, by performance, the proper cleaning supplies for a microscope.
  - e. Identify the proper rotation of the objective to ensure it does not contaminate the “dry” lens.
  - f. Demonstrate, by performance, how to increase and decrease the light intensity.
  - g. Demonstrate and identify points, which correlate with the proper care of a microscope.
11. **Compare and contrast cell counts performed on a hemacytometer with those from an automated hematology instrument. Compare and contrast normal ranges for adult males and females as well as infants and adolescence (referring to Red Blood Cell Count, RBC).**
- a. Demonstrate the proper technique for filling a unopette from an EDTA tube or capillary puncture.
  - b. Charge a hemacytometer.
  - c. Demonstrate how to focus on the grid of the microscope.
  - d. List the Hemacytometer Counting “Rules”
    - i. When counting cells on a grid, cells lying on the top and left borders **ARE** counted.
    - ii. Cells on the right and bottom borders are **NOT** counted.
  - e. Identify the routine “red cell counting area”, “white cell counting area” and “platelet counting area” of the grid.
  - f. Complete with 95% accuracy, mathematical problems given the depth, area counted and dilution used in a manual count.
  - g. Perform 3 counts from EACH cell type using parameters set for accuracy.
  - h. List errors inherent in the performance of manual counts.
    - i. Small sample size
    - ii. Nature of the sample – must be free of clots
    - iii. Faulty laboratory equipment
    - iv. Inherent error of cell distribution in the counting chamber
    - v. Compare and contrast procedure of manual count to an automated platelet count
    - vi. Understand the differences between capillary and automated platelet counts
    - vii. Describe the clinical significance of decreased and increased cell counts.

- viii. Compare platelet counts to different disorders associated with platelet dysfunction.
  - ix. Explain how to correct for “in vitro” platelet aggregation.
  - x. Discuss accuracy vs. precision
12. **Compare and contrast your manual counts with those from the automated hematology analyzer.**
13. **Compare and contrast normal ranges for adult males and females as well as infants and adolescence (referring to RBC count).**
- a. Adult male:  $4.7\text{-}6.1 \times 10^6 /\mu\text{L}$
  - b. Adult female:  $4.2\text{-}5.4 \times 10^6 /\mu\text{L}$
14. **Prepare peripheral blood smears and perform differential cell counts on normal and abnormal specimens.**
- a. Perform 10 manual differentials
    - i. Identify each cell type within the granulocytic and agranulocytic cell line.
    - ii. List and detail the morphologic characteristics in each stage of normal granulocyte development, as seen on the peripheral smear.
    - iii. Name the types of inclusions seen in white blood cells and red blood cells, state their composition and staining characteristics.
    - iv. Identify cells that are “not normal” as seen on the peripheral smear.
    - v. Estimate platelet counts and correlate them with automated counts.
    - vi. Compare and contrast the different cell line maturation schemes of normal cells seen on a peripheral smear.
  - b. Identify key morphological factors, which aid in the cell identification and contrast the following factors to the specific identification of a specific cell.
    - i. Nucleus to cytoplasm ration
    - ii. Chromatin pattern of nucleus
    - iii. Presence/absence of granules
    - iv. Shape and size of nucleus
    - v. Presence/absence of vacuoles
    - vi. Density of color
  - c. Identify from a smear and explain a condition that would cause:
    - i. Neutophilia
    - ii. Eosinophilia
    - iii. Infections mononucleosis
    - iv. Leukemia
    - v. Thrombocytosis
    - vi. Throbocytopenia
    - vii. Neutropenia
    - viii. Myelodysplastic syndromes
  - d. Identify plasma cells and atypical lymphocytes from slides and understand their significance in peripheral smears.
  - e. Compare and contrast the variations seen in the differential depending upon where the differential is performed on the smear (what part of the smear)
15. **Prepare slides for and perform reticulocyte counts, compare and contrast normal values for adult males and females.**
- a. Describe the maturation of the reticulocyte.



- b. Describe how the reticulocyte count can be used in the diagnosis of anemias.
- c. Prepare 4 peripheral blood smears. Use Methylene blue stain; properly stain 4 slides for manual reticulocyte counts.
- d. Calculate reticulocyte counts using a Miller disc.
- e. Compare and contrast manual reticulocyte count with that from an automated hematology analyzer.
- f. Compare and contrast normal ranges for adult males and females
  - i. Adult males: 1.1-2.1%
  - ii. Adult females: 0.9-1.9%
- a. Assess sources of error that can occur in the performance of manual reticulocyte counts.

## **Clinical Coagulation Lecture – HTEC 82A**

- A. Summarize platelet and hemostatic mechanisms.**
1. Categorize the major systems involved in maintaining hemostasis.
  2. Categorize the minor systems involved in maintaining hemostasis.
- B. Summarize the events that take place in primary hemostasis.**
1. Diagram the platelet's ultrastructure and its organelles.
  2. Summarize platelet function in primary hemostasis.
- C. Summarize the events that take place in secondary hemostasis**
1. Categorize coagulation factors by hemostatic function.
  2. Categorize coagulation factors by physical properties.
  3. Categorize coagulation factors by pathways including:
    - a) Diagram the extrinsic pathway of hemostasis and state two major uses of the prothrombin time (PT).
    - b) Diagram the intrinsic pathway and state two major uses of the partial thromboplastin time (PTT).
- D. Analyze the events that take place in fibrinolysis.**
1. Summarize the process of fibrinolysis.
  2. Examine the laboratory tests associated with dissolution of the fibrin clot.
- E. Categorize disorders of primary hemostasis**
1. Design a chart classifying quantitative disorders causing thrombocytopenia.
  2. Summarize qualitative platelet disorders based on abnormal platelet function or response.
  3. Design a chart listing vascular platelet disorders.
  4. Summarize congenital connective tissue disorders.
- F. Summarize disorders of plasma clotting factors including laboratory test results and clinical manifestations**
1. Factor I (fibrinogen)
  2. Factor II (prothrombin)
  3. Factor V (proaccelerin)
  4. Factor VII (proconvertin)
  5. Factor VIII
  6. Factor IX (Christmas factor)
  7. Factor X (Stuart-Prower factor)
  8. Factor XI (Plasma thromboplastin Antecedent)
  9. Factor XII (Hageman factor)
  10. Factor XIII (Fibrin-stabilizing factor)
  11. Prekallikrein (Fletcher factor)
  12. High-Molecular weight kininogen (Fitzgerald factor)
- G. Differentiate circulating anticoagulants (Inhibitors)**
1. Evaluate specific factor inhibitors
  2. Evaluate nonspecific inhibitors
- H. Examine disseminated intravascular coagulation according to clinical and laboratory abnormalities.**
1. Summarize the coagulation response, triggering mechanisms, decompensated and compensated DIC state.
  2. Summarize the therapy for DIC.
  3. Summarize clinical conditions associated with DIC.

- I. Evaluate the regulation of thrombosis and anticoagulant therapy.**
  - 1. Summarize the regulation of coagulation and fibrinolysis.
  - 2. Design a chart illustrating inherited thrombophilia, acquired thrombotic disorders and other acquired conditions associated with thrombosis.
  - 3. Differentiate laboratory tests used to evaluate patients with hypercoagulable states, thrombosis, lupus, thrombocytopenia and monitoring anticoagulant therapy.
  
- J. Evaluate quality control and quality assurance as it relates to the coagulation laboratory.**
  - 1. Summarize quality control activities in the coagulation laboratory.
  - 2. Summarize a quality assurance program for the coagulation laboratory.
  
- K. Evaluate methods of measurements used in automated coagulation instrumentation**
  - 1. Examine important specimen collection issues for coagulation testing.
  - 2. Identify pre-analytical, analytical and post-analytical sources of error in coagulation testing.

## Clinical Coagulation Laboratory – HTEC 82

1. **Practice the use of Standard Precautions as they apply in the coagulation laboratory according to Occupational Safety and Health Administration (OSHA) mandates**
  - a. Explain the basic aspects of infection control policies, including how and when to use personal protective equipment (PPE) or devices (gown, gloves, and goggles).
  - b. Demonstrate, via weekly performance, the first objective by using PPE during all laboratory work with hazardous material.
  - c. Relate the importance of a safety program as defined in the Safety Manual (lab manual for this course) by supplying the correct answer to questions or by demonstration of appropriate actions related to prepared simulations.
  - d. Explain the pre and post exposure prophylactic measures for handling potentially occupational transmission of certain pathogens.
  - e. Select and use proper disinfectants to decontaminate the work area when a hazardous spill has occurred or when beginning or ending a laboratory session.
  - f. Explain the basic steps to first-aid.
  - g. Locate, describe and/or explain the following:
    - i. Evacuation routes
    - ii. Biohazardous material
    - iii. Blood Borne Pathogens
    - iv. Standard Precautions
    - v. Aerosols
    - vi. MSDS (Material Safety Data Sheets)
2. **Demonstrate safe use and disposal of biohazardous materials.**
  - a. Describe how to properly segregate and dispose of various types of waste products generated in the clinical laboratory, including the use of sharp containers for needles, lancets and /or other sharps.
  - b. Demonstrate, via weekly performance, proper disposal of biological samples, as instructed by procedure or instructor.
3. **Illustrate the anatomy and physiology of the thrombocyte (platelet)**
  - a. Draw a platelet, label the 3 zones/layers and define their function
  - b. Within each zone/layer label the major contents
  - c. Describe the changes the platelet undergoes during primary hemostasis
  - d. Define and describe platelet adhesion and aggregation
  - e. Identify laboratory tests associated with primary hemostasis
  - f. Record in your laboratory notebook, the reference ranges for the above laboratory tests
  - g. Correlate clinical manifestations with abnormal laboratory test results.
4. **Complete the pre-analytical questionnaire (laboratory workbook) concerning patient variables that effect platelet function test results**
  - a. Abnormal bleeding after surgery, cutting yourself, during menstruation, or a family history involving abnormal bleeding
  - b. Nosebleeds, or easy bruising tendencies
  - c. Family history of stroke or blood clots
  - d. Current medications
5. **Perform an Ivy, Duke or Simplate Bleeding Time test**
  - a. Follow the procedure as detailed in your laboratory workbook
  - b. Discuss the importance of “unimportance” of this test
  - c. Identify factors that prolong and/or shorten a bleeding time test
  - d. Identify factors that interfere with the bleeding time test

- e. Differentiate between these three bleeding time tests
- 6. Discuss the mechanism of action for Prothrombin time (PT) test**
  - a. Diagram the extrinsic pathway of hemostasis
  - b. State the two major uses of the PT test
- 7. Discuss the mechanism of action for Activated Partial Thromboplastin Time (PTT) test**
  - a. Diagram the intrinsic pathway of hemostasis
  - b. State the two major uses of the PTT test
- 8. Defend the coagulation department specimen collection procedures and discuss how these can affect test results**
  - a. Describe the important issues regarding the collection of specimens for coagulation testing
  - b. Identify proper specimen collection
  - c. Explain how specimen collection and anticoagulants directly relate to specimen test results
- 9. Compare and contrast the various instrument options for performing PT, PTT and fibrinogen tests**
  - a. Differentiate endpoint detection on instrument methodologies: mechanical, photo-optical, chromogenic and immunologic
  - b. Compare and contrast advantages and disadvantages of each instrument
- 10. Relate the importance of International Normalized Ratio (INR) in monitoring anticoagulant therapy**
  - a. Define INR
  - b. Define International Sensitivity Index (ISI)
  - c. State the INR calculation
  - d. Discuss why the INR was developed
- 11. Describe specific factor assays. Include discussion of Activated Protein C Resistance (APCR) prevalence in Caucasians versus Hispanic, African-American, Asian and Native American populations, inherited Protein C Deficiency in infants, prevalence of Factor V Leiden deficiency in African Americans and Asians versus Europeans, and X-linked recessive disorder of Factors VIII (Hemophilia A) and IX (Hemophilia B).**
  - a. Identify which factor deficiencies would be corrected by using pooled normal plasma when PT is abnormal and corrected
  - b. Identify which factor deficiencies would be corrected by using pooled normal plasma when APTT is abnormal and corrected
  - c. Identify which factor deficiencies would be corrected by using pooled normal plasma when both the PT and APTT are abnormal and corrected
  - d. Discuss what could be responsible in mixing studies when the pooled plasma does not correct the abnormal APTT and/or PT
  - e. Explain the principal of the fibrinogen test, detailing its normal reference range and its limitations
  - f. Explain the principal of the Fibrin Degradation Products (FDP) test, detailing its normal reference range and its limitations
  - g. Explain the principal of the D-Dimer test (D-D1), detailing its normal reference range and its limitations
  - h. Explain the principal of the Thrombin Time (TT) test, detailing its normal reference range and its limitations

## **Clinical Urinalysis Lecture – HTEC 81A**

### **A. Summarize renal anatomy and physiology.**

1. Diagram the formation of urine by tracing its formation through the kidney.
2. Compare and contrast major physiologic functions the kidney employs during urine formation.
3. Prepare a list of the substances found in normal urine.
4. Correlate abnormal urine results with clinical diagnosis.

### **B. Summarize the three main components of a routine urinalysis.**

1. Assess the proper procedure for urine specimen collection for routine urinalysis, including storage and preservation.
2. Differentiate normal versus abnormal physical properties that might be encountered in urine specimens and correlate physical findings with chemical and microscopic findings.
3. Examine a urine specimen for chemical constituents by using a multiple-reagent strip with correct techniques and knowledge of the general procedure and precautions necessary for valid results.
4. Evaluate the clinical significance, principle of test, specificity and sensitivity, interferences, additional considerations, and confirmatory or related follow-up tests for the chemical analysis of a routine urinalysis.
5. Categorize, identify, describe and discuss the various urine sediment constituents that might be encountered in the microscopic analysis of the urine, including pathophysiology and clinical importance.
  - a) Cellular constituents
  - b) Epithelial cells
  - c) Other cellular constituents
  - d) Casts
  - e) Crystals and amorphous material
  - f) Contamination and artifacts

### **C. Analyze the types of quality control and quality assurance used in the urinalysis department.**

1. Assess quality control in the physical, chemical and microscopic components of the routine analysis.
2. Assess the components of a quality assurance system for urinalysis.

### **D. Analyze urinalysis data.**

1. Analyze the clinical usefulness of urinalysis and classify tests pertaining to diseases or conditions affecting the kidney or urinary tract and metabolic disease.
2. Evaluate urinalysis test results and recognize discrepant results.

### **E. Evaluate analysis of extravascular fluids.**

1. Differentiate the components of routine examination, including gross examination, cell counts, morphologic examination, and common chemical test of cerebrospinal fluid.
2. Differentiate the components of routine examination, including gross examination, cell counts, morphologic examination, and common chemical test of serous fluid.
3. Differentiate the components of routine examination, including gross examination, cell counts, morphologic examination, and common chemical test of synovial fluid.

**F. Evaluate analysis of miscellaneous specimens**

1. Differentiate the components of routine examination, including gross examination, cell counts, morphologic examination, and common chemical test of nasal smears
2. Evaluate the clinical significance of tests for fecal occult blood, include a description of common interferences and special dietary considerations necessary for specimen collection. Analyze the chemical principle of the common slide tests for fecal occult blood.
3. Evaluate the significance of testing for the presence of fecal leukocytes, and the procedure for slide preparation.
4. Summarize the Fern test and the postcoital test for cervical mucus.
5. Summarize the components of a qualitative semen analysis.

