ÍSyracuse City School District
Career and Technical Education Program
Course Syllabus
CLT 100: Clinical Lab Technology 100

Program Overview

Students enrolled in the Clinical Lab Technology program will acquire the knowledge and technical skills that will prepare them either for positions as entry level laboratory assistants or for advanced placement in post-secondary education. Students will gain practical learning experience through scientific investigations and experiments, as well as the collection and testing of samples, writing reports, and presenting information in a state-of-the-art, high-tech laboratory setting. As a career link, established partnerships with many local businesses and medical facilities provide students with internships and potential future employment opportunities. In addition, students have the opportunity to earn a Career and Technical Endorsement on their diploma by successfully passing an industry-standard technical assessment.

Course Description

This course gives students an introduction to the profession of clinical lab technology, its scope of practice, and career opportunities available for the clinical lab technician. In addition, students will develop an orientation to the healthcare environment, effective communication skills, and a foundation in medical ethics, biomedical and legal issues, including HIPAA, OSHA, and CDC regulations. Students will have the opportunity for hands on work with laboratory equipment and diagnostic testing. Classroom and laboratory safety, professionalism, and career readiness skills are emphasized.

Pre-Requisites

N/A

Course Objectives

By the end of the Clinical Lab Technology 100 course students will:

1. Be acquainted with a wide range of occupational and educational opportunities for college and career readiness.
2. Participate in hands-on activities and create products to demonstrate the knowledge and skills of a clinical lab technician.
3. Practice and identify professional communication needed to serve patients and the public
4. Identify and practice procedures for maintaining laboratory safety related to infection control, electrical, chemical, biological, and fire safety.
5. Understand regulatory issues in the clinical laboratory pertaining to licensure, OSHA, CLIA, and HIPAA.
6. Apply ethical standards to the healthcare setting, including patient confidentiality.
7. Understand the career application of clinical lab technology information through participation in field experiences.
8. Demonstrate skills in processing self-knowledge in relation to the clinical lab technology course and program, the world of work, and future planning.

Integrated Academics

N/A

Equipment and Supplies

- **School will provide:** All textbooks and laboratory supplies
- **Student will provide:** Closed toed shoes for laboratory setting, externship professional attire, and a three-ring binder

Textbook

Estridge, Barbara H., and Anna P. Reynolds. 2008. *Basic Clinical Laboratory Techniques, 5th Edition.* Clifton Park, NY: Delmar Cengage Learning.

Grading

Grades will be calculated as follows:

30% Projects/Labs/Presentations/Papers
30% Classwork/Homework/Energizers
20% Tests/Quizzes
20% Class Participation (attendance, cooperation, classroom discussion, preparation)

Additional Course Policies

- Attendance is critical for program success. A large percentage of students' grades are based on attendance. Students who attend all class meetings are more likely to accomplish the course successfully.
- A daily grade is awarded on attendance, attitude, professionalism, and participation.
- If students are absent from class they will lose participation points for that day.
- If it is an unexcused absence, students will not be able to receive any participation points for that day.
- If students are absent, any missed work will be placed in the student's mailbox to be completed. It is the student's responsibility to check for missing assignments.
- Cells phones are not allowed in the laboratory or classroom. They need to be turned off.
- Use of cell phone will result in lost participation points and possible confiscation of the student's phone. Calls and texts can be made before or after class, or during break.
- Professional behavior is expected at all times.

Course Calendar

Quarter	Units of Study
1	• Classroom Practices: Being Successful in CLT 100 • Introduction to Clinical Laboratory Careers • Roles and Responsibilities of a Clinical Laboratory Technician • Departments in the Clinical Laboratory and Basic Diagnostic Tests
2	• Personal and Professional Qualities of a Laboratory Technician • Professional Communication • Ethical and Legal Considerations for the Clinical Laboratory Technician
3	• Medical Terminology for the Laboratory Professional • Introduction to the Medical Math • Infection Control Practices in the Laboratory
4	• Laboratory Safety: Physical, Chemical, and Biological Hazards • Circulatory System • The Microscope • Review and Final Examination

Syracuse City School District
Career and Technical Education Program
Scope and Sequence
CLT 100: Clinical Lab Technology 100

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Week 1 **Classroom Practices: Being Successful in CLT 100**	• What are the expectations for the clinical lab technology classroom? • What is Blackboard? • How can I develop study skills in order to be successful in Laboratory Technology? • How can I manage my time this year? • How can I improve note-taking? • How can I study effectively to prepare for a test?	• Explain and follow classroom procedures. • List rules for general classroom and lab safety. • Use Blackboard as an online learning tool. • Identify the importance of motivation for achieving career goals. • Evaluate ways to manage time. • Identify and describe their specific learning styles. • Assess individual strengths and weakness. • Utilize skills that will help get the most benefit from lectures, labs, and readings. • Demonstrate effective note-taking. • Investigate various study skills for test taking and identify two effective skills.	• Quiz on Classroom Procedures and General Safety • Goal Setting Reflection Worksheet • Self-Evaluation Checklists • Critical Thinking Exercise-Round Robin • Chapter Review Questions • Improving Study Habit Questionnaire • "What Did I Learn" Worksheets • Online Assessment	**Career Ready Practices** CRP 1,2,4,6,7,8,10,11 **Cluster Standards** HL 1,4,5 ST 6 **Pathway Standards** HL-DIA 4 ST-SM 3	**ELA** 9-10R 2,4 9-10W 2,4 9-10SL 1 9-10L 1,2,3,6 **Literacy** RST 1,2,4,7,8,9 WHST 2,4,7 **Science**
Weeks 2-3 **Introduction to Clinical Laboratory Careers**	• What is laboratory technology? • What are the career pathways in the laboratory? • In what types of laboratories do laboratory technicians find employment? • What are the different roles in the organizational structure of the clinical laboratory? • How much education is needed to pursue various careers in the laboratory? • What types of license or certifications are required to gain employment in the laboratory? • What is the place for me in the laboratory?	• Define laboratory technology and the function of the laboratory. • List potential employers for clinical laboratory assistants in non-hospital laboratories. • Differentiate various job titles in the clinical laboratory using an organizational chart. • List the major departments in the clinical lab and name a common test. • Define various job titles in the clinical laboratory. • Match personality characteristics to possible career choices. • Explain how clinical labs are regulated. • Explain the purpose of proficiency testing. • Explain how labs are credentialed. • Identify skills necessary for specific careers.	• About Me Template • Self Portrait Project-Rubric • Written Assessment on Definitions, Job Titles, and Departments in the Laboratory • Education and Salary Graph • Research Paper on Employment Outlook, Salaries, and Work Environment • Presentation on Various Career Pathways in the Laboratory • Laboratory Career Brochure • Career Matching Matrix • Online Assessment	**Career Ready Practices** CRP 2,6,7,10,11 **Cluster Standards** HL 1,2,4 ST 4 **Pathway Standards** ST-SM 4	**ELA** 9-10R 1,4,8 9-10W 2,4,5,6,7 9-10SL 1,4,5,6 9-10L 1,2,3,6 **Literacy** RST 1,2,4 WHST 2,4,5,6,7 **Science**
Weeks 4-5 **Roles and**	• What are the tasks and roles of various laboratory	• Describe the roles of clinical laboratory staff including education, professional	• Quiz on Roles and Responsibilities of	**Career Ready Practices** CRP 2,6,7,8,11	**ELA** 9-10R 1,2,4,8 9-10W 2,4

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Responsibilities of a Clinical Laboratory Technician	personnel? • What are other allied health professionals in the laboratory? • How does scientific reasoning apply in daily life?	credentials, and contributions to the clinical laboratory. • Describe several tasks performed by a laboratory technician. • Describe the scientific method. • Explain how the scientific method is used to answer questions and solve problems in the laboratory. • Show how the scientific method is used to solve an investigation, including all the steps of the method and an experiment.	Laboratory Personnel • Guest Speaker Interview Questions • Scientific Methods Lab • Online Assessment		9-10SL 1,3 9-10L 1,2,3,6
				Cluster Standards HL 2,4 ST 4	**Literacy** RST 1,2,4,7 WHST 2,4,5,6,7
				Pathway Standards HL-DIA 5 ST-SM 4	**Science**
Weeks 6-11 **Departments in the Clinical Laboratory and Basic Diagnostic Tests**	• What are the various departments in the clinical laboratory? • What are the commonly performed tests in the various departments in the clinical laboratory? • What are the specimen requirements for various tests in the laboratory? • What do laboratory tests tell us? • How do physicians choose what diagnostic test to order?	• List the various departments in a clinical laboratory. • List the sub-departments in microbiology. • Compose a list of several tests performed in the different departments in the clinical laboratory. • Name the tests included in a Complete Blood Count (CBC). • List three parts of a urinalysis. • Name two methods for blood collection. • Research a common test performed in the laboratory. • List and describe common diagnostic tests. • Draw conclusions on which diagnostic tests should be ordered to determine a disease state. • Determine conditions that may produce abnormal test results.	• Presentation on a Common Tests Performed in the Laboratory • Quiz on Departments and Common Tests Performed in the Laboratory • Lab Kit Summary • Unit Exam on Laboratory Careers, Roles, Responsibilities, Departments, and Common Tests • Patient Case Studies • Concept Maps • Online Assessment	**Career Ready Practices** CRP 2,6,7,8,11	**ELA** 9-10R 1,2,4,8 9-10W 2,4,5,6,7 9-10L 1,2,3,6
				Cluster Standards HL 2,4 ST 4	**Literacy** RST 1,2,4,7 WHST 2,4,5,6,7
				Pathway Standards HL-DIA 5 ST-SM 4	**Science** HS-ETS1-2, HS-ETS1-3
Weeks 12-13 **Personal and Professional Qualities of a Laboratory Technician**	• What are the personal qualities that are desirable in the laboratory? • What are the benefits of effective teamwork? • Why is being a team-player important in health care? • How can conflicts be resolved?	• List personal qualities that are desirable in a clinical laboratory professional. • Discuss the lab professional/patient relationship. • Demonstrate the standards of professional appearance as they apply to lab coats, shoes, hair, and jewelry. • Create a profile of a healthcare worker that includes personal and professional traits. • List the steps of conflict resolution. • Demonstrate how to resolve conflict.	• Diagram of a Professional Laboratory Technician • Teamwork Problem Solving Activity • Online Assessment	**Career Ready Practices** CRP 1,6,7,9,12	**ELA** 9-10R 1,2,4,8 9-10W 2,4 9-10SL 1 9-10L 1,2,3,6
				Cluster Standards HL 1,4 ST 4	**Literacy** RST 1,2,4 WHST 2,5,6,7
				Pathway Standards HL-DIA 1 ST-SM 4	**Science**
Weeks 14-16 **Professional Communication**	• What are the basic concepts of communication? • How do I communicate	• Identify different types of communication. • Practice verbal and nonverbal communication.	• Clear Verbal Communication Exercise • Peanut Butter and Jelly	**Career Ready Practices** CRP 1,4,9,12	**ELA** 9-10R 1,2,4 9-10W 2,4 9-10SL 1,3,4

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	professionally to serve the needs of my patients? • What are factors that interfere with communication? • Why is active listening important in healthcare? • How do I communicate with patients of different ages? • What is the importance of complete and accurate telephone messages?	• Engage in active listening. • Identify cultural differences and how to address them in healthcare. • Demonstrate ways population-specific care is applied while communicating with patients. • Practice taking a complete telephone message.	Communication Exercise • Telephone Message Activity • Communication Chapter Activity • Communication Quiz • Online Assessment		9-10L 1,2,3,6
				Cluster Standards HL 1,4,6 ST 4	**Literacy** RST 1,2,4 WHST 2,4
				Pathway Standards HL-DIA 1 ST-SM 4	**Science**
Weeks 17-19 **Ethical and Legal Considerations for the Clinical Laboratory Technician**	• What is HIPAA? • What is patient confidentiality? • Does a patient have rights? • What does it mean to be ethical? • What is patient's consent? • What is medical law? • What is diversity? • What is the difference between flirting and sexual harassment?	• Define HIPAA and explain how to provide confidentiality for health information. • List privileged information. • Discuss several medical laws. • Explain the patient's bill of rights, informed consent, and patient confidentiality. • Explain examples of situations that might result in legal action. • Explain how cultural diversity affects the workplace. • Discuss types of sexual harassment and workplace violence.	• Human Bingo • Chapter Activity Worksheet • Confidentiality and HIPAA Activity • Patient Confidentiality Quiz • Cultural Diversity Partner Project • "Connect the Dots" Activity • Online Assessment	**Career Ready Practices** CRP 1,4,5,9,12	**ELA** 9-10R 1,2,4,8 9-10W 2,4 9-10SL 1 9-10L 1,2,3,6
				Cluster Standards HL 2,4,5,6 ST 4	**Literacy** RST 1,2,4 WHST 2,4,7
				Pathway Standards HL-DIA 1 ST-SM 2	**Science**
Weeks 20-21 **Medical Terminology for the Laboratory Professional**	• How do healthcare professionals communicate? • What are some basic medical abbreviations used in the laboratory • What is a stem word? • What is a prefix? • What is a suffix?	• Explain why it is important to have a working knowledge of medical terminology in healthcare. • Use common medical abbreviations to complete laboratory orders. • Distinguish parts of a medical term. • Construct medical terms using stems, prefixes, and suffixes.	• Jeopardy • Medical Terminology Activity Packet • Medical Terminology Quiz • "Mini Me" Project • Medical Terminology Exam • Online Assessment	**Career Ready Practices** CRP 2,4	**ELA** 9-10R 1,2,4,8 9-10W 2,4 9-10L 1,2,3,6
				Cluster Standards HL 1 ST 6	**Literacy** RST 1,2,4 WHST 2,4,5
				Pathway Standards HL-DIA 1,5	**Science**
Weeks 22-23 **Introduction to Medical Math**	• What are the basic metric units? • What is the importance of properly using the metric system? • How is volume and weight measured using the metric system? • How is Fahrenheit temperature converted to Celsius? • What is the 24 (military time) hour clock?	• Convert English units to metric units. • Convert metric units to English units. • Convert units within the metric system. • Perform measurements using the metric system. • Convert standard time to 24-hour clock. • Convert 24-hour clock to standard time.	• Metric System Quiz • Metric System Measurement Worksheet • Metric System Unit Test • Quiz on 24-Hour Clock • Online Assessment	**Career Ready Practices** CRP 2,8	**ELA** 9-10R 1,2,4 9-10W 2,4 9-10L 1,2,3,6
				Cluster Standards HL 1 ST 6	**Literacy** RST 1,2,4,7 WHST 2,4,5,6,7
				Pathway Standards HL-DIA 5 ST-SM 2,4	**Science**
Weeks 24-29	• What are the classes of	• Differentiate microorganisms.	• Hand Washing	**Career Ready Practices** CRP 1,2,3,5,8,9	**ELA** 9-10R 1,2,4,8