## Clinical Urinalysis Laboratory – HTEC 81

1. **Practice the use of Standard Precautions as they apply in the coagulation laboratory according to Occupational Safety and Health Administration (OSHA) mandates**
  - a. Explain the basic aspects of infection control policies, including how and when to use personal protective equipment (PPE) or devices (gown, gloves, and goggles).
  - b. Demonstrate, via weekly performance, the first objective by using PPE during all laboratory work with hazardous material.
  - c. Relate the importance of a safety program as defined in the Safety Manual (lab manual for this course) by supplying the correct answer to questions or by demonstration of appropriate actions related to prepared simulations.
  - d. Explain the pre and post exposure prophylactic measures for handling potentially occupational transmission of certain pathogens.
  - e. Select and use proper disinfectants to decontaminate the work area when a hazardous spill has occurred or when beginning or ending a laboratory session.
  - f. Explain the basic steps to first-aid.
  - g. Locate, describe and/or explain the following:
    - i. Evacuation routes
    - ii. Biohazardous material
    - iii. Blood Borne Pathogens
    - iv. Standard Precautions
    - v. Aerosols
    - vi. MSDS (Material Safety Data Sheets)
2. **Demonstrate safe use and disposal of biohazardous materials.**
  - a. Describe how to properly segregate and dispose of various types of waste products generated in the clinical laboratory, including the use of sharp containers for needles, lancets and /or other sharps.
  - b. Demonstrate, via weekly performance, proper disposal of biological samples, as instructed by procedure or instructor.
3. **Describe and define the types of quality control performed in the urinalysis department**
  - a. Define the purpose of quality control in the urinalysis department
  - b. Define the quality control necessary for chemical analysis of urine using reagent strips
  - c. Discuss the origin and use of urinalysis controls
  - d. Differentiate between internal and external quality control
4. **Describe proper specimen collection**
  - a. Discuss the importance of proper specimen collection
  - b. Describe containers appropriate for routine analysis, timed collections and microbiological specimens
  - c. Define labeling procedures for urine specimens
  - d. Differentiate between first morning specimens, random specimens, and pooled urine specimens
  - e. Describe the process for collecting a clean catch midstream urine specimen in males and females
  - f. List four urine preservatives and their uses



5. **Describe the procedure for the physical analysis of urine testing including specific gravity**
  - a. Observe color, turbidity and odor as part of the physical analysis
  - b. Define specific gravity
  - c. Compare and contrast the methods used to measure specific gravity
  - d. Determine when and how to perform corrections to specific gravity due to temperature, high concentrations of glucose and protein
  - e. Identify factors that cause abnormally high and low specific gravity readings in urine
  
6. **Discuss the principals of the chemical analysis of urine**
  - a. Demonstrate, by performance, the proper procedure for chemical analysis using reagent strips
  - b. List the causes of false-positive and false-negative results for each of the analyses when using chemical reagent strips
  - c. Discuss the appropriate use and principles of supplementary/confirmatory testing including an investigation as why children less than 2 years of age are tested with a copper reduction test for sugar in addition to a reagent strip test
  - d. Identify abnormal results in the chemical analysis of urine testing
  - e. Correlate abnormal results with possible disease states
  
7. **Describe the function of each part of the microscope as it relates to performing microscopic urinalysis**
  - a. Describe the function of each part of the microscope
  - b. Demonstrate by procedure the proper procedure for performing a microscopic examination of urine
  - c. Demonstrate by performance, the proper care and storage of the microscope

## **Clinical Hematology/Coagulation/Urinalysis Practica – HTEC 280**

- 1. Practice departmental procedures for safety according to Occupational Safety and Health Administration (OSHA) mandates.**
  - a. Demonstrate the basic aspects of infection control policies, by using personal protective equipment (PPD) or devices (gown, gloves, and goggles).
  - b. Explain evacuation routes
  - c. Locate fire alarms and extinguishers
  - d. Locate eye wash stations and emergency showers
  - e. Locate safety equipment
  - f. Locate spill kits
  - g. Locate MSDS (Material Safety Data Sheets).
- 2. Demonstrate safe use and disposal of biohazardous materials.**
  - a. Demonstrate the proper segregation and disposal of various types of waste products generated in the clinical laboratory, including the use of sharp containers for needles, lancets and/or other sharps.
  - b. Demonstrate proper disposal of biological samples, as instructed by procedure or instructor.
3. Explain departmental organization to include specimen processing and handling, criteria for specimen rejection, and use of laboratory information system (LIS)
  - a. Receive specimens submitted to the clinical hematology, urinalysis and coagulation departments. Determine if the specimens were collected, stored and transported correctly. If proper procedures have been met, process the specimens according to the procedures of the clinical site.
  - b. Site criteria and follow the clinical site's procedure for sample rejection regarding:
    - i. Hematology specimens
    - ii. Urinalysis specimens
    - iii. Coagulation specimens
  - c. Centrifuge patient samples as required
  - d. Familiarize yourself with testing workflow
  - e. Identify tests requiring special specimen handling
  - f. Pour off, when applicable, into sample cups appropriate for each test/analyzer. Perform dilutions of samples when appropriate with accurate results
  - g. Proficient in the use of the LIS including: pending worklists, generating worklists, enter and verifying results, access patient result inquiry and maintain patient confidentiality.
- 4. Demonstrate proficiency in the operation of automated or semi-automated instrumentation.**
  - a. Name the instrumentation used in the laboratory and explain the principle of operation
  - b. Successfully relate normal values to the appropriate test
  - c. Check reagent inventories and load reagents when necessary
  - d. Perform daily startup according to clinical sites protocol
  - e. Analyze quality control products
  - f. Record and document the quality control results per clinical site protocol
  - g. Analyze patient samples
  - h. Recognize abnormal results and troubleshoot accordingly

- i. Evaluate and perform acceptable troubleshooting activities relative to quality control or patient results
  - j. Perform daily shutdown according to clinical sites protocol
  - k. Perform routine instrument maintenance
- 5. Summarize test methods and principles learned during this rotation by completing the worksheets provided.**
  - a. Document daily the procedures performed, including observations
  - b. Obtain signature from supervising technologist verifying work performed, principles covered, and skills competency.
- 6. Perform and interpret all Hematology procedures performed in this department with results acceptable to the supervising Clinical Laboratory Scientist. These should include but are not limited to:**
  - a. Peripheral blood smears
    - i. Prepare and stain smears suitable for microscopic review
    - ii. Perform microscopic evaluation by reproducing normal scattergram differentials.
    - iii. Perform the physical and quantitative analysis and microscopic preparation of body fluid smears
    - iv. Observe bone marrow aspirate and biopsy collections
- 7. Perform and interpret all Urinalysis procedures performed in this department with results acceptable to the supervising Clinical Laboratory Scientist. These should include but are not limited to complete urinalysis, confirmatory testing and tests performed on 24-hour urine.**
  - a. Perform physical and chemical analysis of urine specimens
  - b. Perform microscopic examination of urine by:
    - a. Performing standardized preparation of urine sediment according to laboratory protocol
    - b. Using appropriated microscopic and staining techniques to enhance formed element visualization
    - c. Identifying and enumerates casts and other formed elements accurately
  - c. Perform confirmatory and 24-hour tests: determines analyte concentration by calculation or by reading charts/graphs
- 8. Perform and interpret all Coagulation procedures performed in this department with results acceptable to the supervising Clinical Laboratory Scientist. These should include, but are not limited to:**
  - a. Perform PT, PTT and fibrinogen assays
  - b. Observe or perform technique used to perform bleeding time. Discuss clinical significance and current interpretations of this test with supervising Clinical Laboratory Scientist

## **Clinical Immunohematology Lecture– HTEC 84A**

- A. Compare and contrast immunological principles and applications of several methods and site applications.**
1. Discuss the principles and applications of agglutination, precipitation, hemagglutination, and latex agglutination.
  2. Differentiate between immunofluorescent, immunodiffusion, neutralization and complement fixation.
- B. Evaluate the mechanisms that protect the body from disease or injury and explain the parts and function of each.**
1. Differentiate between natural resistance and acquired immunity.
  2. Evaluate cellular immunity in terms of the roles of lymphocytes and phagocytic cells.
  3. Summarize the mechanism of action after receiving an immunization.
- C. Differentiate the various antigens and antibodies of several clinical procedures and discuss the assay's clinical significance.**
1. Discuss the principles of: anti-streptolysin, mono, C-reactive protein, HCG, rheumatoid factor, RPR and cold agglutins.
  2. Relate test results from the above examples to clinical diagnosis.
- D. Summarize blood banking/Immunohematology principles.**
1. Relate blood banking/Immunohematology principles to disease states of the human blood system.
  2. Evaluate general treatment and/or prevention of those diseased states.
- E. Compare and contrast the mode of inheritance of the major blood groups.**
1. Illustrate by diagram, the methods of ABO grouping (cell and serum).
  2. Include characteristics of the antibodies that define the system and the reason for the use of each reagent.
  3. Compare and contrast the inheritance and antigen frequency of major blood groups, secretor blood group substances, and major antigens as related to different cultures.
- F. Compare and contrast the basis of Rh nomenclature.**
1. Compare and contrast Fisher-Race, Wiener and Rosenfield nomenclature.
  2. Examine the most probable genotypes.
  3. Explain the test for detection and identification of antigens and antibodies in the Rh/Hr Blood group system.
- G. Summarize the principle and state the significance of the antiglobulin test: both direct and indirect.**
1. Differentiate between a direct coombs test performed on an infant versus an adult.
  2. Compare and contrast the direct and the indirect antiglobulin tests, including their purpose, clinical significance and procedure.
  3. Describe laboratory testing in diagnosis of autoimmune hemolytic anemia.
  4. Summarize the effects of the presence of warm autoimmune hemolytic anemia and cold hemagglutinin disease on laboratory tests.
- H. Summarize the principle and significance of the procedure used for antibody identification.**
1. Summarize the test detection for identification of antigens and antibodies.
  2. Compare and contrast the various serologic and immunologic characteristics of antibodies in the ABO, Rh, Lewis, P I, Kell, Duffy, Kidd, MNSs, Lutheran, and Xg blood group systems.
  3. Discuss the probability value that should be established when proving an antibody.
- I. Compare and contrast the four major causes of transfusion reactions and means of detection in the laboratory.**

1. Compare and contrast immune, nonimmune, immediate and delayed transfusion reactions.
  2. Identify the three steps that must be taken by the blood bank when a transfusion reaction is suspected.
- J. Compare and contrast the mechanisms of sensitization in both Rh and ABO hemolytic disease of the newborn (HDN), and the effects of the antigen-antibody complex of the fetus.**
1. Examine the indications for use of Rh immunoglobulin.
  2. Calculate the correct dosage of Rh immunoglobulin in case studies presented.
  3. Describe the principles of the rosette and Kleihauer-Betke tests.
  4. Evaluate routine prenatal and postnatal laboratory investigation of HDN.
- K. Summarize the preparation, storage requirements, effects of storage, and use of blood components.**
1. Compare and contrast the advantages and disadvantages of each blood component chosen.
  2. Explain the procedure for pooling and processing of fresh frozen plasma, cryoprecipitate, and plateletpheresis.
- L. Summarize the criteria for the selection and screening of blood donors.**
1. Summarize the criteria for the selection and screening of blood donors.
  2. Relate the importance of providing educational material to prospective donors.
  3. Describe various types of donor reactions and appropriate steps to follow.
  4. List the serological test procedures performed on potential blood donor's blood before any of the blood components are transfused to a patient.
- M. Compare and contrast the regulations and accrediting agencies of blood and transfusion centers.**
1. Examine the role of quality assurance in a blood center or transfusion service.
  2. Differentiate between quality assurance, quality control and continuous quality improvement.
  3. Identify regulatory agencies involved in the safety of health care workers.

## **Clinical Immunohematology Laboratory – HTEC 84**

- 1. Practice the use of Standard Precautions as they apply in the coagulation laboratory according to Occupational Safety and Health Administration (OSHA) mandates**
  - a. Explain the basic aspects of infection control policies, including how and when to use personal protective equipment (PPE) or devices (gown, gloves, and goggles).
  - b. Demonstrate, via weekly performance, the first objective by using PPE during all laboratory work with hazardous material.
  - c. Relate the importance of a safety program as defined in the Safety Manual (lab manual for this course) by supplying the correct answer to questions or by demonstration of appropriate actions related to prepared simulations.
  - d. Explain the pre and post exposure prophylactic measures for handling potentially occupational transmission of certain pathogens.
  - e. Select and use proper disinfectants to decontaminate the work area when a hazardous spill has occurred or when beginning or ending a laboratory session.
  - f. Explain the basic steps to first-aid.
  - g. Locate, describe and/or explain the following:
    - i. Evacuation routes
    - ii. Biohazardous material
    - iii. Blood Borne Pathogens
    - iv. Standard Precautions
    - v. Aerosols
    - vi. MSDS (Material Safety Data Sheets)
- 2. Demonstrate safe use and disposal of biohazardous materials.**
  - a. Describe how to properly segregate and dispose of various types of waste products generated in the clinical laboratory, including the use of sharp containers for needles, lancets and /or other sharps.
  - b. Demonstrate, via weekly performance, proper disposal of biological samples, as instructed by procedure or instructor.
- 3. Perform the proper techniques of pipetting and making serial dilutions when conducting serological tests.**
  - a. Define titer and describe how to make serial dilutions
  - b. Demonstrate, by performance, correct technique in diluting a serum specimen serially as directed in the laboratory manual
- 4. Interpret the specific disease states covered in the course and describe the serologic assays used to evaluate them.**
  - a. Discuss the principles and applications of agglutination, precipitation, hemagglutination, and latex agglutination
  - b. Define and discuss various antigens and antibodies of clinical procedures and discuss their significance
  - c. Discuss the specific disease states as described in the laboratory manual and describe the serological assays used to evaluate them
  - d. Perform and interpret all serologic assays used in this lab
- 5. Demonstrate techniques essential to correct evaluation of Immunohematology procedures**
  - a. Prepare a 3-5% red cell suspension by utilizing proper cell washing technique
  - b. Perform agglutination grading as outlined in the laboratory manual procedure to the satisfaction of the instructor
  - c. Interpret results of agglutination grading

- d. Calibrate serofuge using cell button procedure
- 6. Perform and interpret quality control procedures**
  - a. Perform and interpret quality control on daily reagents
  - b. Record/document quality control results on worksheets
  - c. Troubleshoot any quality control results that did not perform as expected
  - d. Summarize the importance of quality control within the blood bank laboratory
- 7. Illustrate by diagram, the mode of inheritance of the major blood groups**
  - a. Describe the methods of ABO grouping including the characteristics of the antibodies that define the system, and reason for the use of each reagent
  - b. Perform blood type analysis as described in the laboratory manual
  - c. Explain the secretion of blood group substances
  - d. Explain the test for detection and identification of antigens and antibodies in the Rh/Hr blood group system
  - e. Explain troubleshooting methods useful in blood type analysis
- 8. Compare and contrast the inheritance and antigen frequency of major blood groups, secretor blood group substances and major antigens as related to different cultures**
- 9. Define the criteria for donor selection**
  - a. Summarize minimum age and weight for potential blood donors
  - b. Summarize vitals such as temperature, blood pressure, and pulse for acceptable blood donors
  - c. List the serological test procedures performed on potential blood donor's blood before any of the blood components are transfused to a patient
- 10. Describe the principle and state the significance of the antiglobulin test, direct and indirect**
  - a. Differentiate between a direct coombs test performed on an infant versus an adult
  - b. Perform an indirect coombs test as described in the laboratory manual
  - c. Perform a direct coombs test as described in the laboratory manual
  - d. Perform an elution procedure as outlined in the laboratory manual
- 11. Define the principle and significance of the procedure for antibody identification**
  - a. Explain the test detection and identification of antigens and antibodies in the Rh blood group system
  - b. Specify the nomenclatures and the modes of action of common antibodies
  - c. Perform and correctly interpret antibody panel results
  - d. Describe the elimination method principles used to interpret antibody identification
- 12. Define routine prenatal testing and postnatal laboratory investigation to prevent Hemolytic disease of the Newborn**
  - a. Define the indications for use of Rh immunoglobulin
  - b. Perform ABO and Rh with D variant testing if required on adult and neonates as directed in the laboratory workbook
  - c. Explain the principle of the fetalscreen test
  - d. Explain the procedure for assigning and calculate the dosage of Rh immunoglobulin for a patient
- 13. Compare and contrast the different methods/procedures utilized for compatibility testing**
  - a. Explain the different testing techniques used in compatibility testing
  - b. Summarize the criteria for selection of blood donor units for transfusion
  - c. List four causes of transfusion reactions and means of detection in the laboratory
  - d. Perform compatibility testing as directed in the laboratory manual

14. **Describe the correct procedure for processing various blood components**
  - a. Describe the preparation, storage requirements, effects of storage, and use of blood components, stating the advantages and disadvantages of each in a clinical situation
  - b. Explain the procedure for pooling and processing of fresh frozen plasma, cryoprecipitate, and plateletpheresis.