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Infection Control Practices in the Laboratory	microorganisms? • What are the components of the infectious cycle? • What are Standard Precautions? • What is Personal Protective Equipment (PPE)? • What is the proper way to wash hands using aseptic technique? • How are contaminated gloves removed properly? • What is the proper way to dispose of needles in the laboratory? • How is contaminated material disposed of safely in the laboratory?	• List the components of the infectious cycle. • Obtain information on methods of transmission, signs and symptoms, treatment, and complications of an infectious disease. • Explain Standard Precautions. • Choose the proper PPE and observe Standard Precautions while in the laboratory setting. • Explain and demonstrate of proper hand washing and glove removal. • Demonstrate proper disposal of sharps and non-sharp medical waste.	Performance Based Assessment • Glove Removal Performance Based Assessment • Microorganism Foldable • Disinfectant Lab Report • Disease Transmission Lab • Infectious Cycle Quiz • "What's in the Pillow" Lab • Infectious Disease PowerPoint Presentation-Rubric • "Foreign Trip" • Infection Control Unit Test • Online Assessment		9-10W 2,4 9-10SL 1,2,4,5 9-10L 1,2,3,6
				Cluster Standards HL 3,4 ST 3,6	**Literacy** RST 1,2,4,7 WHST 2,4,7
				Pathway Standards HL-DIA 5	**Science** HS-LS2-1 HS-LS2-8
Weeks 30-33 **Laboratory Safety: Physical, Chemical, and Biological Hazards**	• What are the Centers for Disease Control (CDC) and Occupational Safety and Health Administration (OSHA)? • Why must laboratory safety rules be observed? • What are laboratory hazards? • What is a Safety Data Sheet (SDS)? • How is HIV or hepatitis contracted? • What steps should be taken if a lab accident occurs? • How are lab counters disinfected? • What is the National Fire Protection Association (NFPA) diamond? • What type of fire extinguisher is used for chemicals in the lab?	• Identify the role of the CDC and OSHA in providing laboratory safety. • Construct a laboratory safety poster. • Produce a SDS for a laboratory chemical. • Distinguish the difference between antiseptic and disinfectant. • Measure and transfer a solution using a graduated cylinder. • Demonstrate how and when to use the eyewash and emergency shower in the laboratory. • Prepare a 10% bleach solution using proportions. • Create a NFPA chemical label. • Relate each class of fire extinguisher to the specific fire it is used for. • Simulate the operation of a fire extinguisher.	• Safety Poster Rubric • SDS and NFPA Labeling Project - Rubric • Preparing a 10% Bleach Solution Performance Skill • Working with Proportions Quiz • Laboratory Safety Unit Test • Online Assessment	**Career Ready Practices** CRP 1,2,3,5,8,9	**ELA** 9-10R 1,2,4,8 9-10W 2,4 9-10L 1,2,3,6
				Cluster Standards HL 3,4 ST 3,6	**Literacy** RST 1,2,4,7,9 WHST 2,4,5,6,7
				Pathway Standards HL-DIA 5	**Science** HS-LS2-1 HS-LS2-8 HS-PS1-11
Weeks 34-37 **Circulatory System**	• How does blood circulate through the body? • Why does the heart make a lub-dub sound? • What is in the blood? • How are blood cells identified when using a microscope?	• Label the structures of the heart. • Construct a diagram of the pathway of blood through the heart. • Differentiate the anatomy and function of arteries, veins, and capillaries. • List the major components of blood. • List five plasma components. • Describe and explain the function of each	• Structure of the Heart Quiz • Diagram of the Pathway of the Blood Through the Heart • Blood Vessel Quiz • Pulse and Blood Pressure Lab • White Blood Cell (WBC)	**Career Ready Practices** CRP 2,3,4,6,7,8,11	**ELA** 9-10R 1,2,4 9-10W 2,4 9-10L 1,2,3,6
				Cluster Standards HL 1 ST 6	**Literacy** RST 1,2,4,7,9 WHST 2,4,5,6,7
				Pathway Standards	**Science**

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		blood cell. • Identify and differentiate blood cells using a microscope and digital images.	Foldable-Rubric • Leukocyte Labeling Activity • Circulatory Unit Test • Online Assessment	HL-DIA 5 ST-SM 2	HS-LS-2
Weeks 38-39 **The Microscope**	• How is a microscope used? • What are all the parts of a light microscope?	• Identify the parts of a light microscope. • Demonstrate the use of coarse and fine adjustments. • Utilize the low, high, and oil immersion objectives. • Adjust the condenser and iris diaphragm. • Demonstrate proper care and storage of a microscope.	• Microscope Labeling Quiz • Student Enrichment Worksheet • Microscope Performance Assessment • Online Assessment	**Career Ready Practices** CRP 2,8	**ELA** 9-10R 1,2,4 9-10W 2,4 9-10L 1,2,3,6
				Cluster Standards HL 4 ST 3,5,6	**Literacy** RST 1,2,4,7,9 WHST 2,4,5,6,7
				Pathway Standards HL-DIA 5 ST-SM 2,4	**Science** PS4.C
Week 40 **Review and Final Examination**	• What were my learning goals this year in laboratory technology?	• Complete the assessment demonstrating a thorough knowledge of laboratory technology.	• Final Assessment	**Career Ready Practices** CRP 2,7,8,10,12	**ELA** 9-10R 1,2,4 9-10W 2,4 9-10L 1,2,3,6
				Cluster Standards HL 1 ST 6	**Literacy** RST 1,2,4 WHST 2,4
				Pathway Standards HL-DIA 5 ST-SM 2,4	**Science** HS-LS-2 HS-LS2-1 HS-LS2-8 HS-PS1-11

Syracuse City School District
Career and Technical Education Program
Course Syllabus
CLT 200: Clinical Lab Technology 200

Program Overview

Students enrolled in the Clinical Lab Technology program will acquire the knowledge and technical skills that will prepare them either for positions as entry level laboratory assistants or for advanced placement in post-secondary education. Students will gain practical learning experience through scientific investigations and experiments, as well as the collection and testing of samples, writing reports, and presenting information in a state-of-the-art, high-tech laboratory setting. As a career link, established partnerships with many local businesses and medical facilities provide students with internships and potential future employment opportunities. In addition, students have the opportunity to earn a Career and Technical Endorsement on their diploma by successfully passing an industry-standard technical assessment.

Course Description

This course gives students an introduction to the basic skills and equipment used in the clinical laboratory. Students will be oriented to the elements of quality control and laboratory mathematics. The course gives students a review of clinical assays used in the clinical laboratory. Students are introduced to the techniques for safe collection and handling of specimens for laboratory analysis.

Pre-Requisites

CLT 100: Clinical Lab Technology 100

Course Objectives

By the end of the Clinical Lab Technology 200 course students will:

1. Participate in hands-on activities and create products to demonstrate the knowledge and skills of a clinical lab technician.
2. Understand the career application of clinical lab technology information through participation in field experiences.
3. Demonstrate skills in processing self-knowledge in relation to the clinical lab technology course and program, the world of work, and future planning.
4. Describe safety regulations and best practices in the laboratory.
5. Identify and explain the use of common laboratory equipment.
6. Perform common laboratory mathematical calculations.
7. Describe what a quality assurance program is and identify common components.
8. Discuss the function of hematology, chemistry, microbiology, urinalysis, immunology, and immunohematology labs in regard to the type of specimen analyzed and the type of testing performed.

Integrated Academics

.5 Health Credit (CHE 100)

Equipment and Supplies

- **School will provide:** All textbooks and laboratory supplies
- **Student will provide:** Closed toed shoes for laboratory setting, externship professional attire, and a three-ring binder

Textbook

Estridge, Barbara H., and Anna P. Reynolds. 2008. *Basic Clinical Laboratory Techniques, 5th Edition.* Clifton Park, NY: Delmar Cengage Learning.

Grading

Grades will be calculated as follows:

30% Projects/Labs/Presentations/Papers
30% Class work/Homework/Energizers

20% Tests/Quizzes
20% Class Participation (attendance, cooperation, classroom discussion, preparation)

Additional Course Policies

- Attendance is critical for program success. A large percentage of students' grades are based on attendance. Students who attend all class meetings are more likely to accomplish the course successfully.
- A daily grade is awarded on attendance, attitude, professionalism, and participation.
- If students are absent from class they will lose participation points for that day.
- If it is an unexcused absence, students will not be able to receive any participation points for that day.
- If students are absent, any missed work will be placed in the student's mailbox to be completed. It is the student's responsibility to check for missing assignments.
- Cells phones are not allowed in the laboratory or classroom. They need to be turned off.
- Use of cell phone will result in lost participation points and possible confiscation of the student's phone. Calls and texts can be made before or after class, or during break.
- Professional behavior is expected at all times.

Course Calendar

Quarter	Units of Study
1	• Introduction to Classroom Practices • Study Skills: Being Successful in CLT 200 • Review of Laboratory Safety: Physical, Chemical, and Biological Hazards • The Microscope • Common Labware • Introduction to Medical Math and Basic Laboratory Calculations
2	• Introduction to Urinalysis • Introduction to Phlebotomy • Basic Clinical Chemistry Tests and Quality Assurance
3	• Basic Hematology • Immunology and Immunohematology
4	• Basic Microbiology • Review and Final Examination

Syracuse City School District
Career and Technical Education Program
Scope and Sequence
CLT 200: Clinical Lab Technology 200

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Week 1 **Introduction to Classroom Practices**	• What are the classroom procedures for CLT? • What are the rules for classroom safety? • How will Blackboard be used this year? • What advice can a sophomore in a P-Tech program give a freshman?	• Review, explain and follow classroom procedures. • Discuss general classroom and lab safety. • Participate in online discussions and use a grading rubric. • Develop a "Letter for Success" for incoming freshmen.	• General Safety Quiz • Compliance of Classroom Procedures • "Letters for Success"	**Career Ready Practices** CRP 2,6,7,10,11	**ELA** 9-10R 1,2,4 9-10W 2,4 9-10SL 1 9-10L 1,2,3
				Cluster Standards HL 1,3 ST 3,5	**Literacy** RST 1,2,4 WHST 2,4,5,6,7
				Pathway Standards ST-SM 2,4	**Science**
Week 2 **Study Skills: Being Successful in CLT 200**	• How can I develop study skills in order to be successful in Laboratory Technology? • How can I manage my time this year? • How can I improve note-taking? • How do I use the features of my textbook? • How do I study to prepare for a test?	• Identify the importance of motivation and having a good attitude for achieving school and career goals. • Evaluate ways to manage time. • Utilize skills that will help get the most benefit from lectures, labs, and readings. • Demonstrate effective note-taking. • Describe how their textbook is organized and how to use its features. • Investigate various study skills for test taking.	• Goal Setting Reflection Worksheet • Self-Evaluation Checklists • Critical Thinking Exercise-Round Robin • Chapter Review Questions • Improving Study Habit Questionnaire • "What Did I Learn" Worksheets • Textbook Scavenger Hunt	**Career Ready Practices** CRP 1,2,4,8,10,12	**ELA** 9-10R 1,2,4 9-10W 2,4 9-10SL 1,3 9-10L 1,2,3,6
				Cluster Standards HL 1,4,5 ST 6	**Literacy** RST 1,2,4,5 WHST 2,4,7
				Pathway Standards HL-DIA 4 ST-SM 3	**Science** ETS1.B
Week 3 **Review of Laboratory Safety: Physical, Chemical, and Biological Hazards**	• Why must laboratory safety rules be observed? • What are some common laboratory hazards? • What are Standard Precautions? • What is a bloodborne pathogen? • What is OSHA, and Right to Know? • What PPE should be worn in the lab? • How is handwashing done using aseptic technique? • How are contaminated gloves removed properly? • What is the proper way to dispose of needles in the	• List safety regulations that pertain to the clinical lab. • Give examples of physical and chemical hazards in the lab. • Explain Standard Precautions. • Explain OSHA's Bloodborne Pathogen policy. • Demonstrate proper handwashing techniques. • Choose the proper PPE and observe Standard Precautions while in the laboratory setting. • Explain and demonstrate of proper hand washing and glove removal. • Demonstrate proper disposal of sharps and non-sharp medical waste. • List the components of the infectious cycle.	• Safety Poster Rubric • Chapter Activity Worksheet	**Career Ready Practices** CRP 1,2,8,12	**ELA** 9-10R 1,2,4 9-10W 2,4 9-10L 1,2,3,6
				Cluster Standards HL 3,4,5 ST 3,6	**Literacy** RST 1,2,4,7 WHST 2,4,5
				Pathway Standards HL-DIA 5 ST-SM 2	**Science** ETS1.B

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	laboratory? • How are contaminated materials disposed of safely in the laboratory? • What are the components of the infectious cycle? • How are lab counters disinfected? • What steps should be taken during a lab spill accident?	• Prepare and use a 10% bleach solution to disinfect patient areas. • Demonstrate the use of the eyewash and emergency shower in the laboratory.			
Weeks 4-5 **The Microscope**	• How is a microscope used? • What are all the parts of a light microscope? • How are the fine and coarse adjustments used? • How is a slide viewed under low, high and oil immersion objectives? • What is the proper cleaning, storage, and care of a microscope?	• Point-out and name the parts of a light microscope. • Demonstrate the use of coarse and fine adjustments. • Utilize the low, high, and oil immersion objectives. • Adjust the condenser and iris diaphragm. • Demonstrate proper care and storage of a microscope.	• Microscope Labeling Quiz • Student Enrichment Worksheet • Microscope Performance Skill	**Career Ready Practices** CRP 2,8 **Cluster Standards** HL 4 ST 3,5,6 **Pathway Standards** HL-DIA 5	**ELA** 9-10R 1,2,4 9-10W 2,4 9-10L 1,2,3,6 **Literacy** RST 1,2,4,7 WHST 2,4 **Science** PS4.C
Week 6-7 **Common Labware**	• Why are there so many types of labware in the lab? • What are the characteristics of different types of labware? • How are different types of labware used? • How are liquids measured in the laboratory? • What is an autoclave and how is it used?	• Identify five basic types of containers used in the lab. • Identify three types of flasks. • Demonstrate proper care and cleaning of labware. • Differentiate between volumetric vs. serological pipettes. • Describe the operation of manual and automatic pipettes. • Demonstrate use of micropipettes. • Measure and transfer liquids using pipettes/labware. • Differentiate between critical and non-critical measurements. • Explain the proper use of an autoclave.	• Labware Measurement Activity • “Who Am I” White Board Assessment • Lab Review Questions • Unit Assessment	**Career Ready Practices** CRP 1,2,8 **Cluster Standards** ST 6 **Pathway Standards** HL-DIA 3,5 ST-SM 2	**ELA** 9-10R 1,2,4 9-10W 2,4 9-10L 1,2,3,6 **Literacy** RST 1,2,4,7 WHST 2,4,5,6,7 **Science** HS-LS1-3
Week 8-10 **Introduction to Medical Math and Basic Laboratory Calculations**	• How is math used in the laboratory? • What are the basic metric units? • What is the importance of properly using the metric system? • How is Fahrenheit	• Convert English units to metric units. • Convert metric units to English units. • Convert units within the metric system. • Perform measurements using the metric system. • Convert standard time to 24-hour clock. • Convert 24-hour clock to standard time.	• Metric System Quiz • Metric System Measurement Worksheet • Metric System Olympics • Metric System Scavenger Hunt • Metric System Unit Test • Military Time Matching	**Career Ready Practices** CRP 2,8 **Cluster Standards** HL 1,3 ST 2,3,6 **Pathway Standards**	**ELA** 9-10R 1,2,4 9-10W 2,4 9-10L 1,2,3,6 **Literacy** RST 1,2,4,7 WHST 2,4,5,6,7 **Science**