## Clinical Immunhematology Practica – HTEC 284

- 1. Practice departmental procedures for safety according to Occupational Safety and Health Administration (OSHA) mandates.**
  - a. Demonstrate the basic aspects of infection control policies, by using personal protective equipment (PPD) or devices (gown, gloves, and goggles).
  - b. Explain evacuation routes
  - c. Locate fire alarms and extinguishers
  - d. Locate eye wash stations and emergency showers
  - e. Locate safety equipment
  - f. Locate spill kits
  - g. Locate MSDS (Material Safety Data Sheets).
- 2. Demonstrate safe use and disposal of biohazardous materials.**
  - a. Demonstrate the proper segregation and disposal of various types of waste products generated in the clinical laboratory, including the use of sharp containers for needles, lancets and/or other sharps.
  - b. Demonstrate proper disposal of biological samples, as instructed by procedure or instructor.
- 3. Explain departmental organization to include specimen processing and handling, criteria for specimen rejection, and use of laboratory information system**
  - a. Receive specimens submitted to the immunology/Immunohematology laboratory. Determine if the specimens have been collected, stored and transported to the laboratory appropriately. If proper criteria has been met, process the specimens according to the procedures of the clinical site.
  - b. Site criteria to follow the clinical site's procedure for sample rejection regarding: blood bank specimens, component processing, serology specimens
  - c. Centrifuge patient samples as required
  - d. Familiarize yourself with testing workflow
  - e. Identify tests requiring special specimen handling
  - f. Pour off, when applicable, into sample cups appropriate for each test/analyzer
  - g. Perform dilutions of samples when appropriate with accurate results
  - h. Proficient in the use of the LIS
- 4. Demonstrate proficiency in the operation of automated or semi-automated instrumentation**
  - a. Name the instrumentation used in the laboratory and explain the principle of operation
  - b. Successfully relate normal values to the appropriate test
  - c. Check reagent inventories and load reagents when necessary
  - d. Perform daily startup according to the clinical site protocol
  - e. Analyze quality control products
  - f. Record and document the quality control results per clinical site protocol
  - g. Evaluate and perform acceptable troubleshooting activities relative to quality control or patient results
  - h. Perform daily shutdown according to clinical sites protocol
  - i. Perform routine instrument maintenance

5. **Summarize test methods and principles learned in this rotation by completing the worksheets provided.**
  - a. Document daily the procedures performed, including observations
  - b. Obtain signature from supervising technologist verifying work performed, principles covered and skills competency
6. **Perform and interpret all blood bank procedures with 100% accuracy. Confirm results with CLS**
  - a. Determine the ABO and Rh type of any specimen, including forward, reverse and Du testing and be able to recognize discrepancies in typing results
  - b. Perform cord blood testing and properly evaluate cord bloods with positive direct antiglobulin tests
  - c. Select blood for transfusions and perform major crossmatch procedures for persons with negative antibody screens. Determine which units are suitable for transfusion
  - d. Identify unexpected red blood cell antibodies
  - e. Confirm the ABO and Rh type of donor units received in Transfusion Service
  - f. Perform Rhogam workups and explain the criteria for appropriate use of antenatal and postpartum Rhogam
7. **Perform procedures relating to blood and blood components following the guidelines of the clinical site**
  - a. Correctly issue blood and blood components
  - b. Properly select, prepare, store, outdate, use, and test for compatibility for all blood components
  - c. Select blood for transfusion and perform the major crossmatch procedure for persons with positive antibody screens
  - d. Discuss the considerations involved when switching the ABO and/or Rh type of blood transfused to a patient
8. **Observe and discuss with the supervising CLS, a transfusion reaction workup.**
9. **Perform and interpret all serology assays run in the department with results acceptable to the supervising CLS. These may include, but are not limited to:**
  - a. Pregnancy testing
  - b. Infectious mononucleosis testing
  - c. System Lupus Erythematosus testing
  - d. Antinuclear antibody testing
  - e. Rheumatoid factor testing
  - f. Syphilis testing

## Clinical Microbiology Lecture – HTEC 83A

- A. Communicate the importance of universal precautions in the clinical laboratory setting.**
- D. Defend the practice of Biohazardous waste disposal as it applies to the risks in the microbiology department.
  - E. Design rules for good personal hygiene and defend their use to ensure patient and employee safety.
- B. Summarize the fields of study included in microbiology.**
1. Differentiate the specialty fields of: bacteriology, virology, rickettsiology and parasitology.
  2. Compare and contrast the routine procedures for identifying the above areas of microbiology.
- C. Compare and contrast the organization of the microbiology department in a small and large laboratory.**
1. Examine the test menu of a small microbiology laboratory.
  2. Examine the test menu of a large microbiology laboratory.
- D. Relate the processes involved in infection and how nosocomial infections are acquired.**
1. Relate opportunistic pathogens to nosocomial and community-acquired infections.
  2. Relate pathogenic worms to disease.
- E. Design a quality control program in the microbiology department.**
1. Relate the criteria for the necessity of quality control in the microbiology laboratory.
  2. Create a chart that documents proper monitoring of: equipment, media, reagents and antisera, antimicrobial tests, maintenance of stock cultures and control of specimens and specimen collection.
- F. Design a system for proper specimen collection and transport for the microbiology department.**
1. Relate the basic principles of specimen collection for materials received in the microbiology laboratory.
  2. Summarize patient education for clean-catch urines, sputum and stool.
  3. Analyze mechanisms for maintaining organism viability relating to preservation, storage, and transport of specimens.
  4. Examine prioritization guidelines used during processing to prevent degradation of the specimen.
  5. Prepare charts for selection of routine primary culture media and media for unusual fastidious bacteria.
- G. Identify clinically significant microorganisms noted in clinical microbiology laboratories.**
1. Differentiate between Staphylococci and Streptococci
  2. Categorize various gram positive rods
  3. Differentiate between gram-negative rods, especially Enterbacteriaceae, Haemophilus, and enteric pathogens.
- H. Organize a microorganism identification system.**
1. Select appropriate media and inoculation techniques.
  2. Choose appropriate differential stains.
  3. Assess organism growth requirements.
  4. Evaluate morphological characteristics of organisms
  5. Propose appropriate biochemical tests
  6. Select commercial and rapid identification systems that will aid in microorganism identification.
  7. Propose serological tests helpful in identifying microorganisms.
  8. Devise a chart showing the common classifications of microorganisms by staining and morphological characteristics.

**I. Discuss the actions of antibiotics on microorganisms.**

1. Evaluate the basic structure of microorganisms and the specific functions of individual components with the action of antimicrobial agents.
2. Differentiate between bacteriostatic and bactericidal. Relate factors that can influence outcome of specific antimicrobial activity.
3. Summarize the major sites of action and their primary mechanism of action for major classes of antimicrobial agents.
4. Examine the major mechanisms by which resistance to various antimicrobial agents can occur.

**J. Compare and contrast the various methods for susceptibility testing including advantages and disadvantages.**

1. Examine the rationale behind the performance of antimicrobial susceptibility tests.
2. Evaluate the method for selection of specific drugs in testing and reporting.
3. Summarize how zone interpretive criteria used with the disk diffusion test are established.

**K. Categorize the organisms that are required to be reported to the state's Department of Health Services and describe how this is accomplished.**

1. Prepare a mock report to the Department of Health concerning a targeted organism.
2. Evaluate the required documentation, notification and follow-up required.

**L. Evaluate general characteristics of medically important fungi.**

1. Evaluate the appropriate specimen collection procedures, staining methods, and culture techniques used in the mycology laboratory.
2. Differentiate the terms associated with fungal structures.
3. Categorize fungi in to their respective classes

**M. Evaluate general characteristics of medically important parasites.**

1. Assess the major considerations in collecting and handling of specimens for identification of intestinal, blood, and tissue parasites.
2. Evaluate the general procedure for performing the direct wet mount, concentration procedures and permanent stained smears.
3. Analyze the mechanism of pathogenesis, method of infection, clinical symptoms, prevention, and treatment of the major human pathogens.
4. Examine the morphology, the life cycle, including the infective stage and the diagnostic stage, and the usual procedure for identification of the parasites covered in lecture.

**N. Compare and contrast laboratory protocols for viruses, Rickettsiae and anaerobic bacteria.**

1. Examine the characteristics of viruses, and differentiate these organisms from bacteria.
2. Examine how viruses are transmitted or acquired, the infection the virus produces, and the effective method of laboratory diagnosis for viruses presented in lecture.
3. Evaluate the different methods used in the diagnosis of viral infections, including advantages and limitations of conventional tissue cultures and rapid viral antigen detection methods.

## Clinical Microbiology Laboratory – HTEC 83

1. **Practice the use of Standard Precautions as they apply in the coagulation laboratory according to Occupational Safety and Health Administration (OSHA) mandates**
  - a. Explain the basic aspects of infection control policies, including how and when to use personal protective equipment (PPE) or devices (gown, gloves, and goggles).
  - b. Demonstrate, via weekly performance, the first objective by using PPE during all laboratory work with hazardous material.
  - c. Relate the importance of a safety program as defined in the Safety Manual (lab manual for this course) by supplying the correct answer to questions or by demonstration of appropriate actions related to prepared simulations.
  - d. Explain the pre and post exposure prophylactic measures for handling potentially occupational transmission of certain pathogens.
  - e. Select and use proper disinfectants to decontaminate the work area when a hazardous spill has occurred or when beginning or ending a laboratory session.
  - f. Explain the basic steps to first-aid.
  - g. Locate, describe and/or explain the following:
    - i. Evacuation routes
    - ii. Biohazardous material
    - iii. Blood Borne Pathogens
    - iv. Standard Precautions
    - v. Aerosols
    - vi. MSDS (Material Safety Data Sheets)
2. **Demonstrate safe use and disposal of biohazardous materials.**
  - a. Describe how to properly segregate and dispose of various types of waste products generated in the clinical laboratory, including the use of sharp containers for needles, lancets and /or other sharps.
  - b. Demonstrate, via weekly performance, proper disposal of biological samples, as instructed by procedure or instructor.
3. **Identify the parts and functions of the light microscope and model proper use and care of the microscope**
  - a. Examine your microscope and locate each of the items listed and illustrated in the laboratory workbook
  - b. Describe the function of each item located
4. **Describe the basic principles of specimen collection**
  - a. Describe the basic principles of specimen collection for materials received in the form of aspirates, tissues, and swabs
  - b. Demonstrate knowledge of mechanisms for maintaining organism viability relating to storage, transport, and preservation of specimens by appropriate actions or answers when asked
  - c. Explain proper patient instruction and preparation to specimen collection
  - d. Review the aseptic techniques for handling clinical specimens and transferring microorganisms
5. **Use proper techniques for smear preparation and primary media inoculation**
  - a. Demonstrate technique for inoculating primary media
  - b. Use charts for the selection of routine primary media
6. **Describe the reagents and procedures for the Gram stain and demonstrate proper use**
  - a. Demonstrate technical skills in the preparation and staining of bacterial smears

- b. Demonstrate expertise in making a wet mount
  - c. Perform a simple stain
  - d. Demonstrate the ability to perform the gram stain procedure correctly
  - e. Read the gram stain microscopically and illustrate the organisms seen
7. **Compare and contrast normal flora vs. pathogens of selected body sites as they appear on selective media**
- a. Discuss the importance of normal body flora in host defense
  - b. Name the predominant flora of various body sites
  - c. Describe the appearance of usual flora on various media
  - d. Describe the appearance of important pathogens on various media
8. **Demonstrate the technical skills to perform and interpret laboratory testing in the identification and sensitivity testing for common classifications of microorganisms as detailed in the laboratory workbook**
- a. Demonstrate the technical skills to perform and interpret laboratory testing in the identification of the Staphylococci
  - b. Recognize microscopic characteristics of fastidious gram-negative rods.
  - c. Compare and contrast the clinical manifestations of Neisseria infections in men and women
  - d. Discuss the clinical manifestations of Genital chlamydiosis, include comparison of the physical presence of the infection in men versus women and laboratory diagnosis
  - e. Choose media appropriate for the culture of gram negative rods
  - f. Choose media appropriate for the isolation of bacteria responsible for gastrointestinal infections
  - g. Choose media appropriate for the isolation of bacteria responsible for eye infections
  - h. Choose media appropriate for the isolation of bacteria responsible for central nervous system infections
  - i. Choose media appropriate for the isolation of bacteria responsible for bacteremia
  - j. Demonstrate knowledge of procedures to perform susceptibility testing
9. **Demonstrate knowledge of the general characteristics of medically important fungi and parasites**
- a. Demonstrate knowledge of the methods for fungal identification
  - b. Demonstrate the technical skills to perform and interpret KOH slide preparations
  - c. Choose a medically important parasite that has its origin outside the US, and prepare a short report on its epidemiology, life cycle and its clinical manifestations.
10. **Summarize the differences between the viruses, Rickettsiae and anaerobic bacteria**

## Clinical Microbiology Practica – HTEC 283

- 1. Practice departmental procedures for safety according to Occupational Safety and Health Administration (OSHA) mandates.**
  - a. Demonstrate the basic aspects of infection control policies, by using personal protective equipment (PPD) or devices (gown, gloves, and goggles).
  - b. Explain evacuation routes
  - c. Locate fire alarms and extinguishers
  - d. Locate eye wash stations and emergency showers
  - e. Locate safety equipment
  - f. Locate spill kits
  - g. Locate MSDS (Material Safety Data Sheets).
- 2. Demonstrate safe use and disposal of biohazardous materials.**
  - a. Demonstrate the proper segregation and disposal of various types of waste products generated in the clinical laboratory, including the use of sharp containers for needles, lancets and/or other sharps.
  - b. Demonstrate proper disposal of biological samples, as instructed by procedure or instructor.
- 3. Explain departmental organization to include specimen processing and handling, criteria for specimen rejection, and use of laboratory information system**
  - a. Receive specimens submitted to the Microbiology laboratory. Determine if the specimens have been collected, stored and transported to the laboratory appropriately. If proper criteria has been met, process the specimens according to the procedures of the clinical site.
  - b. Site criteria for specimen rejection and follow the procedure established by the clinical site for specimen rejection if necessary
  - c. Proficient in the use of the LIS including: pending worklists, generating worklists, enter and verifying results, access patient result inquiry and maintain patient confidentiality
- 4. Demonstrate proficiency in the operation of automated or semi-automated instrumentation**
  - a. Name the instrumentation used in the laboratory and explain the principle of operation
  - b. Successfully relate normal values to the appropriate test
  - c. Check reagent inventories and load reagents when necessary
  - d. Perform daily startup according to clinical sites protocol
  - e. Analyze quality control products
  - f. Record and document the quality control results per clinical site protocol
  - g. Analyze patient samples
  - h. Recognize abnormal results and troubleshoot accordingly
  - i. Evaluate and perform acceptable troubleshooting activities relative to quality control or patient results
  - j. Perform daily shutdown according to clinical sites protocol
  - k. Perform routine instrument maintenance
- 5. Summarize test methods and principles learned during this rotation by completing worksheets provided**
- 6. Perform and interpret all microbiology procedures with 100% accuracy. Confirm results with supervising CLS**
- 7. Describe discuss and perform quality control procedures involving media, equipment and sensitivity testing**
- 8. Identify sources of potential error in the clinical microbiology laboratory**

- 9. Summarize current State and Federal regulations regarding microbiology specimens.**



## Appendix 4

### Technical Skills

Technical Standards are the essential non-academic requirements of the program that a student must be able to master in order to successfully participate in the MLT program and become employable. Examples of this program's technical standards are provided below. If you are not sure that you will be able to meet these technical standards, please consult with the MLT Program Director for further information and to discuss your individual situation.