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	converted to Celsius? • What is the 24-hour (military time) clock? • How are measurements of volume and weight performed using the metric system? • How dilutions of reagents prepared in the laboratory? • How are reagents prepared using proportions or ratios? • What are serial dilutions?	• Perform basic laboratory measurements. • Perform ratio, proportion, and percentage calculations. • Prepare percent solutions. • Prepare a reagent using proportions or ratios. • Select proper tools for preparing reagent. • Prepare a 10% bleach solution. • Prepare serial dilutions. • Describe how to prepare Normal and Molar solutions.	• Quiz On 24-Hour Clock • Proportions Quiz • Reagent Preparation Skill • Student Activity Worksheet • Unit Test	HL-DIA 4,5 ST-SM 1,3,4	
Week 11-14 **Introduction to Urinalysis**	• What are the parts of the urinary system? • How does the kidney function and produce urine? • How is urine collected and tested? • What are the three parts of a urinalysis? • What information can a urinalysis provide?	• Identify parts of the urinary system. • Illustrate various parts of the kidney. • Summarize how urine is formed. • Summarize the importance of collection and storage of urine. • Differentiate the four types of urine specimens and explain how they are collected. • List the three parts of a urinalysis. • Perform a physical exam of urine. • Design a reference chart for urine chemical tests. • Perform and interpret a chemical exam of urine. • Prepare a urine sediment for microscopic exam. • Name and explain the significance of casts/crystals/cells found in urine sediment. • Perform a urine hCG test and interpret results.	• "How is Urine Tested?" Lab • Urinary System Quiz • Urine Collection Quiz • Physical Exam Case Study • Physical Exam of Urine Skill • Physical Exam of Urine Test • Chemical Exam Reference Chart • Chemical Exam of Urine Skill • Chemical Exam of Urine Test • Urine Microscopic Sediment Skill • Urine hCG Lab/Skill	**Career Ready Practices** CRP 1,2,4,6,7,8,11,12 **Cluster Standards** HL 1,2,3,4 ST 3,6 **Pathway Standards** HL-DIA 1,2,4,5 ST-SM 2,3,4	**ELA** 9-10R 1,2,4 9-10W 2,4 9-10L 1,2,3,6 **Literacy** RST 1,2,4,7 WHST 2,4,5,6,7 **Science** HS-LS1-2 HS-LS1-3
Week 15-17 **Introduction to Phlebotomy**	• How is a venipuncture performed? • What equipment is needed to perform a venipuncture? • What are the various types of anticoagulant? • Why are tubes drawn in a certain order? • What do the different color tubes mean?	• Describe the components of the vacuum tube system. • List the various types of evacuated blood tubes and their anticoagulants. • Demonstrate the "order of draw". • Select the equipment needed to perform a venipuncture. • Complete a laboratory requisition. • Interpret testing needed from laboratory requisition.	• Venipuncture Equipment Identification Chart • Order of Draw Relay Races • Order of Draw/Anticoagulant Poster Project • Order of Draw/Anticoagulant Skill • Tourniquet Application	**Career Ready Practices** CRP 1,2,4,6,7,8,11,12 **Cluster Standards** HL 1,2,3,4 ST 3,6 **Pathway Standards** HL-DIA 1,2,4,5 ST-SM 2,3,4	**ELA** 9-10R 1,2,4 9-10W 2,4 9-10L 1,2,3,6 **Literacy** RST 1,2,4,7 WHST 2,4,5,6,7 **Science** HS-LS1-2

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	• What information must be on the tube and the patient requisition? • How is a tourniquet applied? • What vein is used for drawing blood? • What are the steps in post-phlebotomy patient care?	• Label a blood tube with correct documentation. • Name safety precautions to be followed during a venipuncture. • Demonstrate patient identification prior to venipuncture. • Correctly apply and release a tourniquet. • Describe the post-phlebotomy steps in patient care.	• Quiz - Tubes and Anticoagulants • Unit Test		
Week 18-21 **Basic Clinical Chemistry Tests and Quality Assurance**	• What information do blood chemistries provide? • How is blood chemistry measured in the lab? • How does the body maintain homeostasis with blood chemistries? • What is the importance of blood glucose and lipid levels in the blood? • What tests are performed to measure blood glucose and lipids? • How does quality control pertain to the laboratory? • What is the difference between accuracy and precision? • What is a Levey-Jennings chart? • What does “in control” mean?	• List components of common laboratory panels. • Name common methodologies used in clinical chemistry. • List the parts of a spectrophotometer. • Explain the function of glucose in the body. • Identify factors that affect blood glucose levels. • Differentiate collection requirements for various glucose tests. • Perform a blood glucose measurement. • Explain the function of lipids in the body including HDL vs. LDL. • Calculate risk factors based on HDL and LDL. • Perform lipid testing. • Evaluate quality assessment for lipid and glucose testing. • Differentiate the use of standards vs. controls. • Define and utilize Levey-Jennings charts. • Detect when a control is out of control. • Detect a shift or a trend in a method.	• Patient Case Studies • Diabetes Testing Lab • Glucose Monitor Lab/Skill • Lipid Testing Lab • Unit Case Studies	**Career Ready Practices** CRP 1,2,4,6,7,8,11,12 **Cluster Standards** HL 1,2,3,4 ST 3,6 **Pathway Standards** HL-DIA 1,2,4,5 ST-SM 2,3,4	**ELA** 9-10R 1,2,4 9-10W 2,4 9-10L 1,2,3,6 **Literacy** RST 1,2,4,7 WHST 2,4,5,6,7 **Science** HS-LS1-2 HS-LS1-3
Week 22-27 **Basic Hematology**	• How does blood circulate through the body? • Why does the heart make a lub-dub sound? • What is in the blood? • How does blood clot? • How are blood cells identified using a microscope? • What information do blood	• Label the structures of the heart. • Construct a diagram of the pathway of blood through the heart. • Differentiate the anatomy and function between arteries, veins, and capillaries. • List the major components of blood. • State three functions of the blood. • List and describe five plasma components. • Explain the function of each blood cell.	• Structure of The Heart Quiz • Diagram of The Pathway of The Blood Through the Heart • Blood Vessel Quiz • Pulse and Blood Pressure Lab • WBC Foldable-Rubric • Leukocyte Labeling	**Career Ready Practices** CRP 1,2,4,6,7,8,11,12 **Cluster Standards** HL 1,2,3,4 ST 3,6 **Pathway Standards** HL-DIA 1,2,4,5 ST-SM 2,3,4	**ELA** 9-10R 1,2,4 9-10W 2,4,5,6,7 9-10SL 1,4 9-10L 1,2,3,6 **Literacy** RST 1,2,4,7 WHST 2,4,5,6,7 **Science** HS-LS1-2 HS-LS1-3

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	cells provide about overall health? • What are some common blood disorders? • What are CBC and HCT and what does each measure? • What is hemoglobin (Hgb)? • What equipment is used for different types of blood tests? • How are specimens prepared?	• Identify and differentiate blood cells using a microscope. • Discuss the origin of blood cells. • Name three functions of the hematology lab. • Research a hematological disease. • Demonstrate the preferred specimen for hematology testing. • Differentiate reference values for various hematology tests. • Explain the components of a CBC (Complete Blood Count) and what each one measures. • Perform an automated CBC. • Perform a HCT (Hematocrit). • Discuss the main components of Hgb. • Perform a Hgb using an analyzer. • Name the two dyes used in Wright's Stain. • Prepare and stain a blood smear for differential count using Wright's Stain. • Perform an Erythrocyte Sedimentation Rate. • Identify and locate the parts of a hemocytometer. • Utilize a microscope to identify ruled counting areas of a hemocytometer. • Demonstrate how to use a Unopette system.	Activity • Circulatory Unit Test • Patient Case Studies • Chapter Review Questions • Performance Based Skills • Leukemia Research Project/ • Presentations • Unit Exam		
Week 28-33 **Immunology and Immuno-hematology**	• What is the difference between natural resistance and acquired immunity? • What are the characteristics of specific immunity? • What is the difference between antigens and antibodies? • What are five different classes of antibodies? • Why do people get vaccinated? • What are the principles of some common antibody-	• Explain the difference between natural resistance and acquired immunity. • State three characteristics of specific immunity. • Name the major cells involved with specific immunity. • Diagram the structure of an antibody molecule. • Differentiate the terms antigen and antibody. • Describe the five different antibody classes. • Explain the principles of some common antibody-antigen tests such as IM (Infectious Mononucleosis). • Perform and interpret a rapid IM test.	• Immunoglobulin Matching Quiz • ABO Worksheets • Punnett Square Quiz • ABO Quiz • ABO Typing Lab and Skill • Unit Test • IM Lab and Skill	**Career Ready Practices** CRP 1,2,4,6,7,8,11,12 **Cluster Standards** HL 1,2,3,4 ST 3,6 **Pathway Standards** HL-DIA 1,2,4,5 ST-SM 2,3,4	**ELA** 9-10R 1,2,4 9-10W 2,4 9-10L 1,2,3,6 **Literacy** RST 1,2,4,7 WHST 2,4,5,6,7 **Science** HS-LS1-2

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	antigen tests? • How is blood type determined?	• Name the four blood groups in the ABO system. • Demonstrate how blood groups are inherited. • Explain forward and reverse grouping. • Perform and interpret ABO slide typing.			
Week 34-39 **Basic Microbiology**	• How is the type of infection determined? • What are the three basic shapes of bacteria? • What are aseptic techniques in bacteriology? • What is the difference between antiseptics and disinfectants? • What are the techniques used to inoculate media? • How are microbiological smears prepared? • How does a health professional determine what antibiotics to prescribe?	• Diagram the three basic shapes of bacteria. • Demonstrate aseptic techniques in bacteriology. • Differentiate between antiseptics and disinfectants. • Demonstrate how to inoculate media and quadrant streaking techniques. • Define alpha, beta, and gamma hemolysis as they appear on blood agar. • Prepare microbiological smears. • Perform the gram stain procedure. • Identify Gram-positive and Gram-negative organisms on a smear. • Discuss the importance of identifying Grp A strep. • Perform a rapid strep test for Grp A Strep.	• Streaking A Media Plate Lab/Skill • Preparing and Staining a Microbiological Smear Lab/Skill • Grp A Strep Lab/Skill • Microbiology Unit Test	**Career Ready Practices** CRP 1,2,4,6,7,8,11,12	**ELA** 9-10R 1,2,4 9-10W 2,4 9-10L 1,2,3,6
				Cluster Standards HL 1,2,3,4 ST 3,6	**Literacy** RST 1,2,4,7 WHST 2,4,5,6,7
				Pathway Standards HL-DIA 1,2,4,5 ST-SM 2,3,4	**Science** HS-LS1-1
Week 40 Review and Final Examination	• What were my learning goals this year in laboratory technology?	• Complete the assessment demonstrating a thorough knowledge of laboratory technology.	• Final Assessment	**Career Ready Practices** CRP 7,8,10,12	**ELA** 9-10R 1,2,4 9-10W 2,4 9-10L 1,2,3,6
				Cluster Standards HL 1	**Literacy** RST 1,2,4,7 WHST 2,4
				Pathway Standards HL-DIA 5 ST-SM 2,4	**Science** HS-LS1-1 HS-LS1-2 HS-LS1-3

Syracuse City School District
Career and Technical Education Program
Course Syllabus
CLT 300: Clinical Lab Technology 300 – Anatomy and Physiology

Program Overview

Students enrolled in the Clinical Lab Technology program will acquire the knowledge and technical skills that will prepare them either for positions as entry level laboratory assistants or for advanced placement in post-secondary education. Students will gain practical learning experience through scientific investigations and experiments, as well as the collection and testing of samples, writing reports, and presenting information in a state-of-the-art, high-tech laboratory setting. As a career link, established partnerships with many local businesses and medical facilities provide students with internships and potential future employment opportunities. In addition, students have the opportunity to earn a Career and Technical Endorsement on their diploma by successfully passing an industry-standard technical assessment.

Course Description

CLT 300 integrates the skills and knowledge learned in previous Clinical Lab Technology courses. This is a laboratory-based course that investigates the structure and function of the human body. Topics covered will include the basic organization of the body, biochemical composition, and major body systems along with the impact of diseases on certain systems. Students will engage in many topics to truly understand the structure and function of the human body. Working from the topics of basic anatomical terminology and the biochemical composition of the human body, to detailed investigation of each of the major systems of the body, students will learn through reading materials, study guides, unit worksheets, group work, projects, and labs. Students will also expand on their professional skills through field trips, internships, research, and professional certifications. Upon completion of this course, students will be well-prepared for CLT 400: Clinical Lab Technology 400.

Pre-Requisites

CLT 100: Clinical Lab Technology 100
CLT 200: Clinical Lab Technology 200

Course Objectives

By the end of the Clinical Lab Technology 300 course students will:

1. Explain the concept of homeostasis, how it interrelates basic human body functions and life processes, and demonstrate a knowledge of the organization of the human body.
2. Describe the major anatomical components of each human body system studied, describe their anatomical locations and structures, and explain their physiological functions at both the organ and cellular levels.
3. Apply the concepts learned in the lecture to understand and analyze laboratory activities and observations.
4. Obtain healthcare provider CPR, First Aid, and Phlebotomy Certification.
5. Complete job shadows and internship experiences.

Integrated Academics

1 CTE Integrated Science Credit

Equipment and Supplies

- **School will provide:** All textbooks and laboratory supplies
- **Student will provide:** Closed toed shoes for laboratory setting, externship professional attire, and a three-ring binder

Textbooks

- Martini, Nath, Bartholomew. 2015. Fundamentals of Anatomy and Physiology, 10th edition.
- Marieb & Smith. 2016. Human Anatomy and Physiology Laboratory Manual (cat version), 12th edition.

NOTE: Older and/or used editions are acceptable. Keep in mind that page numbers may be different.

Grading

Grades will be calculated as follows:

30% Projects/Labs/Presentations/Papers
30% Class work/Homework/Energizers
20% Tests/Quizzes
20% Class Participation (attendance, cooperation, classroom discussion, preparation)

Additional Course Policies

- Attendance is critical for program success. A large percentage of students' grades are based on attendance. Students who attend all class meetings are more likely to accomplish the course successfully.
- A daily grade is awarded on attendance, attitude, professionalism, and participation.
- If students are absent from class they will lose participation points for that day.
- If it is an unexcused absence, students will not be able to receive any participation points for that day.
- If students are absent, any missed work will be placed in the student's mailbox to be completed. It is the student's responsibility to check for missing assignments.
- Cells phones are not allowed in the laboratory or classroom. They need to be turned off.
- Use of cell phone will result in lost participation points and possible confiscation of the student's phone. Calls and texts can be made before or after class, or during break.
- Professional behavior at all times is expected.

Course Calendar

Quarter	Units of Study

1	• Homeostasis
	  ○ Basic Chemistry
	  ○ Biochemistry
	• Cell Physiology
	  ○ Cell Structure, Function, and Reproduction
	  ○ Cellular Transport and Protein Synthesis
	  ○ Cellular Energetics
	• Tissues
	  ○ Integumentary System
	  ○ Bone
	  ○ Muscles

2	• Respiratory System • Urinary System • Professional Skills

3	• Central Nervous System
	  ○ Electrophysiology and Neurons
	  ○ Spinal Cord and Reflexes
	  ○ The Brain
	• Peripheral Nervous System
	  ○ Sensory Pathways – Somatic Nervous System
	  ○ Autonomic Nervous System
	• Endocrine System
	• Cardiovascular System
	  ○ Blood
	• The Heart

4	• Cardiovascular System: Blood Vessels and Regulation • Immune System • Digestive System • Reproductive System • Professional Certifications

Syracuse City School District
Career and Technical Education Program
Scope and Sequence
CLT 300 – Health Professions Level 300 – Anatomy and Physiology

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Weeks 1-2 **Homeostasis: Basic Chemistry**	• What is matter and how is it organized to form different structures? • How does the structure of an atom make each element unique? • Why is homeostasis important and what are the results of a homeostatic imbalance? • How can directional terms and regional terms help describe location in the body?	• Identify the sub-atomic particles, their charges, and their role in atomic structure. • Differentiate between elements, molecules, and compounds. • Identify common elements and ions within the human body. • Identify a molecule as either polar or nonpolar. • Compare and contrast ionic, covalent and hydrogen bonds. • State how the structure of water relates to its function. • Explain the concept of homeostasis and discuss the importance of homeostatic regulation. • Demonstrate the correct use of directional and regional terms.	• Lab Reports • Practice Worksheets • Discussions • Graphic Organizer • Case Study Analysis • Quiz	**Career Ready Practices** CRP 1,2,4,7,8,11,12	**ELA** 11-12R 1,4 11-12W 1,2,4,5 11-12SL 1,4 11-12L 1,2,3,6
				Cluster Standards HL 1 ST 2,6	**Literacy** RST 1,2,4,7,8,9 WHST 2,4,5,6,7
				Pathway Standards HL-DIA 1 ST-SM 1,2,4	**Science** HS-LS1-3
Week 3 **Homeostasis: Biochemistry**	• How do molecules bond together to form larger molecules? • What is an organic molecule and how does it differ from an inorganic molecule? • Which monomers are used to build the major macromolecules used in the body? • How are the major macromolecules used in the body? • What is the function of DNA and RNA? • What is ATP used for in living things? • How does protein structure affect its function? • What role do enzymes play in chemical reactions? • How does structure of an enzyme determine its	• Describe the general structure of a macromolecule, including the reactions used to synthesize and break down. • Describe the structure and functions of the following classes of carbohydrates: monosaccharides, disaccharides, and polysaccharides. • Describe the structure and functions of the following classes of lipids: fatty acids, glycerides, eicosanoids, steroids, phospholipids, and glycolipids. • Describe the structure and functions of the following classes of nucleic acids: DNA and RNA. • Describe the structure and function of ATP. • Describe protein structure, including the four levels of structural complexity and how protein structure can be disrupted by denaturation. • List the primary functions of proteins in the body. • Explain the function and importance of enzymes.	• Lab Reports • Practice Worksheets • Discussions • Models • Case Study Analysis • Unit Test	**Career Ready Practices** CRP 1,2,4,7,8,11,12	**ELA** 11-12R 1,4,7 11-12W 1,2,4,5 11-12SL 1,4 11-12L 1,2,3,6
				Cluster Standards HL 1 ST 2,6	**Literacy** RST 1,2,4,7,8,9 WHST 2,4,5,6,7
				Pathway Standards HL-DIA 1 ST-SM 1,2,4	**Science** HS-LS1-6

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	function?				
Week 4 **Cell Physiology: Cell Structure, Function, and Reproduction**	• What is a cell? • What is an organelle and how does each organelle contribute to cell function? • How would cell function change if organelles did not work together? • How do cells reproduce? • What is the purpose of asexual reproduction? • What are the steps of mitosis? • What are the end products of mitosis?	• Identify and explain the function of eukaryotic cell organelles. • Explain the stages of cell cycle, including interphase, mitosis, and cytokinesis. • Identify mitosis as a form of asexual reproduction. • Explain the role of mitosis in the human body. • List and explain the steps of mitosis. • Describe how mitosis forms two genetically identical, diploid daughter cells.	• Lab Reports • Practice Worksheets • Discussions • Student-Created Diagrams • Models • Case Study Analysis • Research Summaries • Quiz	**Career Ready Practices** CRP 1,2,4,7,8,11,12	**ELA** 11-12R 1,4,7 11-12W 1,2,4,5,6,7 11-12SL 1,4 11-12L 1,2,3,6
				Cluster Standards HL 1 ST 2,6	**Literacy** RST 1,2,4,7,8,9 WHST 2,4,5,6,7
				Pathway Standards HL-DIA 1 ST-SM 1,2,4	**Science** HS-LS1-2
Week 5 **Cell Physiology: Cellular Transport and Protein Synthesis**	• How does the structure of the cell membrane determine what can enter/exit the cell? • What are the different mechanisms used to transport molecules across a cell membrane? • What effect do different types of solutions have on the movement of solutes? • How do cells move large molecules across the cell membrane? • What is the function of DNA? • How is a genetic trait determined? • What molecules make up the structure of DNA? • What are the bases that make up DNA and RNA and why are they important? • What are proteins and how are they used in the human body? • What are the steps required to produce a protein in a cell? • What happens to a protein after it is built? • How does protein structure	• Describe the structure and function of the plasma membrane. • List and describe the various types of passive cell transport. • Describe active cell transport. • Describe the various types of vesicular transport. • Describe the functions of the major cellular locations and components involved in gene expression including the nucleus, nuclear membrane, cytosol, ribosomes, rough endoplasmic reticulum. • List and describe the key enzymes, steps, and cellular components involved in the process of transcribing sequences of DNA into the three types of RNA. • Describe the specific processes involved in producing mRNA transcripts including initiation, elongation, and termination steps along with additional processing steps required to produce mature mRNA transcripts ready to be translated in the cytosol. • Describe the specific enzymes, cellular components, and processes involved in translation of mRNA including initiation, elongation, and termination steps along with additional processing steps required to produce functional proteins in either the cytosol or rough endoplasmic reticulum.	• Lab Reports • Practice Worksheets • Discussions • Models • Simulations • Research Summary • Quiz	**Career Ready Practices** CRP 1,2,4,7,8,11,12	**ELA** 11-12R 1,4,7 11-12W 1,2,4,5,6,7 11-12SL 1,4 11-12L 1,2,3,6
				Cluster Standards HL 1 ST 2,6	**Literacy** RST 1,2,4,7,8,9 WHST 2,4,5,6,7
				Pathway Standards HL-DIA 1 ST-SM 1,2,4	**Science** HS-LS1-1

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	affect its function?				
Week 6 **Cell Physiology: Cellular Energetics**	• What is ATP used for in living things? • How does the structure ATP relate to its function? • What molecules are required to produce ATP? • What role does the presence of oxygen play in the production of ATP? • What are the steps involved in aerobic and anaerobic respiration? • How are hydrolysis and dehydrations synthesis used to recycle ATP?	• Describe the structure of ATP and explain how energy is stored in ATP. • Explain the pathways used in ATP production under both aerobic and anaerobic conditions. • Describe the pathways involved in cellular ATP production including glycolysis, Kreb's cycle and the electron transport chain. • Explain how energy is recycled using the processes of dehydration synthesis and hydrolysis of ATP/ADP.	• Lab Reports • Practice Worksheets • Discussions • Simulations • Research summaries • Unit Test	**Career Ready Practices** CRP 1,2,4,7,8,11,12	**ELA** 11-12R 1,4 11-12W 1,2,4,5,6,7 11-12SL 1,4 11-12L 1,2,3,6
				Cluster Standards HL 1 ST 2,6	**Literacy** RST 1,2,4,7,8,9 WHST 2,4,5,6,7
				Pathway Standards HL-DIA 1 ST-SM 1,2,4	**Science** HS-LS1-1
Week 7 **Tissues: Integumentary System**	• What are the categories used to define levels of cellular organization in the human body? • What are the main types of tissues in the body? • How does the structure of tissue in the human body relate to its function? • What are the functions of skin? • How is the skin organized? • What types of tissue makes up the layers of the skin? • What role do accessory organs such as sweat glands and sebaceous glands play in the skin? • How does cellular structure of skin cells relate to their function? • What happens to skin as it is exposed to sunlight and as a person ages? • Which layers of the skin are damaged in different types of burns? • How does burn damage in the skin affect other functions in the body? • What events occur	• Explain the levels of organizational units used within the human body (organelles, cells, tissues, organs, organ systems). • Identify characteristics of the four categories of human tissue. • Identify the components and the general functions of the integumentary system. • List and describe the accessory structures of the integumentary system and their functions. • Explain why the histology of the epidermis is well suited for its function • Describe the distinctive features of each of the five layers of thick skin including the various cells present and the function of each. • Describe the characteristics of the hypodermis (subcutaneous layer) and explain how the components within the hypodermis contribute to its function. • Describe the life cycle of a keratinocyte and explain what happens to the keratinocytes, including the process of keratinization, as they move from the deepest layer to the most superficial. • Describe the general structure and characteristics of the dermis, including the papillary and reticular layers, and its association with the epidermis. • Explain what cleavage lines are and how they are useful to surgeons. • Explain the basis of fingerprints. • Describe the pigments responsible for	• Lab Reports • Practice Worksheets • Discussions • Models • Simulations • Case Study Summary • Detailed Scientific Drawings • Quiz	**Career Ready Practices** CRP 1,2,4,7,8,11,12	**ELA** 11-12R 1,4,7 11-12W 1,2,4,5 11-12SL 1,4 11-12L 1,2,3,6
				Cluster Standards HL 1 ST 2,6	**Literacy** RST 1,2,4,7,8,9 WHST 2,4,5,6,7
				Pathway Standards HL-DIA 1 ST-SM 1,2,4	**Science** HS-LS1-6 HS-LS1-7

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	following superficial or deep skin damage?	producing various skin colors and identify where in the skin these pigments would be found. • Explain the danger and benefit of sun exposure and describe how melanocytes protect us from damaging UV radiation. • Differentiate among the three different types of skin cancer and identify the specific epidermal origin of each. • Briefly explain how the degree of a burn relates to the severity of the burn and the ability of the skin to heal. • Describe the events involved in epidermal wound healing and deep wound healing.			
Weeks 8-9 **Tissues: Bone**	• How does the skeletal system assist with protection in the body? • How does the structure of compact bone differ from the structure of spongy bone? • How does the overall structure of bone provide great strength and flexibility, but keep bone from being too bulky and heavy? • How can damage to a bone affect other human body systems? • What is bone remodeling? • How do osteoblasts and osteoclasts assist with bone remodeling and overall bone homeostasis? • What is the relationship between bone remodeling and blood calcium levels? • How do hormones assist in the maintenance of healthy bone and the release of calcium to be used in other body processes? • What are the four main stages of healing that occur after a bone fracture? • What role do joints play in	• Describe the functions of the skeletal system. • Describe the differences and similarities among cellular and extracellular components of osseous tissue. • Distinguish between compact and spongy bone. • Differentiate among the different types of bone cells in terms of their origin and development, characteristic features, function, general location and contribution to the growth and maintenance of the bone. • Describe the general features of a long bone, focusing more specifically on the area of longitudinal growth. • Compare and contrast endochondral and intramembranous ossification. • Describe how bones grow in length and in width. • Explain the process of bone remodeling and fracture repair. • Describe how nutrition, hormones and weight-bearing exercise affect bone growth and remodeling. • Describe how calcium balance is maintained and why calcium homeostasis is physiologically important to the skeleton. • Differentiate among the major categories of joints based on degree of movement and/or structure and explain how structure correlates with function. • Select a clinically important synovial joint and describe the organization, accessory structures, and function of that joint.	• Lab Reports • Practice Worksheets • Discussions • Detailed Scientific Drawings • Models • Simulations • Case Study Summary • Quiz	**Career Ready Practices** CRP 1,2,4,7,8,11,12 **Cluster Standards** HL 1 ST 2,6 **Pathway Standards** HL-DIA 1 ST-SM 1,2,4	**ELA** 11-12R 1,4 11-12W 1,2,4,5 11-12SL 1,4 11-12L 1,2,3,6 **Literacy** RST 1,2,4,7,8,9 WHST 2,4,5,6,7 **Science** HS-LS1-2