#### Visual Skills:

A student in the MLT program must possess sufficient visual skills to accurately perform and aid in the interpretation of laboratory assays, including the ability to:

- Read calibration lines on pipettes and laboratory instruments that are one millimeter apart.
- Distinguish between solutions that are clear, opaque or particulate in test tubes and/or on glass slides.
- Identify stained and unstained cellular components in the range of one-micrometer using a binocular bright-field microscope.
- Differentiate color reactions.
- Be able to easily distinguish between numbers (computer screen and printed)

#### Manipulative Skills:

A student in the MLT program must possess adequate manipulative skills to perform a variety of laboratory assays, including the ability to:

- Turn dials, press keyboards, and move switches on laboratory instruments.
- Use a rubber bulb to draw liquid into a marked pipette and then use a gloved finger to control the release of that liquid to within one millimeter of a fixed point on the pipette.
- Isolate bacteria in microbiology by smoothly moving a loop (a 12-inch wire with a looped end) over the surface of an agar (gel) culture plate without tearing the surface of the agar.
- Manipulate and observe large and small objects and biological specimens without endangering the integrity of the object or the health and safety of people.

#### Cognitive Skills:

A student in the MLT program must possess skills that enable him/her to coordinate with other persons both in and out of the lab, including the ability to:

- Effectively interface with customers, co-workers, physicians, and administrators: practice good hospitality habits and communication skills.
- Read, write, and communicate effectively.
- Retain a sequence of steps and go through a sequence of steps unassisted.
- Have an awareness of time sequences as determined by timed tests or assays.
- Prioritize actions during an emergency, seek needed assistance and attempt to prevent undesirable secondary effects.
- React WITHOUT impulsiveness, belligerence, argumentative or intrusive behavior.
- Understand spatial, structural and functional relationships between objects, animate or inanimate.
- Apply principles of quantitative measurements and calculations to real problems.

**Affective:**

The student should be able to:

- Maintain honest behavior at all times.
- Respect patients, peers, and faculty.
- Comply with established professional ethics.
- Accept responsibility for own actions.
- Remain receptive to change.
- React to life threatening situations in an appropriate manner and according to established policies and procedures.

The National Accrediting Agency for Clinical Laboratory Science requires specific technical standards to be defined and published for students. Please sign this form to indicate that you have read and understood the program technical standards and believe that you can meet them.

---

Student's Signature

Date

## Appendix 4

**De Anza College - Medical Laboratory Technician Program**  
**Clinical Practical – Chemistry - HTEC 285**  
**216 hours of clinical training**  
**Skills Competency List**

Student Name: \_\_\_\_\_ Clinical Facility \_\_\_\_\_

**Level of Skill: 1 = not performed nor observed, 2 = observed only,  
 3 = Performed or defined satisfactorily, 4 = Proficient, able to perform in job  
 setting after usual employee orientation**

Skill	LOS	Inst. Initials	Student Initials	Date
<b>Communications/Customer Service</b>				
Adheres to confidentiality statement/policies	4			
Demonstrates appropriate communication with Hospital staff/clients.	4			
Demonstrates positive and supportive customer service behaviors.	4			
Identifies and notifies appropriate individual of problems and issues of customer service and observes problem resolution.	4			
Demonstrates support of patient/customer rights.	4			
<b>Personal and professional Behavior</b>				
Adheres to dress code described in <i>student handbook</i> , including wearing nametag at all times and awareness of personal hygiene.	4			
Demonstrates positive training behavior	4			
Demonstrates ability to adjust to working environment	4			
Works with bench instructor to prioritize work when indicated	4			
<b>Safety: The student can define and locate:</b>				
Emergency exit routes	4			
Fire Alarms & extinguishers	4			
Eye Wash/Showers	4			
Safety Equipment to include PPE	4			
Locate spill kit	4			
Define R A C E (or facility's acronym)	4			
Follows hospital/department policies and procedures	4			
Follows infection control policies and procedures	4			
Demonstrates safe and effective use of equipment	4			
Utilizes protective equipment as appropriate	4			
Locate MSDS	4			
<b>Specimen Processing: The student can define and perform:</b>				
Centrifugation	4			

Skill	LOS	Inst. Initials	Student Initials	Date
Workflow of section	4			
Identification of special handling needs	4			
Assign appropriate acquisition numbers/codes to each specimen upon arrival in the laboratory	3			
Demonstrate understanding of all areas of the lab requisition slip and properly interpret the information provided or requested	3			
Specimen separation as required	4			
Diluting specimens as required	4			
Specimen rejection criteria and protocol	4			
<b>Computer Skills: The student can locate and create:</b>				
Patient results, pending tests, uncollected tests	3			
Properly report via telephone results as lab policy directs	3			
Generate work lists, pending lists, and reports as required	3			
Enter results (interface download) with tech co-signature	3			
Record appropriate comments as required by lab policy	3			
Document and take action, as indicated, for critical values	4			
<b>General Laboratory Practice: The student has consistently:</b>				
Worn the appropriate PPE and practices standard precaution	4			
Followed accreditation standards as defined by the site regarding safety, fire safety, disaster, handling of hazardous materials	4			
Recorded, retrieved, or drawn specimens and laboratory data from on-site or ancillary laboratories.	4			
Prepared labels and enters or verifies patient demographics upon receipt of specimens	4			
Instructed patients/health care providers in proper procedure for collection of semen, urine, feces, and other specimens related to this department.	4			
Disposed of specimens in biohazard container and uses spill kits for biohazardous spills.	4			

Skill	LOS	Inst. Initials	Student Initials	Date
<b>Instrumentation:</b> <i>Attach to this skill's list the specific competency list provided by each clinical site for each particular instrument the student is trained.</i>				
<b>#1 Instrument = _____</b>				
Principal of operation, essential components:	4			
Skills: performed independently once				
Test preparation (reagents, std., QC, patient samples)	3			
Calibration/Documentation	3			
QC Documentation	3			
Troubleshooting	2			
Maintenance to include troubleshooting	2			
<b>#2 Instrument = _____</b>				
Principal of operation, essential components:	4			
Skills: performed independently once				
Test preparation (reagents, std., QC, patient samples)	3			
Calibration/Documentation	3			
QC Documentation	3			
Troubleshooting	2			
Maintenance to include troubleshooting	2			
<b>#3 Instrument = _____</b>				
Principal of operation, essential components:	4			
Skills: performed independently once				
Test preparation (reagents, std., QC, patient samples)	3			
Calibration/Documentation	3			
QC Documentation	3			
Troubleshooting	2			
Maintenance to include troubleshooting	2			
<b>#4 Instrument = _____</b>				
Principal of operation, essential components:	4			
Skills: performed independently once				
Test preparation (reagents, std., QC, patient samples)	3			
Calibration/Documentation	3			
QC Documentation	3			
Troubleshooting	2			
Maintenance to include troubleshooting	2			
<b>Name the method:</b>				
Define principle of reaction/operation	4			
State reagent needs and requirements by example	3			
Perform daily start up – including QC and calibration, as needed	3			
Accurately assay patient values to include entering results, applicable comments, and any other action the result would require relative to lab policy.	3			
Perform acceptable trouble shooting for questionable results or out of control QC	2			

<b>Name the method:</b>				
Define principle of reaction/operation	4			
State reagent needs and requirements by example	3			
Perform daily start up – including QC and calibration, as needed	3			
Accurately assay patient values to include entering results, applicable comments, and any other action the result would require relative to lab policy.	3			
Perform acceptable trouble shooting for questionable results or out of control QC	2			
<b>Name the method:</b>				
Define principle of reaction/operation	4			
State reagent needs and requirements by example	3			
Perform daily start up – including QC and calibration, as needed	3			
Accurately assay patient values to include entering results, applicable comments, and any other action the result would require relative to lab policy.	3			
Perform acceptable trouble shooting for questionable results or out of control QC	2			
<b>Name the method:</b>				
Define principle of reaction/operation	4			
State reagent needs and requirements by example	3			
Perform daily start up – including QC and calibration, as needed	3			
Accurately assay patient values to include entering results, applicable comments, and any other action the result would require relative to lab policy.	3			
Perform acceptable trouble shooting for questionable results or out of control QC	2			
<b>Name the method:</b>				
Define principle of reaction/operation	4			
State reagent needs and requirements by example	3			
Perform daily start up – including QC and calibration, as needed	3			
Accurately assay patient values to include entering results, applicable comments, and any other action the result would require relative to lab policy.	3			
Perform acceptable trouble shooting for questionable results or out of control QC	2			

Notes:

## Appendix 4:

**De Anza College - Medical Laboratory Technician Program**  
**Clinical Practical – Hem/Coag/UA - HTEC 280**  
**216 hours of clinical training**  
**Skills Competency List**

Student Name: \_\_\_\_\_ Clinical Facility \_\_\_\_\_

**Level of Skill: 1 = not performed nor observed, 2 = observed only, 3 = Performed or defined satisfactorily, 4 = Proficient, able to perform in job setting after usual employee orientation**

Skill	LOS	Inst. Initials	Student Initials	Date
<b>Communications/Customer Service</b>				
Adheres to confidentiality statement/policies	4			
Demonstrates appropriate communication with Hospital staff/clients.	4			
Demonstrates positive and supportive customer service behaviors.	4			
Identifies and notifies appropriate individual of problems and issues of customer service and observes problem resolution.	4			
Demonstrates support of patient/customer rights.	4			
<b>Personal and professional Behavior</b>				
Adheres to dress code described in <i>student handbook</i> , including wearing nametag at all times and awareness of personal hygiene.	4			
Demonstrates positive training behavior	4			
Demonstrates ability to adjust to working environment	4			
Works with bench instructor to prioritize work when indicated	4			
<b>Safety: The student can define and locate:</b>				
Emergency exit routes	4			
Fire Alarms & extinguishers	4			
Eye Wash/Showers	4			
Safety Equipment to include PPE	4			
Locate spill kit	4			
Define R A C E (or facility's acronym)	4			
Follows hospital/department policies and procedures	4			
Follows infection control policies and procedures	4			
Demonstrates safe and effective use of equipment	4			
Utilizes protective equipment as appropriate	4			
Locate MSDS	4			
<b>Specimen Processing: The student can define and perform:</b>				
Centrifugation	4			

Skill	LOS	Inst. Initials	Student Initials	Date
Workflow of section	4			
Identification of special handling needs	4			
Assign appropriate acquisition numbers/codes to each specimen upon arrival in the laboratory	3			
Demonstrate understanding of all areas of the lab requisition slip and properly interpret the information provided or requested	3			
Specimen separation as required	4			
Diluting specimens as required	4			
Specimen rejection criteria and protocol	4			
<b>Computer Skills: The student can locate and create:</b>				
Patient results, pending tests, uncollected tests	3			
Properly report via telephone results as lab policy directs	3			
Generate work lists, pending lists, and reports as required	3			
Enter results (interface download) with tech co-signature	3			
Record appropriate comments as required by lab policy	3			
Document and take action, as indicated, for critical values	4			
<b>General Laboratory Practice: The student has consistently:</b>				
Worn the appropriate PPE and practices standard precaution	4			
Followed accreditation standards as defined by the site regarding safety, fire safety, disaster, handling of hazardous materials	4			
Recorded, retrieved, or drawn specimens and laboratory data from on-site or ancillary laboratories.	4			
Prepared labels and enters or verifies patient demographics upon receipt of specimens	4			
Instructed patients/health care providers in proper procedure for collection of semen, urine, feces, and other specimens related to this department.	4			
Disposed of specimens in biohazard container and uses spill kits for biohazardous spills.	4			



Skill	LOS	Inst. Initials	Student Initials	Date
<b>Instrumentation:</b> <i>Attach to this skill's list the specific competency list provided by each clinical site for each particular instrument the student is trained.</i>				
<b>#1 Instrument = _____</b>				
Principal of operation, essential components:	4			
Skills: performed independently once				
Test preparation (reagents, std., QC, patient samples)	3			
Calibration/Documentation	3			
QC Documentation	3			
Troubleshooting	2			
Maintenance to include troubleshooting	2			
<b>#2 Instrument = _____</b>				
Principal of operation, essential components:	4			
Skills: performed independently once				
Test preparation (reagents, std., QC, patient samples)	3			
Calibration/Documentation	3			
QC Documentation	3			
Troubleshooting	2			
Maintenance to include troubleshooting	2			
<b>#3 Instrument = _____</b>				
Principal of operation, essential components:	4			
Skills: performed independently once				
Test preparation (reagents, std., QC, patient samples)	3			
Calibration/Documentation	3			
QC Documentation	3			
Troubleshooting	2			
Maintenance to include troubleshooting	2			
<b>Bench Methodologies</b>				
<b>Name the method:</b>				
Define principle of reaction/operation	4			
State reagent needs and requirements by example	3			
Perform daily start up – including QC and calibration, as needed	3			
Accurately assay patient values to include entering results, applicable comments, and any other action the result would require relative to lab policy.	3			
Perform acceptable trouble shooting for questionable results or out of control QC	2			
<b>Name the method:</b>				
Define principle of reaction/operation	4			
State reagent needs and requirements by example	3			
Perform daily start up – including QC and calibration, as needed	3			
Accurately assay patient values to include entering results, applicable comments, and any other action the result would require relative to lab policy.	3			
Perform acceptable trouble shooting for questionable results or out of control QC	2			

<b>Name the method:</b>				
Define principle of reaction/operation	4			
State reagent needs and requirements by example	3			
Perform daily start up – including QC and calibration, as needed	3			
Accurately assay patient values to include entering results, applicable comments, and any other action the result would require relative to lab policy.	3			
Perform acceptable trouble shooting for questionable results or out of control QC	2			
<b>Name the method:</b>				
Define principle of reaction/operation	4			
State reagent needs and requirements by example	3			
Perform daily start up – including QC and calibration, as needed	3			
Accurately assay patient values to include entering results, applicable comments, and any other action the result would require relative to lab policy.	3			
Perform acceptable trouble shooting for questionable results or out of control QC	2			
<b>NOTES:</b>				
<b>Skill</b>	<b>LOS</b>	<b>Instr. Initials</b>	<b>Student Initials</b>	<b>Date</b>
<b>Specific to Urinalysis</b>				
Performs macroscopic examination of urine, including physical and chemical tests	4			
Performs microscopic examination of urine by:				
• Performs standardized preparation of urine sediment according to laboratory protocol	4			
• Uses appropriate microscopic and staining techniques to enhance formed element visualization	4			
• Identifies and enumerates casts and other formed elements	3			
Performs confirmatory and 24 hour tests: determines analyte concentration by calculation or by reading charts/graphs	3			
<b>Specific to Hematology</b>				
Peripheral blood smears:				
• Prepares blood smears suitable for microscopic review	4			
• Stains blood smears suitable for microscopic review	4			
• Performs microscopic evaluation by reproducing <b>normal</b> scattergram differentials	4			
• Introduced to abnormal morphology of cellular elements	2			
Performs the physical and quantitative analysis and microscopic preparation of body fluid smears.	3			
Observes a bone marrow aspirate and biopsy collection	2			