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	the human body? • How are joints classified by both structure and function? • What are the different types of synovial joints?				
Weeks 10-11 **Tissues: Muscles**	• How do muscles assist with movement of the body and of substances around the body? • How are muscle fibers and membranes organized to form a whole skeletal muscle? • What do skeletal muscle structure and attachment to bones convey about function? • What are the requirements for muscle contraction? • How is the condition rigor mortis related to muscle contraction? • What role do calcium and ATP play in muscle contraction? • What is a sarcomere? • How does a sarcomere contract and lengthen to cause muscle contraction? • How do nerves interact with muscles? • How can we assess muscle function? • How does the body maintain a supply of ATP during exercise? • What is muscle fatigue? • How do the structure and function of the three types of muscle tissue compare? • How are muscles named?	• Identify and describe the key components of the connective tissue framework of muscle and tendons. • Identify all the major anatomical features of muscle cells/fibers and describe how each of these components function uniquely in driving excitation-contraction coupling. • Identify the key band, zone, and protein components of the sarcomere and explain how each function and change as part of the contraction cycle. • Describe all key components and steps in excitation-contraction coupling of muscle cells starting from a motor neuron and proceeding through the contraction cycle of actin and myosin. • Describe mechanisms in muscle fibers that regulate the duration and tension of the contraction and how relaxation and rigor mortis of muscles and muscle fibers occurs. • Explain how muscle cells and muscles as a whole regulate tension produced. • List the major energy sources for muscle fibers and how each source functions to provide ATP for contraction during various levels of activity. • Explain the key aspects of muscle metabolism including anaerobic metabolism and the implications of lactic acid production, as well as the metabolic processes that occur to drive aerobic muscle metabolism and muscle fiber recovery. • Describe the effects of fast twitch and slow twitch muscle fiber type, as well as training on muscle performance, including tension/force and endurance aspects. • Compare and contrast the key anatomical and functional differences between cardiac, smooth, and skeletal muscle and list major organs comprised on these various muscle types. • Identify the names and associated actions of	• Lab Reports • Practice Worksheets • Discussions • Models • Student Drawings • Simulations • Case Study Analysis • Research Report • Unit Test	**Career Ready Practices** CRP 1,2,4,7,8,11,12 **Cluster Standards** HL 1 ST 2,6 **Pathway Standards** HL-DIA 1 ST-SM 1,2,4	**ELA** 11-12R 1,4,7 11-12W 1,2,4,5,6,7 11-12SL 1,4 11-12L 1,2,3,6 **Literacy** RST 1,2,4,7,8,9 WHST 2,4,5,6,7 **Science** HS-LS1-2

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		muscles in both human and cat specimens, including the origins and insertions of these muscles.			
Weeks 1213 **Respiratory System**	• Why do we need oxygen? • What is the purpose of breathing and how does it occur? • How do muscles assist in the movement of air in and out of the respiratory system? • How does the oxygen we inhale move to cells? • How does diffusion facilitate gas exchange? • What changes in the respiratory system contribute to asthma? • Why is it valuable to measure lung capacity? • Why might some people be more efficient at capturing oxygen than others? • How does the respiratory system help regulate blood pH and CO_2 levels? • How is respiration rate regulated and what influences this rate?	• Describe the major functions of the respiratory system and protective features against pathogens, particles, and other hazards. • Differentiate between external and internal respiration. • Describe the basic organization of the respiratory system, identify the organs and structures including tissue composition from the nasal cavity to the alveoli and their associated functions. • Identify the structure of the larynx and describe its role in breathing and sound production. • Identify the gross structure of the lungs and pleurae and describe the importance of this structure in pulmonary ventilation. • Explain how gas exchange occurs at the respiratory membrane and how its structure relates to function. • Summarize the mechanisms governing movement of air into and out of the lungs and how Boyle's law relates to the sequence of events. • Identify the muscles responsible for respiratory movements and how these muscles contribute to inspiration or expiration. • Describe the various lung volumes and how they relate to lung capacities. • Describe Dalton's and Henry's Laws and how these laws are related to respiratory gas exchange. • Identify mechanisms of gas exchange in the lungs and the tissues including O_2 and CO_2 concentration gradients and net gas exchange. • Describe the structure and function of hemoglobin, and the transport of oxygen and carbon dioxide in the blood. • Describe how oxygen is transported in the blood, and explain how factors such as temperature, pH, BPG and pCO_2 affect oxygen loading and unloading. • Describe carbon dioxide transport in the	• Lab Reports • Practice Worksheets • Discussions • Models • Simulations • Case Study of Respiratory Disorder • Quiz	**Career Ready Practices** CRP 1,2,4,7,8,11,12 **Cluster Standards** HL 1 ST 2,6 **Pathway Standards** HL-DIA 1 ST-SM 1,2,4	**ELA** 11-12R 1,4 11-12W 1,2,4,5 11-12SL 1,4 11-12L 1,2,3,6 **Literacy** RST 1,2,4,7,8,9 WHST 2,4,5,6,7 **Science** HS-LS1-2 HS-LS1-3

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		blood including the three forms of delivery and the influence of CO_2 on blood pH. • Explain the factors that influence rate and depth of breathing; locate the respiratory centers involved in the regulation of respiration and describe their roles in breathing control.			
Weeks 14-15 **Urinary System**	• What are the functions of the urinary system? • What are the major organs of the urinary system? • What is the general structure of the kidney and how does this structure relate to kidney function? • How does the kidney form urine? • What is the function of the nephron? • What is the relationship between blood and urine? • How do filtration, secretion and reabsorption in the nephron help maintain a fluid and electrolyte balance in the body? • How do the hormones ADH and aldosterone affect the nephron and the body's overall water balance? • What components are found in normal urine? • How do reflexes and voluntary muscle control work together to regulate release of urine from the body?	• Describe the general functions of the urinary system. • Identify anatomical structures of the urinary system and their histological characteristics, including: internal and external structures of the kidney, vasculature of the kidney, ureters, urinary bladder, and urethra. • Identify regions of the nephron and the surrounding capillaries. • Define filtration, reabsorption, and secretion with reference to urine production. • Describe the process of glomerular filtration, including how filtration pressure is calculated. • Explain the regulation of glomerular filtration rate by local, neural, and hormonal mechanisms. • Identify substances that are reabsorbed and/or secreted in the nephron, including the mechanism and location, such as: Na^+, K^+, Cl^-, glucose, H^+, and H_2O. • Describe the hormonal regulation of the reabsorption of Na^+ and water in the nephron. • Differentiate between obligatory and facultative water reabsorption. • Explain the role of the kidneys in the maintenance of acid/base balance. • Describe the normal composition of urine. • Describe the events that occur during the micturition reflex.	• Lab Reports • Practice Worksheets • Discussions • Simulations • Case Study Analysis • Unit Test	**Career Ready Practices** CRP 1,2,4,7,8,11,12	**ELA** 11-12R 1,4 11-12W 1,2,4,5 11-12SL 1,4 11-12L 1,2,3,6
				Cluster Standards HL 1 ST 2,6	**Literacy** RST 1,2,4,7,8,9 WHST 2,4,5,6,7
				Pathway Standards HL-DIA 1 ST-SM 1,2,4	**Science** HS-LS1-2 HS-LS1-7
Weeks 16-20 **Professional Skills**	• What is the purpose of a professional portfolio? • How can keeping a professional portfolio benefit you in your future studies and career? • What careers interest you the most and why? • What experiences can help you best prepare for college admissions and	• Write a professional resume appropriate for college admissions and job applications. • Create a professional portfolio that demonstrates mastery of program content, creativity, professionalism, and experience within their chosen field. • Complete an independent research project that investigates a medical topic of their choice and encompasses multiple investigative skills and content from the program.	• Portfolio • Peer Assessment • Supervisor Formal Evaluations • Practical Exam • Lab Report • Discussions • Student Reflections	**Career Ready Practices** CRP 1,2,4,7,8,9,10,11,12	**ELA** 11-12R 1,4,7 11-12W 1,2,4,5 11-12SL 1,2,3,4 11-12L 1,2,3,6
				Cluster Standards HL 1 ST 4,5,6	**Literacy** RST 1,2,4,7,8,9 WHST 2,4,5,6,7
				Pathway Standards HL-DIA 1 ST-SM 2,4	**Science**

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	employment opportunities?	• Complete an internship, mentorship, or shadowing experience with at least one professional in the field of their choice. • Identify and investigate potential career options through college visits and field trips to local businesses. • Participate in mock interviews to prepare for college admissions and job interviews.			
Week 21 **Central Nervous System: Electrophysiology and Neurons**	• What are the major structures and functions of the nervous system? • How does the structure of a neuron relate to its function? • How do different types of neurons work together to coordinate bodily functions? • What role do passive and active transport play in the function of a neuron? • What are the steps of an action potential? • What is a synapse and how are chemicals used to transmit messages at the synapse? • What can occur as a result of neuronal malfunctions?	• Describe the structural and functional subdivisions of the nervous system including sensory/afferent, motor/efferent, interneurons, somatic, visceral/autonomic, central, and peripheral nervous systems. • Identify the key structural features of the neuron and describe their specific functions. • Describe the differences in anatomy, location, and function of unipolar, multipolar, and bipolar neurons. • Describe the anatomy of synapses including the structure and roles of the pre- and post-synaptic cells. • Describe the structure, function, and location of neuroglial cells of both central and peripheral nervous systems. • Review the key roles of transmembrane channel and carrier proteins in determining and maintaining transmembrane potential, as well as rapid changes in the resting membrane potential (action potentials). • Compare and contrast graded versus action potentials and where and how these changes in transmembrane potentials occur on neurons. • Describe the various phases of the action potential (including the relative and absolute refractory periods) and associated key structural components of the neuron that contribute to the changes in membrane potential for each phase. • Define and differentiate between depolarization and hyperpolarization, as related to membrane potential and the types of ions channels and ion diffusions that contribute to these potential changes. • Describe the structural and functional differences between continuous and salutatory propagation of action potentials. • Distinguish between Type A, B, and C	• Lab Reports • Practice Worksheets • Discussions • Graphic Organizer • Simulations • Case Study Analysis • Quiz	**Career Ready Practices** 1,2,4,7,8,11 **Cluster Standards** HL 1 ST 2,6 **Pathway Standards** HL DIA 1 ST-SM 2,4	**ELA** 11-12R 1,4,7 11-12W 1,2,4 11-12SL 1,4 11-12L 1,2,3,6 **Literacy** RST 1,2,4,7,8,9 WHST 2,4,5,6,7 **Science** HS-LS1-2 HS-LS1-3

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		neuron fibers both structurally and functionally based on the type of sensory or motor information transmitted by each. • Describe the key roles of neurotransmitters at the synapse and be able to provide examples of excitatory and inhibitory neurotransmitters. • Describe the key components and events involved in transmission of action potentials across a cholinergic synapse. • Explain the difference between excitatory and inhibitory post-synaptic potentials (EPSPs and IPSPs) and how temporal and spatial summation, relate to these concepts and information processing. • Identify various disorders caused by neuronal malfunctions. • Describe the causes, symptoms and treatments of specific neuronal disorders as presented through case studies.			
Week 22 **Central Nervous System: Spinal Cord and Reflexes**	• How does the structure of the spinal cord affect its function? • How are different types of neurons used to bring messages to and from the spinal cord? • What is a reflex and how do they work? • How are different types of neural circuit pathways used to facilitate electrical communication in the body?	• Identify and describe the key structural and functional attributes of the spinal cord including cross sectional anatomy, spinal nerves and nerve plexuses, spinal nerve roots, and the spinal meninges. • Describe the general organization of the gray and white matter of the spinal cord including sensory and motor nuclei, ascending and descending columns and tracts, and commissures. • Describe the key anatomy and function of sensory and motor pathways to and from the spinal cord using spinal nerves including both somatic and visceral modalities. • Compare and contrast the structural and functional differences between somatic, visceral, motor, and sensory neurons. • Explain the physiology and clinical relevance of sensory dermatomes. • Discuss and differentiate between the following types of reflexes: innate and acquired, monosynaptic and polysynaptic, somatic, and visceral, spinal, and cranial. • Describe the components and events involved in the reflex arc including stretch, withdrawal, and crossed-extensor reflexes. • Describe the following neural circuit pathways: divergence, convergence, reverberation, serial and parallel processing.	• Lab Reports • 3-D Models • Practice Worksheets • Graphic Organizer • Simulations • Case Study Analysis • Quiz	**Career Ready Practices** 1,2,4,7,8,11 **Cluster Standards** HL 1 ST 2,6 **Pathway Standards** HL DIA 1 ST-SM 2,4	**ELA** 11-12R 1,4,7 11-12W 1,2,4,5 11-12L 1,2,3,6 **Literacy** RST 1,2,4,7,8,9 WHST 2,4,5,6,7 **Science** HS-LS1-3

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		• Identify the possible causes and effects of ineffective reflexes as presented through case studies.			
Week 23: **Central Nervous System: The Brain**	• What are the locations and functions of the major regions of the brain? • What is CSF and how does it contribute to the function of the nervous system? • What is the blood-brain barrier and why is it important? • How does the limbic system help regulate emotions and learning? • How are basal nuclei used to relay information to and from other parts of the brain? • What are consequences of miscommunication in the body? • How do scientists determine which areas of the brain are associated with specific actions, emotions, or functions? • How are cranial nerves used to control specific regions in the body?	• Identify and describe the key structural and functional features of medulla oblongata, pons, thalamus and hypothalamus, mesencephalon, cerebellum, and cerebrum. • Identify and describe the locations of the cranial meninges and their functions for the brain and CNS. • Identify and describe the development and function of all the ventricles of the brain and the associated structures that play a role in the formation, circulation, and reabsorption of cerebrospinal fluid (CSF). • Describe the key functions of cerebrospinal fluid and how the Blood – CSF barrier is maintained. • Describe the key structural components of the Blood Brain Barrier and the associated physiological implications of these specialized capillaries in the brain. • Explain the roles of the limbic system and describe key portions of the brain involved in this system along with their specific functions in emotions and learning. • Describe the components and key functions of the basal nuclei in the cerebrum. • Describe the key structural and functional features of the cerebral cortex including the concepts of hemispheric lateralization and disconnection syndrome. • Identify and describe the functions of the various nerve fiber tracts in the cerebral white matter. • Identify and describe functions and locations of the primary motor and sensory cortices, cortical association, and integrative areas (including Wernicke's and Broca's areas and the premotor cortex). • Describe the anatomical and physiological concepts of the cortical homunculus in terms of both sensory and motor functions. • Describe how electroencephalograms are generated and the various types of brain waves observed. • Describe the physiology of seizures and explain the concept and implications of	• Lab Reports • Practice Worksheets • Discussions • Models • Case Study Analysis • Unit Test	**Career Ready Practices** 1,2,4,7,8,11 **Cluster Standards** HL 1 ST 2,6 **Pathway Standards** HL DIA 1 ST-SM 2,4	**ELA** 11-12R 1,4,7 11-12W 1,2,4,5 11-12SL 1,4 11-12L 1,2,3,6 **Literacy** RST 1,2,4,7,8,9 WHST 2,4,5,6,7 **Science** HS-LS1-2

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		epilepsy. • Identify the cranial nerves on pictures or models of the brain and be able to describe key sensory and/or motor functions of these nerves. • Describe the causes, symptoms, and treatments of at least two brain disorders as presented through case studies.			
Weeks 24-25 **Peripheral Nervous System: Sensory Pathways - Somatic Nervous System**	• What role does the thalamus serve in processing neuronal information? • How are different types of receptors used for sensory input? • What is the difference between somatic and visceral sensory information? • How does the nervous system control skeletal muscle movement? • What structures are used to maintain balance and motor control?	• Describe the role of the thalamus in transmission and sorting of sensory information along with the related concepts of 1st, 2nd, and 3rd order neurons in the processing of somatic sensory information. • Explain the concepts of sensory receptor specificity, receptive fields, and transduction of sensory information in the form of graded and action potentials along neurons. • Compare and contrast nociceptors, thermoreceptors, chemoreceptors, and mechanoreceptors. • Distinguish between somatic and visceral sensory information. • Identify and describe sensory information carried by the posterior column and spinothalamic pathways, along with the concepts of 2nd order neurons and decussation of the information to the cortex. • Identify and describe how motor information to skeletal muscle is initiated and directed through upper and lower motor neurons through the motor cortex, pyramids, and corticospinal tracts. • Describe the roles of the basal nuclei, cerebellum, and vestibulospinal tracts in sensory perception and associated motor control. • Analyze a research paper investigating the somatic nervous system and state its hypothesis, summarize the data, and discuss the researcher's conclusion. • Recommend modifications or further follow up studies to a currently published research article.	• Lab Reports • Practice Worksheets • Discussions • Student Created Diagrams • Models • Research Article Summary/Analysis • Quiz	**Career Ready Practices** 1,2,4,7,8,11,12 **Cluster Standards** HL 1 ST 2,6 **Pathway Standards** HL DIA 1 ST-SM 2,4	**ELA** 11-12R 1,4 11-12W 1,2,4,5 11-12SL 1,4 11-12L 1,2,3,6 **Literacy** RST 1,2,4,7,8,9 WHST 2,4,5,6,7 **Science** HS-LS1-3
Week 26 **Peripheral Nervous System: Autonomic**	• How are ganglionic neurons used to facilitate electrical communication in the sympathetic and	• Identify and describe the location and function of pre- and post-ganglionic neurons in the sympathetic and parasympathetic nervous systems.	• Lab Reports • Practice Worksheets • Discussions • Models	**Career Ready Practices** 1,2,4,7,8,11	**ELA** 11-12R 1,4,7 11-12W 1,2,4,5 11-12SL 1,4 11-12L 1,2,3,6

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Nervous System	parasympathetic nervous systems? • What are visceral motor nuclei and how are they used in the nervous system? • How do the structure and function differ between the sympathetic and parasympathetic nervous systems? • How is the nervous system used to maintain regulatory cycles within the human body?	• Explain the concepts of visceral motor nuclei in both divisions of the autonomic nervous system and compare/contrast their anatomical locations. • Describe the key structural components and functions of the sympathetic nervous system. • Identify and describe the functions of the three types of ganglia in the sympathetic nervous system including sympathetic chain, collateral, and suprarenal medullae. • List and describe functions for the alpha and beta receptors of the sympathetic nervous system. • Describe the key structural components and functions of the parasympathetic nervous system. • Identify and describe the functions of the terminal and intramural ganglia in the parasympathetic nervous system. • Describe the concepts and associated components involved in autonomic tone, sleeping, and memory. • Analyze a research paper investigating the somatic nervous system and state its hypothesis, summarize the data, and discuss the researcher's conclusion. • Recommend modifications or further follow up studies to a currently published research article.	• Simulations • Research Paper Summary/Analysis • Quiz	**Cluster Standards** HL 1 ST 2,6 **Pathway Standards** HL DIA 1 ST-SM 2,4	**Literacy** RST 1,2,4,7,8,9 WHST 2,4,5,6,7 **Science** HS-LS1-3
Week 27 **Endocrine System**	• What is a hormone? • How do hormones interact with target cells? • What are examples of endocrine glands and exocrine glands in the human body? • How do feedback loops help regulate the action of hormones? • How can too little or too much of a hormone lead to disease?	• Identify the major endocrine organs on models and/or diagrams. • Describe the primary means of intercellular communication in the body. • Describe the various locations and functions of hormone receptors in target organs and tissues. • Differentiate between lipid-soluble and water-soluble hormones in terms of transport, receptor location and mechanism of action. • Describe typical endocrine reflexes and feedback loops. • Explain the regulatory role of the hypothalamus in the endocrine system, including the hormones it produces and their effects. • For each of the following endocrine organs,	• Lab Reports • Practice Worksheets • Discussions • Simulations • Case Study Summary • Unit Test	**Career Ready Practices** 1,2,4,7,8,11 **Cluster Standards** HL 1 ST 2,6 **Pathway Standards** HL DIA 1 ST-SM 2,4	**ELA** 11-12R 1,4,7 11-12W 1,2,4 11-12SL 1,4 11-12L 1,2,3,6 **Literacy** RST 1,2,4,7,8,9 WHST 2,4,5,6,7 **Science** HS-LS1-2 HS-LS1-3

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		list the primary hormones produced: pituitary gland, pineal gland, thyroid gland, parathyroid glands, adrenal glands, pancreas. • Identify organs that have secondary endocrine functions and list the hormones they produce. • Describe the structure of key hormones, the means of transport, the mechanism of action at target organs/tissues, and the reason for its release/production. • Describe the stages of the general adaptation syndrome (stress response). • Diagnose an endocrine system disorder and explain the cause of this disorder. • Recommend a treatment plan for a specific endocrine system disorder using current medical research.			
Week 28 **Cardiovascular System: Blood**	• How does the structure of blood affect its function? • Why is the shape of a RBC critical for proper function? • What can occur if a RBC does not have the correct shape? • How is blood type determined? • What is a platelet and why are they important? • How does the body prevent blood loss after an injury? • What types of cells are found in blood and what are the functions of each?	• Describe the composition of blood and differentiate between formed elements and plasma. • Identify the key functions and physical characteristics of blood and the components of blood. • Describe the structure of RBCs and explain why RBC structure is optimal for its function. • Describe the basic process of erythropoiesis, the significance of the reticulocyte, and the effect of erythropoietin in the regulation of erythropoiesis. • Discuss the structure and function of hemoglobin. • Describe how specific RBC components are recycled. • Explain the basis for ABO blood types and the Rh factor system and discuss the importance of blood typing in blood transfusions. • Distinguish among the different types of white blood cell types in terms of structure, function, and origin. • Describe the structure, function, and production of platelets. • Describe the specific events that take place in each phase of hemostasis. • Describe the events involved in the formation of a fibrin clot and differentiate between the	• Lab Reports • Practice Worksheets • Discussions • Models • Simulations • Case Study Analysis • Quiz	**Career Ready Practices** 1,2,4,7,8,11,12 **Cluster Standards** HL 1 ST 2,6 **Pathway Standards** HL DIA 1 ST-SM 2,4	**ELA** 11-12R 1,4,7 11-12W 1,2,4 11-12SL 1,4 11-12L 1,2,3,6 **Literacy** RST 1,2,4,7,8,9 WHST 2,4,5,6,7 **Science** HS-LS1-2

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		extrinsic, intrinsic, and common pathway. • Explain how positive feedback loops promote coagulation. • Describe the process of fibrinolysis and explain why it is necessary. • Identify blood disorders in a given case study. • Diagnose sickle cell anemia and describe its causes and appropriate treatment using current medical research.			
Week 29 **Cardiovascular System: The Heart**	• How does the structure of the heart contribute to its function? • What role do coronary arteries serve in terms of heart function? • What role do valves serve in the heart? • How do the structure and functions of the different chambers of the heart differ? • How do medical professionals analyze heart function? • How do the nervous system, muscular system and circulatory system work together to ensure blood moves continuously through the body?	• Identify the unique structural features of cardiac muscle cells/tissue and describe the associated functions of these features (intercalated discs, myoglobin, etc.) • Identify key gross anatomical features of the superficial heart including the great vessels, various sulci, and the major vessels of the coronary circulation. • Identify the names and associated functions of the three layers of the heart wall. • Identify other major anatomical components of the heart wall and explain their functional significance, including the layers of the pericardium, trabeculae carnae, chordae tendineae, and papillary muscles. • Identify landmark anatomical features of all four chambers of the heart and explain why each of the chambers look and function uniquely. • Trace the flow of blood through the pulmonary and systemic circuits of the body while listing the key vessels, chambers, and valves encountered through both circuits. • Describe the valve names and compare/contrast the anatomical and physiological differences in the operation of the atrioventricular versus the semilunar valves. • Describe the key components of the cardiac conduction system and how each functions to initiate and regulate excitation and contraction of the various chambers of the heart. • Explain how the electrocardiogram (EKG) illustrates electrical activity of the cardiac conduction system and be able to attribute each part of the EKG tracing to conduction system components.	• Lab Reports • 3-D Models • Practice Worksheets • Graphic Organizer • Simulations • Case Study Summary • Unit Test	**Career Ready Practices** 1,2,4,7,8,11,12 **Cluster Standards** HL 1 ST 2,6 **Pathway Standards** HL DIA 1 ST-SM 2,4	**ELA** 11-12R 1,4,7 11-12W 1,2,4 11-12L 1,2,3,6 **Literacy** RST 1,2,4,7,8,9 WHST 2,4,5,6,7 **Science** HS-LS1-2

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		• Explain the key pressure and volume changes associated with the cardiac cycle and attribute these changes to flow of blood and opening/closing of valves. • Explain various ways in which stroke volume and heart rate are regulated to adjust cardiac output to match level of activity. • Diagnose a heart attack using EKG images. • Recommend treatment plans for heart attack victims based on current medical research.			
Weeks 30-31 **Cardiovascular System: Blood Vessels and Regulation**	• What is the difference between pulmonary and systemic circulation? • What is the difference in structure and function between veins and arteries? • What role do veins, arteries, and capillaries serve in the circulatory system? • How is blood pressure maintained in the human body?	• Identify and list the structural differences between arteries, arterioles, capillaries, venules, and veins and describe how these differences explain their unique functional or physiological attributes. • Explain how blood flow, volume, and pressure are adjusted in the blood vessels, including how vasoconstriction and venoconstriction are controlled and their effects on these key variables. • Trace the flow of blood from the heart through major blood vessels and back to the heart and describe mechanisms that assist venous return of this blood as pressures decrease through the circuit. • Explain the pressures that drive capillary filtration and reabsorption, along with the function of lymphatic vessels in maintaining blood volume and preventing edema. • Explain the key cardiovascular reflexes operated neurally by the baroreceptors and chemoreceptors and hormonally by several important hormones. • Identify and describe the key anatomical features of the blood supply to various organs including the heart, lungs, liver, and brain, as well as the unique vessels and features of the fetal circulation. • Identify the major arteries and veins in both human and cat specimens. • Diagnose a patient with hypertension and explain the causes, and appropriate treatment using current medical research.	• Lab Reports • Practice Worksheets • Discussions • Detailed Scientific Drawings • Models • Simulations • Case Study Summary • Unit Test	**Career Ready Practices** 1,2,4,7,8,11,12 **Cluster Standards** HL 1 ST 2,6 **Pathway Standards** HL DIA 1 ST-SM 2,4	**ELA** 11-12R 1,4,7 11-12W 1,2,4 11-12SL 1,4 11-12L 1,2,3,6 **Literacy** RST 1,2,4,7,8,9 WHST 2,4,5,6,7 **Science** HS-LS1-3
Week 32 **Immune System**	• What body systems function to protect the human body? • How does the structure of	• Describe both the components and major functions of the lymphatic system. • Describe the distribution and structure of lymphatic vessels and explain how lymph is	• Lab Reports • Practice Worksheets • Discussions • Models	**Career Ready Practices** 1,2,4,7,8,11,12	**ELA** 11-12R 1,4 11-12W 1,2,4 11-12SL 1,4 11-12L 1,2,3,6

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	the lymphatic system relate to its function? • What is an antigen? • What is an antibody? • How do circulating antibodies protect a person from receiving incompatible blood during a transfusion? • What is specific immunity? • What role do lymphocytes play in specific immunity? • How does the body react the second time it is exposed to a particular antigen?	transported. • Explain the basic structure, cellular populations, and function of lymphoid tissue (Lymph nodes). • Describe the structure and function of key lymphoid organs including the spleen and thymus. • Explain the importance of Mucosa-Associated Lymphoid Tissue including the tonsils and Peyer's patches. • Compare and contrast the key elements between the innate and adaptive immune defenses. • Describe the basic components and functions of the innate immune system including surface barriers, cells, and chemical defenses. • Describe the basic components and functions of the adaptive immune system including cell-mediated immunity and antibody-mediated immunity. • Explain what an antigen is and how it affects the adaptive response. • Identify the basic structure of an antibody monomer and name and describe the functions of the five classes of antibodies. • Explain T and B cell development and activation. • Explain humoral immunity including clonal selection of B cells. • List the various types of T cells, how they become activated and how they contribute to the cellular immune response. • Explain the basis of immunological memory and how it relates to vaccination. • Diagnose and describe appropriate treatment plans for patients with autoimmune disorders through the use of case studies.	• Student Drawings • Simulations • Case Study Analysis • Quiz	**Cluster Standards** HL 1 ST 2,6 **Pathway Standards** HL DIA 1 ST-SM 2,4	**Literacy** RST 1,2,4,7,8,9 WHST 2,4,5,6,7 **Science** HS-LS1-2
Week 33-34 **Digestive System**	• What are the functions of the digestive system? • How does the structure of each organ in the digestive system relate to its function? • How does the digestive	• Describe the classes of nutrients required by the body. • Define the two types of digestive processes: mechanical and chemical. • Explain what is meant by absorption. • Identify the organs of the digestive system and describe their major functions.	• Lab Reports • Practice Worksheets • Discussions • Models • Simulations • Case Study Analysis • Quiz	**Career Ready Practices** 1,2,4,7,8,11,12 **Cluster Standards** HL 1 ST 2,6	**ELA** 11-12R 1,4,7 11-12W 1,2,4 11-12SL 1,4 11-12L 1,2,3,6 **Literacy** RST 1,2,4,7,8,9 WHST 2,4,5,6,7