<b>Specific to Coagulation</b>				
Perform PT, APTT, thrombin time, & fibrinogen assays	4			
Observe bleeding time	2			
<b>Reporting of Results: (Hem/Coag/UA)</b>				
Correlates results of pertinent laboratory determinations to each other and to the patient's condition	3			
Provides reference range for analyte	3			
Recognizes abnormal results, panic/critical action values, sources of error initiates corrective action when indicated	4			
Verifies accuracy and transcription of final report	3			

Notes:

## Appendix 4:

**De Anza College - Medical Laboratory Technician Program**  
**Clinical Practical – Immunology/Immunohematology**  
**- HTEC 284**

**180 hours of clinical training**  
**Skills Competency List**

Student Name: \_\_\_\_\_ Clinical Facility \_\_\_\_\_

**Level of Skill: 1 = not performed nor observed, 2 = observed only, 3 = Performed or defined satisfactorily, 4 = Proficient, able to perform in job setting after usual employee orientation**

Skill	LOS	Inst. Initials	Student Initials	Date
<b>Communications/Customer Service</b>				
Adheres to confidentiality statement/policies	4			
Demonstrates appropriate communication with Hospital staff/clients.	4			
Demonstrates positive and supportive customer service behaviors.	4			
Identifies and notifies appropriate individual of problems and issues of customer service and observes problem resolution.	4			
Demonstrates support of patient/customer rights.	4			
<b>Personal and professional Behavior</b>				
Adheres to dress code described in <i>student handbook</i> , including wearing nametag at all times and awareness of personal hygiene.	4			
Demonstrates positive training behavior	4			
Demonstrates ability to adjust to working environment	4			
Works with bench instructor to prioritize work when indicated	4			
<b>Safety: The student can define and locate:</b>				
Emergency exit routes	4			
Fire Alarms & extinguishers	4			
Eye Wash/Showers	4			
Safety Equipment to include PPE	4			
Locate spill kit	4			
Define R A C E (or facility's acronym)	4			
Follows hospital/department policies and procedures	4			
Follows infection control policies and procedures	4			
Demonstrates safe and effective use of equipment	4			
Utilizes protective equipment as appropriate	4			
Locate MSDS	4			
<b>Specimen Processing: The student can define and perform:</b>				
Centrifugation	4			

Skill	LOS	Inst. Initials	Student Initials	Date
Workflow of section	4			
Identification of special handling needs	4			
Assign appropriate acquisition numbers/codes to each specimen upon arrival in the laboratory	3			
Demonstrate understanding of all areas of the lab requisition slip and properly interpret the information provided or requested	3			
Specimen separation as required	4			
Diluting specimens as required	4			
Specimen rejection criteria and protocol	4			
<b>Computer Skills: The student can locate and create:</b>				
Patient results, pending tests, uncollected tests	3			
Properly report via telephone results as lab policy directs	3			
Generate work lists, pending lists, and reports as required	3			
Enter results (interface download) with tech co-signature	3			
Record appropriate comments as required by lab policy	3			
Document and take action, as indicated, for critical values	4			
<b>General Laboratory Practice: The student has consistently:</b>				
Worn the appropriate PPE and practices standard precaution	4			
Followed accreditation standards as defined by the site regarding safety, fire safety, disaster, handling of hazardous materials	4			
Recorded, retrieved, or drawn specimens and laboratory data from on-site or ancillary laboratories.	4			
Prepared labels and enters or verifies patient demographics upon receipt of specimens	4			
Instructed patients/health care providers in proper procedure for collection of semen, urine, feces, and other specimens related to this department.	4			
Disposed of specimens in biohazard container and uses spill kits for biohazardous spills.	4			

Skill	LOS	Inst. Initials	Student Initials	Date
<b>Instrumentation:</b> <i>Attach to this skill's list the specific competency list provided by each clinical site for each particular instrument the student is trained.</i>				
<b>#1 Instrument = Photometer</b>				
Principal of operation, essential components:	4			
Skills: performed independently once				
Test preparation (reagents, std., QC, patient samples)	3			
Calibration/Documentation	3			
QC Documentation	3			
Troubleshooting	2			
Maintenance to include troubleshooting	2			
<b>#2 Instrument = EIA</b>				
Principal of operation, essential components:	4			
Skills: performed independently once				
Test preparation (reagents, std., QC, patient samples)	3			
Calibration/Documentation	3			
QC Documentation	3			
Troubleshooting	2			
Maintenance to include troubleshooting	2			
<b>#3 Instrument = Cell Washer</b>				
Principal of operation, essential components:	4			
Skills: performed independently once				
Test preparation (reagents, std., QC, patient samples)	3			
Calibration/Documentation	3			
QC Documentation	3			
Troubleshooting	2			
Maintenance to include troubleshooting	2			
<b>#4 Instrument =</b>				
Principal of operation, essential components:	4			
Skills: performed independently once				
Test preparation (reagents, std., QC, patient samples)	3			
Calibration/Documentation	3			
QC Documentation	3			
Troubleshooting	2			
Maintenance to include troubleshooting	2			
<b>#5 Instrument =</b>				
Principal of operation, essential components:	4			
Skills: performed independently once				
Test preparation (reagents, std., QC, patient samples)	3			
Calibration/Documentation	3			
QC Documentation	3			
Troubleshooting	2			
Maintenance to include troubleshooting	2			

<b>Bench Methodologies</b>				
<b>ABO/Rh testing including D variant and Du testing</b>				
Define principle of reaction/operation	4			
State reagent needs and requirements by example	3			
Perform daily start up – including QC and calibration, as needed	3			
Accurately assay patient values to include entering results, applicable comments, and any other action the result would require relative to lab policy.	3			
Perform acceptable trouble shooting for questionable results or out of control QC	2			
100% accuracy on 10 samples (no ABO discrepancies)	4			
<b>Direct Antiglobulin Test</b>				
Define principle of reaction/operation	4			
State reagent needs and requirements by example	3			
Perform daily start up – including QC and calibration, as needed	3			
Accurately assay patient values to include entering results, applicable comments, and any other action the result would require relative to lab policy.	3			
Perform acceptable trouble shooting for questionable results or out of control QC	2			
100% accuracy on 10 samples	4			
<b>Indirect Antiglobulin screens and phenotyping (Kell, Duffy, Kid, Rh)</b>				
Define principle of reaction/operation	4			
State reagent needs and requirements by example	3			
Perform daily start up – including QC and calibration, as needed	3			
Accurately assay patient values to include entering results, applicable comments, and any other action the result would require relative to lab policy.	3			
Perform acceptable trouble shooting for questionable results or out of control QC	2			
100% accuracy on 10 samples for antibody screens	4			
100% accuracy on 5 antibody identification panels	4			
<b>Indirect Antiglobulin screens and phenotyping (Lewis, MNS, P)</b>	2			
<b>Crossmatch</b>				
Define principle of reaction/operation	4			
State reagent needs and requirements by example	3			
Perform daily start up – including QC and calibration, as needed	3			
Accurately assay patient values to include entering results,	3			

applicable comments, and any other action the result would require relative to lab policy.				
Perform acceptable trouble shooting for questionable results or out of control QC	2			
100% accuracy on 5 sample crossmatches	4			
<b>Rhogam workups</b>	2			
Define principle of reaction/workup	4			
State reagent needs and requirements by example	4			
<b>Preparation and Issuing of blood and blood components:</b>				
RBC (leukopoor RBC, washed RBC,	2			
FFP	2			
Platelets (random donor, single donor)	2			
Cryoprecipitate	2			
Plasma (fresh frozen,				
<b>Elutions:</b>	2			
Define principle of reaction/workup	4			
State reagent needs and requirements by example	4			
<b>Antibody titers</b>	2			
Define principle of reaction/workup	4			
State reagent needs and requirements by example	4			
<b>Prewarming technique</b>	2			
Define principle of reaction/workup	4			
State reagent needs and requirements by example	4			
<b>Enzyme treatment</b>	2			
Define principle of reaction/workup	4			
State reagent needs and requirements by example	4			
<b>Antibody removal by Adsorption</b>	2			
Define principle of reaction/workup	4			
State reagent needs and requirements by example	4			
<b>ANA</b>	2			
Define principle of reaction/workup	4			
State reagent needs and requirements by example	4			
<b>VDRL</b>	3			
Define principle of reaction/workup	4			
State reagent needs and requirements by example	4			
Accurately assay patient values to include entering results, applicable comments, and any other action the result would require relative to lab policy	3			
Perform acceptable troubleshooting for questionable results or out of control QC.	3			
<b>Hepatitis testing</b>	2			
Define principle of reaction/workup	4			
State reagent needs and requirements by example	4			
<b>Mononucleosis testing</b>	4			
Define principle of reaction/workup	4			
State reagent needs and requirements by example	4			
Accurately assay patient values to include entering results, applicable comments, and any other action the result would require relative to	3			



lab policy				
Perform acceptable troubleshooting for questionable results or out of control QC.	3			
<b>Antistreptolysin O antibody (ASO)</b>	3			
Define principle of reaction/workup	4			
State reagent needs and requirements by example	4			
Accurately assay patient values to include entering results, applicable comments, and any other action the result would require relative to lab policy	3			
Perform acceptable troubleshooting for questionable results or out of control QC.	3			
<b>RPR</b>	4			
Define principle of reaction/workup	4			
State reagent needs and requirements by example	4			
Accurately assay patient values to include entering results, applicable comments, and any other action the result would require relative to lab policy	4			
Perform acceptable troubleshooting for questionable results or out of control QC.	3			
<b>Kits using latex agglutination</b>	4			
Define principle of reaction/workup	4			
State reagent needs and requirements by example	4			
Accurately assay patient values to include entering results, applicable comments, and any other action the result would require relative to lab policy	4			
Perform acceptable troubleshooting for questionable results or out of control QC.	3			
<b>Rubella Ab</b>	2			
Define principle of reaction/workup	4			
State reagent needs and requirements by example	4			
<b>Cold Agglutinins</b>	3			
Define principle of reaction/workup	4			
State reagent needs and requirements by example	4			
Accurately assay patient values to include entering results, applicable comments, and any other action the result would require relative to lab policy	3			
Perform acceptable troubleshooting for questionable results or out of control QC.	3			
<b>C-Reactive Protein</b>	3			
Define principle of reaction/workup	4			
State reagent needs and requirements by example	4			
Accurately assay patient values to include entering results, applicable comments, and any other action the result would require relative to lab policy	3			
Perform acceptable troubleshooting for questionable results or out of control QC.	3			
<b>Immunoglobulins</b>	2			
Define principle of reaction/workup	4			
State reagent needs and requirements by example	4			
<b>Hemagglutinin</b>	3			
Define principle of reaction/workup	4			
State reagent needs and requirements by example	4			

Accurately assay patient values to include entering results, applicable comments, and any other action the result would require relative to lab policy	3			
Perform acceptable troubleshooting for questionable results or out of control QC.	3			
<b>Immunodiffusion</b>	<b>2</b>			
Define principle of reaction/workup	4			
State reagent needs and requirements by example	4			
<b>Indirect Immunofluorescence</b>	<b>2</b>			
Define principle of reaction/workup	4			
State reagent needs and requirements by example	4			
<b>NOTES:</b>				
<b>Reporting of Results:</b>				
Correlates results of pertinent laboratory determinations to each other and to the patient's condition	3			
Provides reference range for analyte	3			
Recognizes abnormal results, panic/critical action values, sources of error initiates corrective action when indicated	4			
Verifies accuracy and transcription of final report	3			

Notes:

## Appendix 4:

**De Anza College - Medical Laboratory Technician Program**  
**Clinical Practical – Microbiology HTEC 283**  
**216 hours of clinical training**  
**Skills Competency List**

Student Name: \_\_\_\_\_ Clinical Facility \_\_\_\_\_

**Level of Skill: 1 = not performed nor observed, 2 = observed only, 3 = Performed or defined satisfactorily, 4 = Proficient, able to perform in job setting after usual employee orientation**

Skill	LOS	Inst. Initials	Student Initials	Date
<b>Communications/Customer Service</b>				
Adheres to confidentiality statement/policies	4			
Demonstrates appropriate communication with Hospital staff/clients.	4			
Demonstrates positive and supportive customer service behaviors.	4			
Identifies and notifies appropriate individual of problems and issues of customer service and observes problem resolution.	4			
Demonstrates support of patient/customer rights.	4			
<b>Personal and professional Behavior</b>				
Adheres to dress code described in <i>student handbook</i> , including wearing nametag at all times and awareness of personal hygiene.	4			
Demonstrates positive training behavior	4			
Demonstrates ability to adjust to working environment	4			
Works with bench instructor to prioritize work when indicated	4			
<b>Safety: The student can define and locate:</b>				
Emergency exit routes	4			
Fire Alarms	4			
Eye Wash/Showers	4			
Safety Equipment to include PPE	4			
Proper Use and function of the Microbiology Hood	4			
Spill Kits specific to Micro	4			
Define R A C E (or facility's acronym)	4			
Follows hospital/department policies and procedures	4			
Follows infection control policies and procedures	4			
Demonstrates safe and effective use of equipment	4			
Utilizes protective equipment as appropriate	4			
<b>Specimen Processing: The student can define and perform:</b>				
Specimen collection requirements for cultures and micro specimens	4			

Skill	LOS	Inst. Initials	Student Initials	Date
Determines suitability of specimens submitted for analysis	4			
Workflow of section	4			
Inoculation of specimens onto (into) media <i>according to facility protocol</i>	4			
Incubates culture/plates/tubes <i>according to the facility's protocol</i>	4			
State purposes and usage of each type of media used in routine testing	4			
Demonstrate aseptic technique, acceptable streaking technique	4			
Discuss rejection criteria for specimens and the protocol to follow for rejecting a specimen	4			
<b>Computer Skills: The student can locate and create:</b>				
Patient results, pending tests, uncollected tests	3			
Properly report via telephone results as lab policy directs	3			
Assign appropriate acquisition numbers/codes to each specimen upon arrival in the laboratory	4			
Demonstrate understanding of all areas of the micro requisition slip and properly interpret the information provided or requested	3			
Generate work lists, pending lists, and reports as required	4			
Enter results (interface download) with tech co-signature	4			
Record appropriate comments as required by lab policy	4			
Document and take action, as indicated, for critical values	4			
<b>General Laboratory Practice: The student has consistently:</b>				
Worn the appropriate PPE and practices standard precaution	4			
Followed accreditation standards as defined by the site regarding safety, fire safety, disaster, handling of hazardous materials	4			
Recorded, retrieved, or drawn specimens and laboratory data from on-site or ancillary laboratories.	4			
Prepared labels and enters or verifies patient demographics upon receipt of specimens	4			
Instructed patients/health care providers in proper procedure for collection of semen, urine, feces, and other specimens related to this department.	4			
Disposed of specimens in biohazard container and uses spill kits for biohazardous spills.	4			