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	system assist in maintaining the water balance in the body? • How do enzymes assist the process of digestion?	• Describe the histology of the digestive tract. • Describe the mechanisms that regulate digestion. • Explain muscular movements in the intestinal tract: peristalsis; segmentation • Describe the anatomy of the oral cavity and pharynx and explain their digestive functions. List the salivary glands and their secretions. Name the permanent teeth and explain the human dental formula. • Describe the anatomy and function of the esophagus. • Describe the anatomy and histology of the stomach. • Discuss digestive and absorptive processes in the stomach. • Explain the nervous and hormonal control mechanisms of gastric activity. • Describe the anatomy and histological organization of the small intestine. • Explain the functions of intestinal secretions and their regulation. • Describe the anatomy and functions of the accessory organs. • Explain nervous and hormonal controls acting on the small intestine. • Describe the absorptive processes of nutrients in the small intestine. • Describe the anatomy and histology of the large intestine. • Discuss the digestive and absorptive processes of the large intestine. • Explain the importance of the gut microbiome in digestion. • Describe the events of the defecation reflex. • Explain the current understanding of the “gut microbiome” and its importance to the digestive processes and influence on the physiology of other organ systems. • Diagnose and provide treatment plans for digestive system disorders through the use of case studies.		**Pathway Standards** HL DIA 1 ST-SM 2,4	**Science** HS-LS1-2
Week 35 **Reproductive System**	• What are the functions of the male reproductive system? • What role does testosterone play in	• Identify and describe the major organs, glands, and tissues of the male reproductive system. • Describe the major components of semen, including their functions and the glands	• Lab Reports • Practice Worksheets • Discussions • Simulations • Case Study Summary	**Career Ready Practices** 1,2,4,7,8,11,12 **Cluster Standards**	**ELA** 11-12R 1,4,7 11-12W 1,2,4 11-12SL 1,4 11-12L 1,2,3,6 **Literacy**

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	development and sexual reproduction? • What is the function of sperm? • How is sperm transferred to the female body during sexual reproduction? • What are the structures in the female reproductive system? • How does the structure of the female reproductive system allow for fertilization and development of a baby? • What role do hormones play in the female menstrual cycle? • How does the female menstrual cycle prepare the female body for pregnancy? • What role do feedback cycles play in menstrual cycle?	producing them. • Identify the key components of a spermatozoan and describe their functions. • Explain the processes of spermatogenesis, including meiosis and spermiogenesis, along with the cells (including nurse, interstitial, spermatogonia, and spermatocytes) and associated hormones and locations. • Describe the major targets and effects of the reproductive hormones including GnRH, FSH, LH, and testosterone. • Identify and describe the major organs, glands, and tissues of the female reproductive system. • Explain the processes of oogenesis, including meiosis and follicle development, along with the cells (including follicular, oogonia, and oocytes) and associated hormones and locations. • Describe the key events, cells, organs, and hormones involved in the ovarian cycle, including the follicular phase, ovulation, and luteal phases. • Describe the key events, cells, organs, and hormones involved in the uterine cycle, including the menses, proliferative, and secretory phases. • Identify the anatomy and histology of the uterine wall including perimetrium, myometrium, and endometrium. • Explain the significance of the hormonal coordination of the uterine and ovarian cycles and its role in the success of oocyte fertilization and implantation. • Explain menopause and its implications. • Describe the role of reproductive therapy through the use of case studies. • Defend an opinion on the use of reproductive therapy techniques using specific evidence to support the claim.	• Student Debates • Unit Test	HL 1 ST 2,6 **Pathway Standards** HL DIA 1 ST-SM 2,4	RST 1,2,4,7,8,9 WHST 2,4,5,6,7 **Science** HS-LS1-2
Weeks 36-40 **Professional Certifications**	• What is the difference between a lay responder and a professional rescuer? • What is the Good Samaritan law and how does it provide legal	• Describe the Good Samaritan laws and the level of protection they provide to a lay rescuer • Define the “duty to act” and give examples of scenarios where this duty applies • Describe the process of obtaining consent to treat and explain when implied consent	• Portfolio • Peer Assessment • Supervisor Formal Evaluations • Practical Exams • Simulations • Students	**Career Ready Practices** 1,2,4,5,7,8,10,11,12 **Cluster Standards** HL 2,5 ST 2,6	**ELA** 11-12R 1,4,7 11-12W 1,2,4 11-12SL 1,2,3,4 11-12L 1,2,3,6 **Literacy** RST 1,2,4,7,8,9 WHST 2,4,5,6,7

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	protection to lay responders? • What is a professional rescuer and why do they have a duty to act? • What are the legal concerns of treating a patient during a medical emergency? • What is the proper way to obtain consent to treat a victim? • What types of interventions can be done in specific medical emergencies? • What is the correct procedure to treat someone who is choking, not breathing or has no signs of life? • What is a phlebotomist? • What are the legal issues related to phlebotomy? • What are standard precautions and why should they always be used? • What are the different types of blood draws performed by phlebotomists? Why would each one be used? • What documentation is required during blood draws and specimen collection?	applies to a victim • Discuss the legal issues related to treating a victim both as a lay responder and a professional rescuer. • Demonstrate the ability to assess a victim and provide appropriate interventions • Give examples of when to use rescue breathing or CPR • Perform rescue breathing to infant, child, and adult victims • Perform correct CPR techniques at the professional rescuer level on an infant, child, and adult victim. • Demonstrate how to aid both a consciously choking and unconsciously choking victim. • List the duties of a phlebotomist. • Define legal issues related to phlebotomy. • Describe the universal precautions as outlined by the CDC. • Describe the venous anatomy and veins and skin surfaces on which phlebotomy can be performed. • Differentiate between serum and plasma. • Identify factors to be considered in venipuncture or skin puncture site selection. • List the equipment and supplies needed to collect blood by venipuncture and skin puncture. • Describe 6 patient factors which influence the ability to perform venipuncture successfully. • Discuss 6 complications associated with blood collection. • Describe the steps in accurate specimen collection and documentation procedures. • Demonstrate a successful venipuncture on manikin arm.	Demonstrations • Discussions • Student Reflections • Peer Review	**Pathway Standards** HL-DIA 1,2,3,4,5 ST-SM 1,2,4	**Science**

Syracuse City School District
Career and Technical Education Program
Course Syllabus
CLT 400: Clinical Lab Technology 400

Program Overview

Students enrolled in the Clinical Lab Technology program will acquire the knowledge and technical skills that will prepare them either for positions as entry level laboratory assistants or for advanced placement in post-secondary education. Students will gain practical learning experience through scientific investigations and experiments, as well as the collection and testing of samples, writing reports, and presenting information in a state-of-the-art, high-tech laboratory setting. As a career link, established partnerships with many local businesses and medical facilities provide students with internships and potential future employment opportunities. In addition, students have the opportunity to earn a Career and Technical Endorsement on their diploma by successfully passing an industry-standard technical assessment.

Course Description

This course gives students training and experience in the practice of phlebotomy including the use of blood collection equipment and the practice of standard safety precautions Students will learn the procedures of routine venipuncture and skin puncture, as well as the proper documentation, handling, and transportation of specimens. Students will investigate the ethical, legal, and regulatory issues surrounding venipuncture and will consider the preanalytical complications, hazards, and complications of blood drawing. Specialized procedures and types of collections will be addressed. Students will prepare for employment by writing resumes and cover letters and participating in practice interviews.

Pre-Requisites

CLT 100: Clinical Lab Technology 100
CLT 200: Clinical Lab Technology 200
CLT 300: Clinical Lab Technology 300

Course Objectives

By the end of the Clinical Lab Technology 400 course students will:

1. Describe the best practices for interaction with patient, patient advocates, and other healthcare staff.
2. Perform a successful venipuncture and dermal puncture, including correct order of draw and safety measures.
3. Differentiate supplies and procedures for all patient types, including newborns through geriatric adults.
4. Identify common additives used in blood collection, explain their reasons for use, and correlate the tube color with the additive and associated tests.
5. Name and explain frequent causes of phlebotomy complications and discuss the problems caused by breaking sterile and antiseptic techniques.
6. Participate in hands-on activities and create products to demonstrate the knowledge and skills of a clinical laboratory technician.
7. Understand the career application of clinical laboratory technology information through participation in field experiences.
8. Demonstrate skill in processing self-knowledge in relation to the clinical laboratory technology course and program, the world of work, and future planning.

Integrated Academics

1 Integrated CTE English Credit

Equipment and Supplies

- **School will provide:** All textbooks and laboratory supplies
- **Student will provide:** Closed toed shoes for laboratory setting, externship professional attire, and a three-ring binder

Textbook

TBD

Grading

Grades will be calculated as follows:

30% Projects/Labs/Presentations/Papers
30% Class work/Homework/Energizers
20% Tests/Quizzes
20% Class Participation (attendance, cooperation, classroom discussion, preparation)

Additional Course Policies

- Attendance is critical for program success. A large percentage of students' grades are based on attendance. Students who attend all class meetings are more likely to accomplish the course successfully.
- A daily grade is awarded on attendance, attitude, professionalism, and participation.
- If students are absent from class they will lose participation points for that day.
- If it is an unexcused absence, students will not be able to receive any participation points for that day.
- If students are absent, any missed work will be placed in the student's mailbox to be completed. It is the student's responsibility to check for missing assignments.
- Assignments are to be turned in **ON TIME**. **Assignments turned in late will lose 5 points per day and will not be accepted if they are longer than 3 days overdue.**
- Cells phones are not allowed in the laboratory or classroom. They need to be turned off.
- Use of cell phone will result in lost participation points and possible confiscation of the student's phone. Calls and texts can be made before or after class, or during break.
- Professional behavior is expected at all times.

****SUNY Broome Standards for Academic Progress**

This class carries college credit from SUNY Broome and adheres to the overall college policy on Standards for Academic Progress. Students must achieve a **"C"** (74.0) which is necessary to complete the appropriate degree. **"C-"** or lower in **ONE** CLT course/lab is considered a failing grade and course must be repeated

Course Calendar

Quarter	Units of Study
1	• Introduction to Classroom Practices • Safety and Infection Control Review • Professionalism and Communication for the Phlebotomist • Cardiovascular System
2	• Ethical, Legal, and Regulatory Issues Surrounding Venipuncture • Documentation, Specimen Handling, and Transportation • Preanalytical Complications, Hazards, and Complications of Blood Drawing • Preparing for Blood Collection
3	• The Venipuncture Procedure • Capillary Blood Specimen Collection
4	• Pediatric and Geriatric Procedures • Special Collections • Obtaining the Job • Practical Assessments • Review for Final Exam

Syracuse City School District
Career and Technical Education Program
Scope and Sequence Year 4
CLT 400: Clinical Lab Technology 400

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Week 1 **Introduction to Classroom Practices**	• What are the classroom procedures for CLT? • What are the rules for classroom safety? • How will Blackboard be used this year? • What advice can a senior in a P-Tech program give first year students?	• Review, explain and follow classroom procedures. • Discuss general classroom and lab safety. • Participate in online discussions and use a grading rubric. • Develop a "Letter for Success" for incoming freshmen.	• General Safety Quiz • Compliance of Classroom Procedures • "Letters for Success"	**Career Ready Practices** CRP 2,6,7,10,11	**ELA** 11-12R 1,2,4 11-12W 2,4 11-12SL 1 11-12L 1,2,3
				Cluster Standards HL 3,4,5 ST 3,6	**Literacy** RST 1,2,4 WHST 2,4,5,6,7
				Pathway Standards ST-SM 4	**Science**
Weeks 2-3 **Safety and Infection Control Review**	• Why must laboratory safety rules be observed? • What are some common laboratory hazards? • What are Standard Precautions? • What is a bloodborne pathogen? • What is OSHA? • What is Right-to-Know? • Why is Hazard Communication important? • What PPE should be worn in the lab? • How is handwashing done using aseptic technique? • How are contaminated gloves removed properly? • What is the proper way to safely dispose of needles and contaminated materials in the laboratory? • What are the components of the infectious cycle? • How are patient areas disinfected? • What steps should be taken during a lab spill accident?	• List safety regulations that pertain to the clinical lab. • Give examples of physical and chemical hazards in the lab. • Explain Standard Precautions. • Explain OSHA's Bloodborne Pathogen policy. • Demonstrate proper handwashing techniques. • Choose the proper PPE and observe Standard Precautions while in the laboratory setting. • Explain and demonstrate of proper hand washing and glove removal. • Demonstrate proper disposal of sharps and non-sharp medical waste. • List the components of the infectious cycle. • Prepare and use a 10% bleach solution to disinfect patient areas. • Demonstrate the use of the eyewash and emergency shower in the laboratory.	• Safety Video Rubric • Chapter Activity Worksheet	**Career Ready Practices** CRP 1,2,8,12	**ELA** 11-12R 1,4 11-12W 2,4 11-12L 1,2,3,6
				Cluster Standards HL 3,4,5 ST 3,6	**Literacy** RST 1,2,4,7 WHST 2,4,7
				Pathway Standards HL-DIA 5 ST-SM 2	**Science**