Skill	LOS	Inst. Initials	Student Initials	Date
<b>Instrumentation:</b> <i>Attach to this skill's list the specific competency list provided by each clinical site for each particular instrument the student is trained.</i>				
<b>#1 Instrument = _____</b>				
Principal of operation, essential components:	4			
Skills: performed independently once				
Test preparation (reagents, std., QC, patient samples)	3			
Calibration/Documentation	3			
QC Documentation	3			
Troubleshooting	2			
Maintenance to include troubleshooting	2			
<b>#2 Instrument = _____</b>				
Principal of operation, essential components:	4			
Skills: performed independently once				
Test preparation (reagents, std., QC, patient samples)	3			
Calibration/Documentation	3			
QC Documentation	3			
Troubleshooting	2			
Maintenance to include troubleshooting	2			
<b>#3 Instrument = _____</b>				
Principal of operation, essential components:	4			
Skills: performed independently once				
Test preparation (reagents, std., QC, patient samples)	3			
Calibration/Documentation	3			
QC Documentation	3			
Troubleshooting	2			
Maintenance to include troubleshooting	2			
<b>Miscellaneous Methods:</b>				
<b>1. Antibiotic sensitivities –Kirby Bauer/MIC/E-testing</b>	3			
<b>2. Gram Stain</b>	4			
<b>3. Kit Antigen testing:</b>				
<b>C difficile</b>				
Define principle of reaction/operation	4			
State reagent needs and requirements by example	4			
Perform daily start up – including QC and calibration, as needed	4			
Accurately assay patient values to include entering results, applicable comments, and any other action the result would require relative to lab policy.	4			
Perform acceptable trouble shooting for questionable results or out of control QC	3			
<b>RSV</b>				
Define principle of reaction/operation	4			
State reagent needs and requirements by example	4			
Perform daily start up – including QC and calibration, as needed	4			

Accurately assay patient values to include entering results, applicable comments, and any other action the result would require relative to lab policy.	4			
Perform acceptable trouble shooting for questionable results or out of control QC	3			
<b>Rapid Strep for Group A (or other kit)</b>				
Define principle of reaction/operation	4			
State reagent needs and requirements by example	4			
Perform daily start up – including QC and calibration, as needed	4			
Accurately assay patient values to include entering results, applicable comments, and any other action the result would require relative to lab policy.	4			
Perform acceptable trouble shooting for questionable results or out of control QC	4			
<b>Occult Blood</b>				
Define principle of reaction/operation	4			
State reagent needs and requirements by example	4			
Perform daily start up – including QC and calibration, as needed	4			
Accurately assay patient values to include entering results, applicable comments, and any other action the result would require relative to lab policy.	4			
Perform acceptable trouble shooting for questionable results or out of control QC	3			
<b>NOTES:</b>				
<b>Skill</b>	<b>Performance</b>	<b>Instr. Initials</b>	<b>Student Initials</b>	<b>Date</b>
<b>Other kit(s): List: _____</b>				
Define principle of reaction/operation	4			
State reagent needs and requirements by example	4			
Perform daily start up – including QC and calibration, as needed	4			
Accurately assay patient values to include entering results, applicable comments, and any other action the result would require relative to lab policy.	4			
Perform acceptable trouble shooting for questionable results or out of control QC	3			

<b>Demonstrates <i>accurate recognition of normal flora and pathogens</i> on the following cultures:</b>				
Urine	4			
Throats	4			
Sputums	3			
Stool	4			
GC	4			
Chlamydia	2			
Fungus	2			
• Transport/Staining	2			
• Germ tube testing	2			
Parasitology	2			
• Staining	2			
• Concentration	2			
Virology	2			
• Kit testing performed _____	4			
Gram stains	4			
<b>Reporting of Results: (Microbiology)</b>				
Correlates results of pertinent laboratory determinations to each other and to the patient's condition	3			
Provides interpretation of organism's presence	3			
Recognizes abnormal results, panic/critical action values, sources of error initiates corrective action when indicated	3			
Verifies accuracy and transcription of final report	3			

Notes:

## Appendix 5 - MLT Core Course Descriptions

Eighteen new courses were created at De Anza College. They are the “core” courses of the Associate Degree in Medical Technology and are listed below.

MLT program prerequisites are Human Anatomy and Physiology, Microbiology with lab, Chemistry with lab, and Phlebotomy certification.

<i>Institution</i>	<i>Course Title</i>	<i>Course Number</i>	<i>Credit Units</i>	<i>Delivery System</i>
<i>De Anza College</i>	<i>Clinical Urinalysis Lecture</i>	<i>HTEC 81A</i>	<i>1.5 qtr</i>	<i>Traditional classroom</i>
<i>De Anza College</i>	<i>Clinical Urinalysis Lab</i>	<i>HTEC 81</i>	<i>0.75 qtr.</i>	<i>De Anza College Lab</i>
<i>De Anza College</i>	<i>Clinical Immunology and Immunoematology Lecture</i>	<i>HTEC 84A</i>	<i>4.5 qtr</i>	<i>Traditional classroom</i>
<i>De Anza College</i>	<i>Clinical Immunology and Immunoematology Lab</i>	<i>HTEC 84</i>	<i>1.5 qtr.</i>	<i>De Anza College Lab</i>
<i>De Anza College</i>	<i>Clinical Chemistry I Lecture</i>	<i>HTEC 85C</i>	<i>4.5 qtr</i>	<i>Traditional classroom</i>
<i>De Anza College</i>	<i>Clinical Chemistry I Lab</i>	<i>HTEC 85A</i>	<i>1.5 qtr.</i>	<i>De Anza College Lab</i>
<i>De Anza College</i>	<i>Clinical Chemistry II Lecture</i>	<i>HTEC 85D</i>	<i>4.5 qtr.</i>	<i>Traditional classroom</i>
<i>De Anza College</i>	<i>Clinical Chemistry II Lab</i>	<i>HTEC 85B</i>	<i>1.5 qtr.</i>	<i>De Anza College Lab</i>
<i>De Anza College</i>	<i>Clinical Microbiology Lecture</i>	<i>HTEC 83A</i>	<i>4.5 qtr.</i>	<i>Traditional classroom</i>
<i>De Anza College</i>	<i>Clinical Microbiology Lab</i>	<i>HTEC 83</i>	<i>1.5 qtr.</i>	<i>De Anza College Lab</i>
<i>De Anza College</i>	<i>Clinical Hematology Lecture</i>	<i>HTEC 80</i>	<i>4.5 qtr.</i>	<i>Traditional classroom</i>
<i>De Anza College</i>	<i>Clinical Hematology Lab</i>	<i>HTEC 80</i>	<i>1.5 qtr.</i>	<i>De Anza College Lab</i>
<i>De Anza College</i>	<i>Clinical Coagulation Lecture</i>	<i>HTEC 82A</i>	<i>1.5</i>	<i>Traditional classroom</i>
<i>De Anza College</i>	<i>Clinical Coagulation Lab</i>	<i>HTEC 82</i>	<i>0.75 qtr.</i>	<i>De Anza College Lab</i>
<i>De Anza College</i>	<i>Clinical Chemistry Practicum</i>	<i>HTEC 285</i>	<i>6.0 qtr.</i>	<i>Hospital Rotation</i>
<i>De Anza College</i>	<i>Clinical Hem, Coag and Urine Practicum</i>	<i>HTEC 280</i>	<i>6.0 qtr</i>	<i>Hospital Rotation</i>
<i>De Anza College</i>	<i>Clinical Microbiology Practicum</i>	<i>HTEC 283</i>	<i>6.0 qtr.</i>	<i>Hospital Rotation</i>
<i>De Anza College</i>	<i>Clinical Immunology and Immunoem Practicum</i>	<i>HTEC 284</i>	<i>4.5 qtr.</i>	<i>Hospital Rotation</i>



## Appendix 5

### **HTEC 85C: Clinical Chemistry I Lecture**

**Units: 4.5 quarter units**

**Prerequisite: Complete MLT Program prerequisites**

**4.5 hour lecture**

The lecture series presents theoretical and practical concepts associated with testing procedures used in the clinical chemistry laboratory including fundamentals of general laboratory principles and specific basic instrumentation methodologies. The important characteristics and relevance of electrolytes and trace metals including their relationship to acid base balance will also be addressed. Correlating test results with disease states will be accomplished. Successful completion of this course and HTEC 85A is required before enrolling in HTEC 85B and HTEC 85D.

### **HEALTH TECHNOLOGY HTEC85A: Clinical Chemistry I Laboratory**

**Units: 1.5 units**

**Co-requisite: HTEC 85C(Clinical Chemistry lecture)**

**4.5 hour lab**

Teaches the general laboratory principles and specific basic instrumentation methodologies used in basic clinical chemistry analysis. After review of laboratory math, and a reintroduction to quality control and quality assurance, the student will be introduced to variables of the preanalytical phase, characteristics important to quality lab technique and safety. Correlating test results with disease states will be accomplished. Successful completion of this course, HTEC 85C, HTEC 85B and HTEC 85D is required before enrolling in Clinical Chemistry Practicum, HTEC 285.

### **HTEC 85D: Clinical Chemistry II Lecture**

**Units: 4.5 quarter units**

**Co-requisite: HTEC 85B (Clinical Chemistry II Laboratory)**

**Pre-requisite: successful completion of HTEC 85A and HTEC 85C**

**4.5 hour lecture**

Teaches relationships between the endocrine system and analytes assayed in the clinical laboratory, including tumor markers, therapeutic drugs, and compounds studied in toxicology. The student will be introduced to vitamins assayed and correlate their clinical significance. The student will correlate liver, kidney, and pancreatic function with test results and compare with states of health and disease. The function and laboratory analysis of various body fluids including effusions, spinal fluid, and synovial fluid will be included. Successful completion of this course and HTEC 85B is required before enrolling in the Clinical Chemistry Practicum, HTEC 285.

### **HEALTH TECHNOLOGY HTEC85B: Clinical Chemistry II Laboratory**

**Units: 1.5 quarter units**

**Co-requisite: HTEC 85D (Clinical Chemistry II lecture)**

**4.5 hour lab**

Intermediate to advanced laboratory principles and techniques used in clinical chemistry analysis. The student will perform and study tests of the endocrine system, therapeutic drug assays and compounds, and other clinical chemistry test specific to special chemistry department test menus. Highly automated instrumentation will be studied and used to demonstrate correct quality control, maintenance, and clinical operation. This course is taken the following semester after successful completion of HTEC 85C and HTEC 85A.

Successful completion of this course and HTEC 85D, HTEC 85C & HTEC 85A is required to enroll in Clinical Chemistry Practicum, HTEC 285.

### **HEALTH TECHNOLOGY HTEC285: Clinical Chemistry Practicum**

**Units: 6.0 quarter units**

**Pre-requisite: HTEC 85C, (Clinical Chemistry II Lecture) and HTEC 85B (Clinical Chemistry II Laboratory).**

**216 hours**

This course provides entry-level clinical laboratory practice/experience in the department of general and special chemistry. Emphasis is placed on technique, accuracy, and precision. Different instrumentation will be introduced as well as bench/manual methods. Competence will be evaluated based on final clinical evaluations. This practicum will be conducted at a clinical affiliate site that will be assigned by the MLT Program Coordinator.

### **HES 82A: Clinical Coagulation Lecture**

**Units: 1.5 quarter units**

**Co-requisite: HTEC 82 (Clinical Coagulation Laboratory)**

**1.5 hour lecture**

This course presents an overview of the homeostatic process, diseases, and laboratory evaluations. Normal and abnormal cases will be studied. Admission to the MLT Program is necessary prior to registration. Successful completion of this course, HTEC 82, HTEC 80, HTEC 80A, HTEC 81 and HTEC 81A is required to enroll in Clinical Hematology/Urinalysis/Coagulation Practicum (HTEC 280).

### **HEALTH TECHNOLOGY HTEC 82: Clinical Coagulation Laboratory**

**Units: 0.75 quarter units**

**Co-requisite: HTEC 82A (Clinical Coagulation lecture)**

**1.5 hour lab**

Introduces the various techniques and safety procedures used the clinical coagulation laboratory. Emphasis on platelet function tests and intrinsic and extrinsic clotting pathway testing. Normal and abnormal cases will be studied. Successful completion of this course and HTEC 82A is required to enroll in Clinical Hematology/Urinalysis/Coagulation Practicum (HTEC 280).

### **HTEC 81 A :Clinical Urinalysis Lecture**

**Units: 1.5 quarter units**

**Co-requisite: HTEC 81**

**1.5 hour lecture**

Teaches the student the various properties and constituents of urine via “on hands” learning. Emphasis is placed on the interpretation and handling of urine specimens and their accompanying requisitions. The students will be taught to examine urine physically, chemically and microscopically and compare clinical values as related to the physiology of the urinary system in health and disease. Successful completion of this course and HTEC 81A, HTEC 80A, HTEC 80, HTEC 82A and HTEC 82 is required to enroll in Clinical Hematology/Urinalysis/Coagulation Practicum, HTEC 280.

### **HEALTH TECHNOLOGY HTEC 81: Clinical Urinalysis Laboratory**

**Units: 0.75 quarter units**

**Co-requisite: HTEC 81A (Clinical Urinalysis lecture)**

**2.25 hour lab**

Teaches the student the various properties and constituents of urine via “on hands” learning. Emphasis is placed on the interpretation and handling of urine specimens and their accompanying requisitions. The students will be taught to examine urine physically,

chemically, and microscopically and compare clinical values as related to the physiology of the urinary system in health and disease. Successful completion of this course and HTEC 81 A is required to enroll in Clinical Hematology/Urinalysis/Coagulation Practicum HTEC 280.

### **HTEC 80A: Clinical Hematology Lecture**

**Units: 4.5 quarter units**

**Co-requisite: HTEC 80 (Clinical Hematology Laboratory)**

**4.5 hour lecture**

This course presents the origin of the various types of blood cells with emphasis on the red and white blood cells. The student will learn about human hematological disorders and classify these based on clinical laboratory findings. Successful completion of this course, HTEC 80A, HTEC 80, HTEC 81, HTEC 81A, HTEC 82 and HTEC 82A is required to enroll in Clinical Hematology/Urinalysis/Coagulation Practice, HTEC 280.

### **HEALTH TECHNOLOGY HTEC 80: Clinical Hematology Laboratory**

**Units: 1.5 quarter units**

**Co-requisite: HTEC 80A (Clinical Hematology lecture)**

**4.5 hour lab**

Introduces the various techniques and safety procedures used in the clinical hematology Laboratory. Emphasizes the morphology and identification of common human blood cells. Successful completion of this course and HTEC 80A is required to enroll in Clinical Hematology/Urinalysis/Coagulation Practicum, HTEC 280.

### **HEALTH TECHNOLOGY HTEC280: Clinical Hematology/UA/Coag Practicum**

**Units: 6.0 quarter units**

**Pre-requisite: HTEC 80A (Clinical Hematology Lecture): HTEC 82A (Clinical Coagulation Lecture) and HTEC 81A (Clinical Urinalysis Lecture): HTEC 80 (Clinical Hematology Laboratory), HTEC 81 (Clinical Urinalysis Laboratory) and HTEC 82 (Clinical Coagulation Laboratory).**

**216 hours**

Course provides entry-level clinical laboratory practice/experience in the department of hematology, urinalysis and coagulation. Emphasis is placed on technique, accuracy, and precision. Different instrumentation will be introduced as well as bench/manual methods. Competence will be evaluated based on final clinical evaluations. This practicum will be conducted at a clinical affiliate site that will be assigned by the MLT Program Coordinator.

### **HTEC 84A: Clinical Immunology/Immunoematology Lecture**

**Units: 4.5 quarter units**

**Co-requisite: HTEC 84 (Clinical Immunology/Immunoematology Laboratory)**

**4.5 hour lecture**

Introduces the student to basic principles of antigen and antibody reactions included in blood grouping and typing, compatibility testing and serological procedures. Introduces serological and Immunoematology procedures and techniques to measure analytes qualitatively and quantitatively. Successful completion of this course and HTEC 82 is required prior to enrolling in Clinical Immunology/Immunoematology Practicum, HTEC 284.

**HEALTH TECHNOLOGY HTEC 84: Clinical Immunology/Immunohematology Laboratory****Units: 1.5 quarter units****Co-requisite: HTEC 84A (Clinical Immunology/Immunoematology lecture)****4.5 hour lab**

Introduces the student to the basic principles of antigen and antibody reactions included in blood grouping and typing, compatibility testing and serological procedures by performance in a student lab environment. Introduces serological and immunoematology procedures and techniques to measure analytes qualitatively and quantitatively. Successful completion of this course and HTEC 84A is required prior to enrollment in Clinical Immunology/Immunoematology Practicum, HTEC 284.

**HEALTH TECHNOLOGY HTEC284: Clinical Immunology/Immunoematology Practicum****Units: 4.5 quarter units****Pre-requisite: HTEC 84 A (Clinical Immunology/Immunoematology lecture),HTEC 84A (Clinical Immunolgy/Immunoematology Laboratory).****180 hours**

Course provides entry-level clinical laboratory practice/experience in the department of serology and blood banking. Emphasis is placed on technique, accuracy, and precision. Different instrumentation will be introduced as well as bench/manual methods. Competence will be evaluated based on final clinical evaluations. This practicum will take place at a clinical affiliate site that will be assigned by the MLT Program Coordinator.

**HTEC 83A: Clinical Microbiology Lecture****Units: 4.5 quarter units****Co-requisite: HTEC 83 (Clinical Microbiology Laboratory)****4.5 hour lecture**

Addresses microorganisms of medial microbiology with emphais on the characteristics of clinically significant microorganisms and their biochemical profile, media for isolation, and identification methods for selected pathogens. The student willb e introduced to identification methods, theories, and techniques used in basic bacteriology, parasitology and mycology. Emphasizes routine organism identification. Successful completion of this course and HTEC 83 is required to enroll in Clinical Microbiology Practicum, HTEC 283.

**HEALTH TECHNOLOGY HTEC 83: Clinical Microbiology Laboratory****Units: 1.5 quarter units****Co-requisite: HTEC 83A (Clinical Microbiology lecture)****4.5 hour lab**

Introduces the various techniques and safety procedures in clinical microbiology. Emphasizes the morphology and identification of common pathogenic organisms. Successful completion of this course and HTEC 83A is required to enroll in Clinical Microbiology Practicum, HTEC 283.

**HEALTH TECHNOLOGY HTEC 283: Clinical Microbiology Practicum****Units: 6.0 quarter units****Pre-requisite: HTEC 83A (Clinical Microbiology lecture) and HTEC 83 (Clinical Microbiology Laboratory).****216 hours**

Course provides entry-level clinical laboratory practice/experience in the department of microbiology. Emphasis is placed on technique, accuracy, and precision. Different instrumentation will be introduced as well as bench/manual methods. Competence will be evaluated based on final clinical evaluations. This practicum will take place at a clinical affiliate site that will be assigned by the MLT Program Coordinator.

## Appendix 6

### Policy of Service Work

Students will not be used to substitute for regular employees as part of their training. Students of the MLT Program should be aware that any service work performed at any of our affiliates is:

- Not required (it is your decision to do)
- Cannot occur during the training hours
- Should not interfere with your progression through the MLT program
- Cannot be counted towards your training hours requirement

Examples of service work....

- ❑ Working as a phlebotomist, specimen processor, lab aide while completing MLT practica or core courses.
- ❑ Working in the student laboratory as a student worker.
- ❑ Continuing to work pm shifts or weekends in a clinical affiliate during your progression through the MLT program.

Students should apply themselves to the program first. Financial needs requiring the student to work long hours outside the program should be discussed with the Program Coordinator as scholarships or financial aid may be in order. Please refer to De Anza College's financial office for assistance.

## Appendix 7 – Student Contact Form

STUDENT: \_\_\_\_\_

DATE: \_\_\_\_\_

COURSE TITLE: \_\_\_\_\_

COURSE INSTRUCTOR: \_\_\_\_\_

Subject:

Instructor comments:

Student comments:

Student Signature \_\_\_\_\_ Date \_\_\_\_\_

Witness (if applicable) \_\_\_\_\_ Date \_\_\_\_\_

Instructor Signature \_\_\_\_\_ Date \_\_\_\_\_

## Appendix 8 – Code of Ethics

The purpose of the code of ethics policy is to ensure professional behavior in all students participating in the Medical Laboratory Technician program. The standard of ethics and conduct for the Medical Laboratory Technician student is dictated by those moral and personal qualities inherent in the profession.

### 1. PROMPTNESS:

- a. Demonstrates punctuality in arrival to all classes, assignments, rotations, and scheduled meetings.

### 2. RESPONSIBILITY:

- a. Wears clean, neat, white lab coat during student laboratories and white uniform with lab coat for clinical rotations.
- b. Follows safety rules.
- c. Completes assigned work as required.
- d. Demonstrates willingness to spend extra time to complete work.
- e. Reports out when leaving assigned areas.
- f. Reports to Instructor reason(s) for absence prior to scheduled class time, rotations, and scheduled meetings.
- g. Attends all classes, rotations days, and scheduled meetings.
- h. In clinical rotations, each student will engage in only those activities he/she has been trained, minimizing the probability of harm to the patient.
- i. Information received from a patient will be discussed for professional purposes only and always keeping patient confidentiality.
- j. Case information will be discussed in classes in a way that the confidentiality of the individual is always maintained.

### 3. INTEGRITY:

- a. Admits to errors or mistakes.
- b. Demonstrates the ability to follow a procedure accurately.
- c. Demonstrates the ability to report results objectively.
- d. Reports reason for absences truthfully.
- e. Recognizes the rights and professional standing of colleagues in their respective professions.

### 4. CLEANLINESS AND ORDERLINESS:

- a. Ability to keep appearance neat and clean.
- b. Maintains instruments/keeps equipment clean.
- c. Keeps supplies replenished and in their place.
- d. Keeps work space clean and neat-- before, during and after working.
- e. Submits report forms that are legible.

### 5. INTEREST:

- a. Displays enthusiasm for laboratory work.
- b. Actively participates in discussions.
- c. Asks relevant questions.
- d. Demonstrates independent study in addition to required work.

### 6. CONSTRUCTIVE, HELPFUL ATTITUDE:

- a. Makes constructive suggestions and actively supports suggestions by demonstrating a “Plan of Action”.
- b. If a student believes that a course is not meeting his/ her learning needs, the student shall initiate discussion with the course instructor as soon as the problem is perceived.
- c. On completion of course work, each student shall complete an honest, written evaluation of each course in which the student is enrolled.
- d. Each student shall engage in open discussion with his/her MLT instructor or Program Coordinator, pertaining to any factor interfering with acceptable progress in the course of study

- 7. ABILITY TO ACCEPT SUGGESTIONS AND ADVICE:**
  - a. Demonstrates acceptance of student progress evaluations.
  - b. Demonstrates constructive use of suggestions and advice.
  
- 8. ADAPTABILITY AND ABILITY TO WORK WITH OTHERS:**
  - a. Demonstrates tact with people in varied environments.
  - b. Demonstrates ability to function well with others as equals.
  - c. Demonstrates leadership ability.
  - d. Demonstrates ability to function well as a subordinate.
  
- 9. ABILITY TO ADJUST TO STRESS AND CHANGING SITUATIONS:**
  - a. Demonstrates composure while under stress.
  - b. Maintains work quality and quantity while under stress.
  - c. Demonstrates ability to prioritize work while under stress.
  - d. Maintains a friendly relationship with others while under stress.
  
- 10. INITIATIVE:**
  - a. Performs routine work-without ignoring or overlooking routine tasks (e.g., machine maintenance, quality control)
  - b. Shows initiative to develop a plan of action if circumstances warrant.
  - c. Shows acceptance of the need for occasional additions to work assignment.



## Appendix 9: Blood Borne Pathogens

Laboratory personnel must constantly be aware of the potential that they have for spreading and contracting infectious diseases. Adherence to strict infection control procedures helps to prevent contracting infectious diseases in the laboratory environment.

The following procedures are designed to help prevent the spread of infectious diseases and employ the concept of “**STANDARD OR UNIVERSAL PRECAUTIONS**”. This concept treats every specimen or patient contact as if it is capable of transmitting infection. Strict adherence to these procedures will help protect the laboratory worker as well as the patient.

### A. Disposal of Sharps

Sharps consist of needles, syringes with integral needles attached, razor blades, stylets, broken glassware, or other sharp cutting objects.

1. All sharps shall be discarded into rigid walled sharps containers.
2. There shall be no recapping or cutting of needles or other sharps before disposal.
3. Syringes (without needles attached) may be placed in containers lined with autoclavable biohazard bags.
4. When the rigid walled sharps container is filled, it shall be sealed and placed in containers lined with autoclavable biohazard bags.
5. Broken glass shall be handled by mechanical means (never to be picked up directly with the hands) and discarded into containers that are designed to be puncture resistant.

### B. Specimen Collection

1. Specimens shall be collected with care in regards to the patient, student, and equipment.
2. Patient drawing area surfaces shall be cleaned with a 10% sodium hypochlorite (bleach) solution or approved disinfectant, prior to performing any invasive procedure.
3. Gloves must be worn when collecting blood from any patient and shall be changed between patient contacts.
4. Good handwashing technique must be performed between patient contacts.
5. Reusable items shall be washed well and/or chemically disinfected, sterilized, or properly disposed.

### C. Specimen Handling

1. All specimens are to be handled as if they are infectious.
2. Gloves must be worn while handling specimen containers.
3. There shall be no pipetting by mouth at any time.
4. Specimen disposal:
  - a. Serum, blood, or blood components:
    1. blood and its products may be flushed down a commode; or
    2. may be placed in the containers lined with autoclavable biohazard bags.
  - b. Feces, urine, or other body fluids:
    1. after exam, the specimen shall be flushed down the commode and the containers disposed of in containers lined with autoclavable biohazard bags; or
    2. may be placed in the containers lined with autoclavable biohazard bags.

### D. Decontamination of Reusable Items

Reusable items, material, or apparatus is to be placed into a 10% sodium hypochlorite (bleach) solution or soap solution for six hours prior to being cleaned for reuse.

### E. Disposal of Infectious Pathological, Surgical, or Biological Wastes

All pathological, surgical, and autopsy material is to be placed in containers lined with autoclavable biohazard bags.

**F. Personnel**

1. Lab coats:
  - a. Shall be worn and buttoned at all times when working in the laboratory areas.
  - b. Shall be removed before leaving the laboratory areas.
  - c. Shall be changed and cleaned when soiled.
2. Gloves must be worn at all times while working in the laboratory. Gloves should be removed before answering telephones. Gloves should be washed off before removing if obviously contaminated with blood or body fluids.
3. Safety glasses, goggles, or face shield shall be worn at all times while performing any task that has the risk of splashing liquid (biological or chemical) into the eyes.
4. Contact lenses should not be cleaned or handled while working in the laboratory.
5. No eating, drinking or smoking shall be allowed in the laboratory work area at any time.
6. Good handwashing technique must be performed immediately prior to beginning work, after removal of gloves, any time the hands/gloves become soiled and upon leaving the laboratory area.
7. Visitors are not allowed in the laboratory area.

**G. Environment**

1. All spills and breakage involving infectious material shall be cleaned immediately with a 10% bleach solution.
  - a. Liberally apply bleach solution.
  - b. Cover with paper towels and leave for five minutes.
  - c. Using gloves, wipe up area.
  - d. Reapply bleach solution, wipe, and allow to air dry.
2. If a significantly large spill occurs, cover with paper towels to try and contain and minimize the spill. Notify instructor or supervisor immediately.
3. Each student is responsible for cleaning the work surfaces and equipment of the area in which they are working prior to beginning work, any time surfaces of equipment are visibly soiled, and upon completion of work with a 10% solution of bleach or approved disinfectant.

## Appendix 10: Hepatitis

Hepatitis means inflammation of the liver. Hepatitis B, which is a viral infection, is one of the multiple causes of hepatitis. Most people with Hepatitis B recover completely, but approximately 5-10% becomes chronic carriers; 1-2% die of fulminated hepatitis. In the group of chronic carriers, they may have no symptoms and appear well, yet can transmit the virus to others. The Hepatitis B Virus (HBV) also appears to be a causative factor in the development of liver cancer. Thus, immunization against HBV can help prevent acute hepatitis and also reduce sickness and death from chronic active hepatitis, cirrhosis and liver cancer.

Acute hepatitis generally begins with mild symptoms that may or may not become severe. These symptoms may include loss of appetite, a vague feeling of oncoming illness, extreme tiredness, nausea, vomiting, stomach pain, dark urine and jaundice (yellow eyes and skin). Skin rashes and joint pain can also occur. Hepatitis B virus can be transmitted by contact with body fluids including blood (including contaminated needles), semen, tears, saliva, urine, breast milk and vaginal secretions.

Health care workers are at high risk of acquiring Hepatitis B because of frequent contact with blood or potentially contaminated body fluids and therefore, vaccine is recommended to prevent the illness. There are a number of vaccines available, consult your physician about what is appropriate for use. A high percentage of healthy people who receive three doses of the vaccine achieve high levels of surface antibody (anti- HBs) and protection against Hepatitis B.

Persons having less response to three doses of vaccine over a six-month period provide immunity for 96% of the individuals tested. The duration of immunity is unknown at this time. Persons who have been infected with HBV prior to receiving the vaccine may go on to develop clinical hepatitis in spite of the immunization.

### **POSSIBLE VACCINE SIDE EFFECTS**

The incidence of side effects is relatively low. The most frequently reported side effects are injection-site soreness, fatigue, induration, erythema, swelling, fever, headache, and dizziness. Other more serious adverse reactions have occurred infrequently. If you have any questions about Hepatitis B or Hepatitis B vaccine, please ask your family physician.

### **CONTRAINDICATIONS/PREGNANCY/NURSING MOTHERS**

Consult your physician about individual conditions or concerns before receiving the Hepatitis B vaccine.

## Appendix 11: Licensure and Professional Organizations

Certification is the process by which a non-governmental agency or association grants recognition of competence to an individual who has met certain predetermined qualifications, as specified by that agency or association. The most common mechanism to achieve certification is through successful completion of a standard examination.

Three agencies currently administer certification examinations: The American Society of Clinical Pathologists (ASCP) Board of Registry, the National Certification Agency for Medical Laboratory Personnel (NCA) and American Medical Technology (AMT). Agencies that are approved under California Law will be determined by the State of California, Department of Health Services, Laboratory Field Services Division. Students must pass a certification examination from a California approved agency in order to be qualified to apply for a California State MLT license.

Founded in 1928 by the ASCP, the Board of Registry is the oldest, most established, and most recognized agency-providing certification for medical laboratory professionals. The Board of Registry (BOR) is an administratively independent certification agency that prepares relevant standards and develops procedures that will assure competence of clinical laboratory personnel.

The NCA has been offering federally recognized certification for clinical laboratory professionals since 1977. The NCA is a voluntary, non-governmental organization and a leader in the area of medical laboratory certification.

The AMT was founded in 1939 as a member-owned and operated national registry for clinical laboratory personnel. Currently AMT certifies Medical Technologists, Medical Laboratory Technicians and other medical/health careers.

Both the BOR and the NCA certify those individuals who meet academic as well as clinical prerequisites and who achieve acceptable performance levels on the respective agency's examination. After completing all MLT program requirements, the student is eligible to take one or both of these national certifying examinations. Students passing the BOR examination can use the designation MLT (ASCP) while students certified through the NCA can use the initials CLT (NCA) behind their name. (CLT=clinical laboratory technician) Applications forms for these examinations will be provided by the Program Coordinator. Each examination has a firm application deadline and fee. Information concerning deadlines and fees will be provided by the Program Coordinator.

ASCP-American Society of Clinical Pathologists  
2100 W. Harrison St.  
Chicago, IL 60612  
(800) 621-4142  
[www.ascp.org](http://www.ascp.org)

CAMLT  
California Association of Medical Laboratory Technology  
1895 Mowry Avenue, suite #112  
Fremont, California 94538-1700  
Fax 510-792-3045 Telephone 510-792-4441  
[www.camlt.org](http://www.camlt.org)

**AMT-American Medical Technologists**  
AMT Building  
710 Higgins Rd.  
Park Ridge, IL 60068  
(847) 823-5169  
[www.amtl.com](http://www.amtl.com)

National Credential Agency for Laboratory Personnel  
5310 Nieman Rd.  
Lenexa, KS 66214  
(913) 438-5110  
[www.nca-info.org](http://www.nca-info.org)

Student membership in a professional society is encouraged so that the student becomes familiar with the concerns and activities of the profession and develops an understanding of professional service. Access to information regarding membership for each of these professional organizations can be viewed on the world wide web.