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Weeks 4-6 **Professionalism and Communication for the Phlebotomist**	• Why are communication skills so important in phlebotomy? • What is the right way to communicate with patients to acquire information? • What if the patient does not speak English? • How does the phlebotomist deal with family members?	• List professional competencies for phlebotomists and performance assessments. • Demonstrate skills for effective communication and active listening. • Demonstrate examples of positive and negative body language. • Describe quality assessment as it relates to phlebotomy.	• Case Studies • Brainstorming Activity: The Patient Encounter • Competency Checklists • Practice Exercises/Role Play • Lego Communication Activity • Telephone Message Activity • Unit Quiz	**Career Ready Practices** CRP 1,2,3,4,7,9,12	**ELA** 11-12R 1,4 11-12W 2,4 11-12SL 1,3,4 11-12L 1,2,3,6
				Cluster Standards HL. 1,2,4	**Literacy** RST 1,2,4,7 WHST 2,4,6,7
				Pathway Standards HL-DIA. 1,2,4,5 ST-SM 4	**Science** HS-LS1-3
Weeks 7-10 **Cardiovascular System**	• How does blood circulate through the body? • Why does the heart make a lub-dub sound? • What is the blood composed of? • Which vein is used for venipuncture?	• Label the structures of the heart. • Construct a diagram of the pathway of blood through the heart. • Differentiate the anatomy and function between arteries, veins, and capillaries. • List the major components of blood. • Locate the veins most commonly used for phlebotomy.	• Structure of the Heart Quiz • Diagram of the Pathway of the Blood Through the Heart • Blood Vessel Quiz • Pulse and Blood Pressure Lab • WBC Foldable and Rubric • Leukocyte Labeling Activity • Student Performance with Vein Identification • Circulatory Unit Test	**Career Ready Practices** CRP 2,3,4,6,7,8,11	**ELA** 11-12R 1,4 11-12W 2,4 11-12L 1,2,3,6
				Cluster Standards HL 1	**Literacy** RST 1,4,5,6,7 WHST 2,4,5,6,7
				Pathway Standards HL-DIA 5 ST-SM 2	**Science** HS-LS1-2 HS-LS1-3
Weeks 11-12 **Ethical, Legal, and Regulatory Issues Surrounding Venipuncture**	• What if a patient refuses to have their blood drawn? • Who gives permission for blood collection from a child? • How can consent be obtained if the patient does not speak English? • What is the Patient Bill of Rights? • What are some common lawsuits surrounding phlebotomy procedures? • What is malpractice and how can it be avoided?	• Discuss the legal and physical risks an employee might encounter while performing a venipuncture. • Explain health care laws and their importance to health care providers. • Define informed consent and implied consent. • Describe the Patient Bill of Rights. • Identify key components of HIPAA. • Identify methods to maintain confidentiality of privileged information on patients. • Explain how a phlebotomist could be the object of litigation. • Describe how to avoid blood collection lawsuits.	• Case Studies • Role Play • Unit Quiz	**Career Ready Practices** CRP 1,4,5,9,12	**ELA** 11-12R 1,4 11-12W 2,4 11-12SL 1,3,4 11-12L 1,2,3,6
				Cluster Standards HL 2,4,5,6	**Literacy** RST 1,4,5,6,7 WHST 2,4,5,6,7
				Pathway Standards ST-SM 2	**Science**
Weeks 13-14 **Documentation, Specimen Handling, and Transportation**	• What information needs to be completed on a laboratory requisition? • Where is specimen collection information	• Describe essential elements of a laboratory requisition form. • Design a laboratory requisition. • List the basic specimen-handling guidelines for maintaining specimen	• Rejection Criteria Assessment • Student Performance Objective: Specimen Preparation and	**Career Ready Practices** CRP 7,8,11	**ELA** 11-12R 1,4 11-12W 2,4 11-12SL 4 11-12L 1,2,3,6
				Cluster Standards	**Literacy**

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	found? • What specimens are centrifuged and which are not? • What is hemolysis and what causes it? • What does it mean when the lab rejects a specimen for testing? • How can specimen rejection be prevented?	integrity. • Name sources of error that can occur during specimen processing or storage. • List reasons for specimen rejection.	Transport • Laboratory Requisition Design • Written Assessment	HL 1,2,3 **Pathway Standards** HL-DIA 1,2,5 ST-SM 1,2,4	RST 1,4,5,6,7 WHST 2,4,5,6,7 **Science** HS-LS1-2 HS-LS1-3
Weeks 15-17 **Preanalytical Complications, Hazards, and Complications of Blood Drawing**	• What should be done if the patient starts to faint while blood is being drawn? • Should a patient pump their fist during a venipuncture? • What if the bleeding doesn't stop after blood collection is finished? • What happens when the area around the puncture sites starts to swell? • What is the difference between antiseptic or. sterile techniques? • What happens if a specimen cannot be collected on a patient?	• Describe preanalytical complications related to blood collection procedures that affect patient safety. • Explain how to prevent and/or handle complications in blood collection. • List preanalytical complications that arise with test requests and requisitions. • Identify how the preanalytical factors of syncope, petechiae, hemolysis, and IVs affect blood collection. • Describe methods used to prevent these interferences. • List factors about a patient's physical disposition that can affect blood collection. • Describe how mastectomy, edema, and thrombosis can affect blood collection. • List complications associated with tourniquet pressure and fist pumping. • List complications that lead to specimen rejection. • Differentiate sterile and antiseptic techniques. • Explain the steps to take if blood cannot be obtained from a patient.	• Case Studies • Competency Assessments • Laboratory Requisition Case Studies • Review Questions • Unit Test	**Career Ready Practices** CRP 7,8 **Cluster Standards** HL 3 **Pathway Standards** HL-DIA. 1,2,5 ST-SM 4	**ELA** 11-12R 1,4 11-12W 2,4 11-12SL 4 11-12L 1,2,3,6 **Literacy** RST 1,4,5,6,7 WHST 2,4,5,6,7 **Science** HS-LS1-3
Weeks 18-20 **Preparing for Blood Collection**	• What equipment is needed to perform a venipuncture? • What do the different color tubes mean? • What are the various types of anticoagulants? • What information must be on the tube and the patient requisition? • How is a venipuncture performed? • How is a tourniquet	• Describe the latest phlebotomy safety supplies and equipment. • Identify the various supplies that should be carried on a specimen collection tray. • List the various types of evacuated blood tubes and their anticoagulants and their reason for use. • Describe the difference between the venipuncture and skin puncture equipment and supplies. • Complete a laboratory requisition. • Interpret testing needed from laboratory	• Venipuncture Equipment Identification Chart • Order of Draw Relay Races • Order of Draw/Anticoagulant Poster Project • Order of Draw/Anticoagulant Skill • Tourniquet Application • Role Play: Patient Identification	**Career Ready Practices** CRP 1,2,4,6,7,8,11,12 **Cluster Standards** HL 1,2,3,4 ST 3,6 **Pathway Standards** HL-DIA 1,2,4,5 ST-SM 2,3,4	**ELA** 11-12R 1,4 11-12W 2,4 11-12SL 1,3,4 11-12L 1,2,3,6 **Literacy** RST 1,4,5,6,7 WHST 2,4,5,6,7 **Science** HS-LS1-3

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	applied? • What vein is used for drawing blood? • Why are tubes drawn in a certain order? • How should the specimen be handled to protect the specimen integrity? • What are the steps in patient care should occur post-phlebotomy?	requisition. • Label a blood tube with correct documentation. • Demonstrate patient identification prior to venipuncture. • Correctly apply and release a tourniquet. • Demonstrate the “order of draw”. • Name safety precautions to be followed during a venipuncture. • Describe the post-phlebotomy steps in patient care.	• Quiz: Tubes and Anticoagulants • Case Studies • Unit Test		
Weeks 21-25 **The Venipuncture Procedure**	• How is an outpatient vs. an inpatient identified? • Do technicians have to wash their hands between patients if they are wearing gloves? • What do concentric circles in the decontamination process mean? • What is hemoconcentration? • What is the procedure to ensure that the vein will not move when the needle is inserted? • What angle is used to insert a needle into a vein? • What is the procedure if the vein is missed? • How are tubes changed during a multiple draw venipuncture?	• Describe the proper manner for greeting and interacting with a patient. • Describe the major points in identifying the patient. • Describe and discuss techniques for dealing with family and visitors during blood collection. • Demonstrate the use of venipuncture supplies for a typical venipuncture. • Describe when hand hygiene and gloving procedures are used. • Describe the detailed steps of a venipuncture procedure. • Palpate the most appropriate sites for venipuncture. • Apply a tourniquet to a patient’s arm and explain its effects on the venipuncture process. • Demonstrate the decontamination process for venipuncture. • Demonstrate how to properly anchor a vein for venipuncture. • Demonstrate proper needle insertion and withdrawal techniques including direction, angle, depth, and aspiration. • Explain the detailed procedure for a venipuncture using the syringe and butterfly method. • Describe the factors that can affect the quality of the blood specimen obtained. • Describe the importance of timed, fasting, and STAT specimens. • Perform a competent/effective venipuncture on a mannequin and on a patient.	• Worksheets and Diagrams • Quizzes • Teacher Observations Student/Patient Interactions • Rubric for Patient Identification and Introduction • Case Studies • Competency Assessments • Student Performance Objective for Vein Palpation and Identification • Student Performance Objective for Vacuum Tube Method for Venipuncture • Student Performance Objective for Syringe Method for Venipuncture • Student Performance Objective for Butterfly Method for Venipuncture • Written Assessment • Job Shadowing	**Career Ready Practices** CRP 1,2,4,6,7,8,11,12 **Cluster Standards** HL 1,2,3,4 ST 3,6 **Pathway Standards** HL-DIA 1,2,4,5 ST-SM 2,3,4	**ELA** 11-12R 1,4 11-12W 2,4 11-12SL 1,3,4 11-12L 1,2,3,6 **Literacy** RST 1,4,5,6,7 WHST 2,4,5,6,7 **Science** HS-LS1-3
Weeks 26-29	• When is a capillary	• Describe reasons for acquiring capillary	• Teacher Observations	**Career Ready Practices**	**ELA**

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Capillary Blood Specimen Collection	puncture vs. a venipuncture performed? • Why is the order of draw different for capillary puncture? • What are the puncture sites for adults vs. infants? • What happens if the incision goes too deep with a capillary puncture?	blood specimens. • Identify the proper sites for performing a skin puncture. • List the types of equipment needed to collect blood by capillary puncture. • List the steps necessary to perform a capillary puncture. • List the effects of heating pads on capillary punctures. • Describe techniques used to obtain a free-flowing capillary puncture specimen. • Describe the correct procedure for capillary collection methods on infants and adults. • Explain reasons for controlling the depth of the incision site. • Perform a competent/effective capillary puncture on a mannequin and on a patient.	• Worksheets • Case Studies • Student Performance Objective: Fingerstick Procedure • Student Performance Objective: Heel Stick Procedure • Job Shadowing	CRP 1,2,4,6,7,8,11,12	11-12R 1,4 11-12W 2,4 11-12SL 1,3,4 11-12L 1,2,3,6
				Cluster Standards HL 1,2,3,4 ST 3,6	**Literacy** RST 1,4,5,6,7 WHST 2,4,5,6,7
				Pathway Standards HL-DIA 1,2,4,5 ST-SM 2,3,4	**Science** HS-LS1-2
Weeks 30-31 **Pediatric and Geriatric Procedures**	• Why should bandages not be applied to pediatric patients? • How is a pediatric patient gently restrained for venipuncture? • What are some ways to deal with a patient with Alzheimer's disease in relation to blood collection?	• Describe fears or concerns that children might have regarding the blood collection process. • List suggestions for parents during the venipuncture or capillary procedure. • Describe the venipuncture sites for infants and children. • Describe the procedure for specimen collection for neonatal screening. • Define physical and emotional changes that are associated with the aging process. • Describe how the healthcare worker should react to physical and emotional changes associated with the elderly.	• Cases Studies • Quiz • Competency Checks	**Career Ready Practices** CRP 1,2,4,8,12	**ELA** 11-12R 1,4 11-12W 2,4 11-12L 1,2,3,6
				Cluster Standards HL 1,2,3	**Literacy** RST 1,4,5,6,7 WHST 2,4,5,6,7
				Pathway Standards HL-DIA 1,2,3,4,5 ST-SM 4	**Science** HS-LS1-3
Weeks 32-33 **Special Collections**	• Why would a doctor order a blood culture? • What is a therapeutic drug? • What is Point of Care (POC) testing? • What is the difference between a glucose test and a glucose tolerance test? • What is the difference between urine specimen collections and why is that	• List the steps and equipment used in blood culture collection. • Identify reasons for collecting a blood culture. • Describe the special precautions needed to collect a TDM (Therapeutic Drug Monitoring). • Describe the most widely used applications of POC testing. • Communicate the requirements for glucose testing and glucose tolerance testing. • List three types of specimen collections	• Patient Instructions for a Fasting Glucose and a Glucose Tolerance Test • Patient Instructions for a 24-Hour Urine Test • Competency Checklist • Written Assessment	**Career Ready Practices** CRP 2,4,8	**ELA** 11-12R 1,4 11-12W 2,4 11-12SL 4 11-12L 1,2,3,6
				Cluster Standards HL 3,4	**Literacy** RST 1,4,5,6,7 WHST 2,4,5,6,7
				Pathway Standards HL-DIA 1,2,4,5 ST-SM 4	**Science** HS-LS1-2 HS-LS1-3

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	important?	and differentiate the uses of the urine specimens obtained from these collections. • Communicate the directions of urine collection to a patient.			
Weeks 34-36 **Obtaining the Job**	• How do I identify potential employers? • What are my needs for employment? • What should my resume include? • Why is a cover letter included with a resume and what should it say? • How do I fill out an application? • How do I prepare for an interview? • What type of questions will I be asked on an interview? • How should I follow up after an interview?	• Identify employment conditions that meet individual needs. • List potential employers in individual area of interest. • Prepare a working resume. • Prepare a cover letter. • Complete an employment application. • Participate in practice interviews. • Prepare a thank you letter to an employer.	• Job Search Worksheets • Student Created Working Resume with Rubric Assessment • Cover Letter with Rubric Assessment • Completed Application for Employment • Practice Interviews with Written Feedback from Interviewees • Prepared Thank You Letter to Employer with Rubric Assessment	**Career Ready Practices** CRP 1,4,10 **Cluster Standards** HL 2,4 **Pathway Standards** HL-DIA 1	**ELA** 11-12R 1,4 11-12W 2,4 11-12L 1,2,3,6 **Literacy** RST 1,4,5,6,7 WHST 2,4,5,6,7 **Science**
Weeks 37-39 **Practical Assessments**	• Have I met the goal to be able to perform a venipuncture collection on a patient? • Have I met the goal to be able to perform a capillary puncture on a patient?	• Perform a competent/effective venipuncture on a patient. • Perform a competent/effective capillary puncture on a patient.	• Practical and Competency Assessments	**Career Ready Practices** CRP 2,4,7,8 **Cluster Standards** HL 1 3 **Pathway Standards** HL-DIA 1,2,4,5 ST-SM 2,3,4	**ELA** 11-12R 1,4 11-12W 2 11-12L 1,2,3,6 **Literacy** RST 1,4,5,6,7 WHST 2,4,5,6,7 **Science** HS-LS1-2 HS-LS1-3
Week 40 **Review for Final Exam**	• What were my learning goals this year in laboratory technology?	• Complete the assessment demonstrating a thorough knowledge of laboratory technology.	• Final Assessment	**Career Ready Practices** CRP 7,8,10,12 **Cluster Standards** HL 1 **Pathway Standards** HL-DIA 5 ST-SM 2,4	**ELA** 11-12R 1,4 11-12W 2,4 11-12L 1,2,3,6 **Literacy** RST 1,4,5,6,7 WHST 2,4,5,6,7 **Science** HS-LS1-2 HS-LS1-3