#### **AMERICAN SOCIETY OF CLINICAL PATHOLOGISTS (ASCP)**

The American Society of Clinical Pathologists has a designation for student and a reduced fee for membership. Membership entitles the student to receive the official publication of the ASCP (*Laboratory Medicine*), eligibility to apply for scholarships and reduced fees for continuing education classes.

#### **AMERICAN SOCIETY FOR CLINICAL LABORATORY SCIENCE (ASCLS)**

The ASCLS is a national professional society for laboratory personnel and includes a broad spectrum of personnel in the clinical laboratory sciences. Students may join at a reduced rate. Membership entitles the students to receive the official publication of ASCLS (*Clinical Laboratory Science*), eligibility to apply for scholarships and reduced fees for continuing education classes.

#### **AMERICAN MEDICAL TECHNOLOGISTS (AMT)**

The American Medical Technologists is a professional society for health professionals. Students may join at a reduced rate and are entitled to receive the official publication of AMT (*AMT Events*), eligibility to apply for scholarships and reduced fees for continuing education classes.

#### **CALIFORNIA ASSOCIATION OF MEDICAL LABORATORY TECHNOLOGY (CAMLT)**

CAMLT is a statewide professional society for laboratory personnel, primarily medical laboratory testing personnel. Associate membership is available to ancillary health care professionals. Student may join at a reduced rate and are entitled to receive the official publication and attend workshops that are often given locally.

## Appendix 12A: Program Costs

Students are responsible for providing uniforms, and transportation to off-campus locations. A large number of services are available to you including financial aid, enrollment fee assistance, scholarships, career and general testing, gender equity and student insurance. Consult the College Catalog for additional information. Speak to the Program Coordinator about your specific needs. Costs should not deter you from completing this program, once eligible.

You can anticipate the following expenses during your program of study. These are **approximate** estimates.

ITEM	YEAR 1	YEAR 2
Uniforms, shoes, lab coats	\$100	\$200
*Books	\$500-700	\$300
Fees(quarter)	\$17/unit	\$17/unit
Transportation	varies	varies
Child Care	varies	varies
Misc. (Parking, dues, Hepatitis B vaccine, TB test, CPR)	varies	\$200
MLT National Exam	N/A	\$150

**REFUNDS:** Any questions concerning the refund policy should be addressed to the Director of Admissions.

**NOTE:** We strongly recommend that you have \$1000.00 available in the beginning of the second year to cover initial expenses.

\*Current textbooks:

## **Appendix 12B: Current Textbooks**

**Clinical Chemistry I & II, lecture and laboratory: Bishop, Clinical Chemistry, 5<sup>th</sup> Ed. ISBN: 0-7817-1776-0, Lippencott Williams & Wilkins and**

**Douchette, L., Mathematics for the Clinical Laboratory. ISBN: 0-7216-4458-9, W.B. Saunders Co.**

**Clinical Hematology & Coagulation, lecture and laboratory: Rodak, Hematology Clinical Principles and Applications, 2<sup>nd</sup> edition. ISBN: 0-7216-8404-1, W.B. Saunders Co.**

**Clinical Urinalysis, lecture and laboratory: Ringsrud, Urinalysis & Body Fluids, 1995, Elsevier Science/Mosby**

**Clinical Immunology, lecture and laboratory: Quinley, Immunohematology Principles and Practices, 2<sup>nd</sup> Ed, Lippencott, Williams, & Wilkins.**

**Clinical Microbiology, lecture and laboratory: Mahon, Textbook of Diagnostic Microbiology, 2<sup>nd</sup> Ed, ISBN: 0-7216-7917-X, W.B Saunders Co.**

### **All Classes:**

**Brooks, M., Exploring Medial Language, 6<sup>th</sup> edition., ISBN: 0-323-02805-5, Elsevier Mosby**

## Appendix 13: MLT Program Checklist

Students desiring to apply for admission to De Anza College MLT Program must have on file with MLT Program Coordinator the following:

1. A completed application for admission to De Anza College MLT Program.
2. Proof, via college transcript, of successful completion (“C” or better) of the following courses:
  - Chemistry with lab
  - Human Anatomy and Physiology or Biology for Biology Majors
  - Microbiology with lab
3. In addition to the above required coursework, the student will be required to have the following certifications and completed forms on file with the MLT Program Coordinator:
  - CPR for Health Care Providers certification-current
  - CA Certified Phlebotomy Technician I or II certification
  - Physician statement of general health
  - Current TB testing – two step or chest X-ray
  - Hepatitis B vaccination
  - Patient confidentiality
  - Dress Code Policy
  - Clinical rotation policy
  - Acknowledgement of receipt of student handbook
4. Before participating in the clinical practica, the student will be required to have the following certifications and completed forms on file with the MLT Program Coordinator (if required by the facility):
  - Tetanus or Diphtheria/Tetanus (within 10 years)
  - MMR (Measles, Mumps, Rubella vaccination or titer
  - Varicella (Chicken pox) titer
  - Signed checklist



### Appendix 14: Student Evaluation of Clinical Site

Site: \_\_\_\_\_

Dates: \_\_\_\_\_ to \_\_\_\_\_

Department: \_\_\_\_\_

Instructor(s): \_\_\_\_\_

Please rate the clinical rotation from 1 to 5 according to the following scale:

1-unacceptable          2-poor          3-average          4-good          5-excellent

Clinical Facility:

- |    |                            |   |   |   |   |   |
|----|----------------------------|---|---|---|---|---|
| 1. | Sufficient instrumentation | 1 | 2 | 3 | 4 | 5 |
| 2. | Sufficient staff           | 1 | 2 | 3 | 4 | 5 |

Personnel:

- |    |  |   |   |   |   |   |
|----|--|---|---|---|---|---|
| 1. | Showed enthusiasm                                  | 1 | 2 | 3 | 4 | 5 |
| 2. | Sufficient knowledge of subject                    | 1 | 2 | 3 | 4 | 5 |
| 3. | Explained performance expectations clearly         | 1 | 2 | 3 | 4 | 5 |
| 4. | Allowed sufficient time to practice each technique | 1 | 2 | 3 | 4 | 5 |
| 5. | Quizzes reinforced material presented              | 1 | 2 | 3 | 4 | 5 |
| 6. | Sufficient resources to pass final exam            | 1 | 2 | 3 | 4 | 5 |

Would you like to be employed in this laboratory? If not, please give explanation. \_\_\_\_\_  
\_\_\_\_\_

Did you feel you were prepared for this clinical rotation? Please be specific. \_\_\_\_\_  
\_\_\_\_\_

Additional  
Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Student signature

Date

**Appendix 14****Post Graduate Evaluation**

## Essential 20

Please complete the following and provide comments whenever applicable.

1. What did you expect to learn during your year(s) with the MLT program?
  
  
  
  
  
  
  
  
  
  
2. Did the program live up to your expectations? If not, what were the deficiencies?
  
  
  
  
  
  
  
  
  
  
3. Overall, was enough academic information presented? (Too much, too little?)
  
  
  
  
  
  
  
  
  
  
4. Was there enough practical experience in the student lab? In the clinical practica? (Too much, too little?)
  
  
  
  
  
  
  
  
  
  
5. Please suggest ideas for training improvement in any/all of the areas below. Please include any confidences you have or did not have post training and any problems you experience because of your training. If you have not worked in these departments, so note.
  - a. Hematology
  
  
  
  
  
  
  
  
  
  
  - b. Coagulation
  
  
  
  
  
  
  
  
  
  
  - c. Urinalysis
  
  
  
  
  
  
  
  
  
  
  - d. Chemistry

- e. Bacteriology
  - f. Mycology
  - g. Parasitology
  - h. Serology
  - i. Blood Bank
  - j. Phlebotomy
6. Are you confident in your ability to perform as a Medical Laboratory Technician?
7. In what area(s) do you feel least confident?
8. Did you spend your clinical practica in more than one facility? If so, do you feel better prepared for your present employment?
9. Did you spend your clinical practica in the facility where you were employed during your training? Do you feel this affected your training? Was it positive, negative, or of no consequence?
10. What would say is our greatest strength? Our greatest weakness?

Your comments and/or suggestions are greatly appreciated. It is through your feedback that we are able to maintain a quality program and review our deficiencies for future corrective action. Thank you for your time and effort!

### Appendix 14: Clinical Instructor Evaluation

Site: \_\_\_\_\_

Dates: \_\_\_\_\_ to \_\_\_\_\_

Department: \_\_\_\_\_

Clinical Instructor: \_\_\_\_\_

Length of Training with this instructor: \_\_\_\_\_

Please rate the clinical rotation from 1 to 5 according to the following scale:

1-unacceptable      2-poor      3-average      4-good      5-excellent

The Instructor:

1.	Showed enthusiasm	1	2	3	4	5
2.	Sufficient knowledge of subject	1	2	3	4	5
3.	Explained performance expectations clearly	1	2	3	4	5
4.	Allowed sufficient time to practice each technique	1	2	3	4	5
5.	Quizzes reinforced material presented	1	2	3	4	5
6.	Sufficient resources to pass final exam	1	2	3	4	5

One thing that my instructor did that was particularly effective was: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

AdditionalComments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
Student signature Date

**Appendix 14****Lecture Instructor Evaluation**

Semester: \_\_\_\_\_

Course: \_\_\_\_\_

Instructor: \_\_\_\_\_

**Students: Please rate each characteristic with “1” being the lowest and “5” being the highest. Your candid comments are taken seriously.**

<b>Item</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Made course requirements clear.					
Explained grading criteria- consistently and fairly enforced					
Availability and helpfulness with understanding the material					
Accessible outside of class					
Gave organized clear presentations/lectures					
Grading was fair and impartial					
Concern for students					
Reviewed tests/quizzes in a reasonable time frame					
Increased my understanding of this subject material					
Was well prepared for class					
Encouraged student participation					
Recommendation to other students to take classes from this instructor					
Overall effectively as an instructor					

Comments:

Suggestions:

## Appendix 14: Student Laboratory Evaluation

Semester: \_\_\_\_\_

Course: \_\_\_\_\_

Instructor: \_\_\_\_\_

Please rate the student laboratory experience from 1 to 5 according to the following scale:

1-unacceptable      2-poor      3-average      4-good      5-excellent

Student Laboratory:

1. Sufficient instrumentation      1      2      3      4      5

2. Value of procedures performed      1      2      3      4      5

Instructor:

1. Showed enthusiasm      1      2      3      4      5

2. Sufficient knowledge of subject      1      2      3      4      5

3. Explained performance expectations clearly      1      2      3      4      5

4. Allowed sufficient time to practice each technique      1      2      3      4      5

5. Quizzes reinforced material presented      1      2      3      4      5

6. Sufficient resources to pass final exam      1      2      3      4      5

One thing that my instructor did that was particularly effective was: \_\_\_\_\_

Suggestions for improvement:

\_\_\_\_\_

\_\_\_\_\_

Do you feel you are prepared for the clinical rotation? Please be specific

\_\_\_\_\_

\_\_\_\_\_

## Appendix 14

### Training Program Evaluation Essential 20

The following tools will determine program effectiveness:

1. Course Evaluation: Each student is encouraged to complete an evaluation of lecture and lab for each MLT core course. The two web-based prerequisite courses also have course evaluation forms.
2. Clinical Practica Evaluation: Students are encouraged to complete an evaluation of their training at our clinical affiliates. This evaluation includes personnel and the facility environment.
3. Overall Program Evaluation: MLT program graduates will be mailed a questionnaire six months after completion of their degree. Response is voluntary.
4. Overall Program Evaluation: Known employers are asked to fill out an evaluation on their new MLT graduate approximately 6 months to one year post hire.
5. Overall Program Effectiveness: This is determined by compilation and review (and subsequent comparative assessment) of test scores from the program's mock board exam and the national ASCP certification exam.

DE ANZA COLLEGE MLT PROGRAM  
21250 STEVENS CREEK BLVD  
CUPERTINO CALIFORNIA 95014  
DEBBIE WAGNER  
MLT PROGRAM COORDINATOR  
408-864-8790

date

[Click here and type recipient's address]

Dear Graduate:

De Anza College is anxious to receive your feedback as a Medical Laboratory Technician graduate. Your perspective as an employee may be different than as a student. We will use this information to improve our program.

We hope you will take a few minutes to complete the questionnaire below and the enclosed evaluation. Please be honest and frank in your evaluation.

Is your present job in?

- A. Hospital
  - a. 25 beds or less
  - b. 100 - 200 beds
  - c. 200 - 300 beds
  - d. Over 300 beds
- B. Clinic
- C. Doctor's office
- D. Blood center
- E. Commercial laboratory
- F. Other \_\_\_\_\_

What department do you work in most of the time? (Hematology, Chemistry, Micro, etc.) \_\_\_\_\_

What shift are you working? \_\_\_\_\_

What was your starting salary? \_\_\_\_\_ What is it now? \_\_\_\_\_

Do you feel you made the right career choice? \_\_\_\_\_ Why? \_\_\_\_\_

\_\_\_\_\_

Sincerely,

Debbie Wagner, MT(ASCP), CLS  
MLT Program Coordinator



**Appendix 14**

De Anza College  
**MLT Clinical Lab**  
**Student Non-Technical Evaluation**

Your input into this student's clinical experience will be very helpful. This evaluation is confidential and will be placed in their student file. Your opinions will be very helpful, for not only their self-evaluation, but this also helps our program become a better experience for MLT training.

**Student Name** \_\_\_\_\_

Check the block best describing the student, at the end of the clinical rotations. Five is the highest, 1 the lowest.

<b>Factor to Evaluate</b>	<b>Always 5</b>	<b>Most of the Time 4</b>	<b>Usually 3</b>	<b>Occasionally 2</b>	<b>Seldom 1</b>
<b>Knowledge</b> of subject					
<b>Perseverance</b> - continues to solve problems in spite of obstacles					
<b>Initiative</b> - can work independently with minimum supervision					
<b>Ability</b> to follow instructions					
<b>Organization</b> - has work well organized					
<b>Willingness</b> to accept responsibility, completes assignments					
<b>Judgement</b> - evaluates situation correctly					
<b>Speed</b> - acceptable for level of experience					
<b>Spirit of Cooperation</b> - completes assigned work before leaving					
<b>Manner with Peers</b> - relates well coworkers and public					
<b>Personal Appearance</b> - attire (uniform) is appropriate, neat and clean					
<b>Punctuality</b> - on time in AM, from breaks/lunch					

Comments: \_\_\_\_\_

Would you recommend this student for hire as a MLT? YES/NO \_\_\_\_\_

Evaluator's Signature \_\_\_\_\_ Date \_\_\_\_\_

## Appendix 14

### Essential 20

#### : MLT Employer Evaluation

We understand you have hired one of De Anza College's Medical Laboratory Technician program graduates. To help us identify areas where we could improve our program, we request that you evaluate your employee relative to their training at De Anza College.

1. Did your new hire
  - a. Require more, less, or an average amount of department orientation?
  
  - b. Have a firm grasp of bench tasks and techniques?
  
  - c. Have a firm grasp of the theory related to their tasks?
  
  - d. Exhibit professional behavior?
  
  - e. Display good intra-departmental communication?
  
2. Do you have suggestions relative to their educational experience? (More training in... less training in....)
  
3. Overall impressions and comments:

\_\_\_\_\_  
Signature/Title

\_\_\_\_\_  
Date