

**Florida Department of Education
Curriculum Framework**

Program Title: Medical Clinical Laboratory Technician
Program Type: ATD (Applied Technology Diploma)
Career Cluster: Health Science

	College Credit	Career Certificate Program
Program Number	N/A	H170600
CIP Number	0351100401	0351100404
Grade Level	Applied Technology Diploma (ATD)	30, 31
Standard Length	40 credit hours	1515 clock hours
CTSO	HOSA: Future Health Professionals	HOSA: Future Health Professionals
SOC Codes (all applicable)	29-2012 Medical and Clinical Laboratory Technicians 31-9099 Healthcare Support Workers, All Other 31-9097 Phlebotomists	29-2012 Medical and Clinical Laboratory Technicians 31-9099 Healthcare Support Workers, All Other 31-9097 Phlebotomists
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml	
Basic Skills Level:	N/A	Mathematics 10 Language: 11 Reading 11

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the Health Science career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of Health Science career cluster.

The content includes but is not limited to didactic and laboratory performance of routine procedures in hematology, immunology, urinalysis, immunohematology, microbiology and clinical chemistry including the use of common laboratory instruments. A clinical component is a necessary element of this program.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is an Applied Technology Diploma (ATD) program that is part of a technical degree program, is less than 60 credit hours, and leads to employment in a specific occupation. An ATD program may consist of either technical credit or college credit. A public school district may offer an ATD program only as clock hour credit, with college credit awarded to a student upon articulation to a state college.

Regulated Programs

This program is regulated by the Florida Board of Clinical Laboratory Personnel: <http://floridasclinicallabs.gov/>

Career Certificate Program

When offered at the district level, this program is a planned sequence of instruction consisting of 3 occupational completion points and the courses as shown below.

OCP	Course Number	Course Title	Length	SOC Code
A	HSC0003	Basic Healthcare Worker	90 hours	31-9099
B	MEA0520	Phlebotomist	75 hours	31-9097
C	MLT0009	Introduction to Medical laboratory Technology	90 hours	29-2012
	MLT0220	Urinalysis and Body Fluids	135 hours	
	MLT0335	Hematology and Hemostasis	280 hours	
	MLT0505	Immunology	60 hours	
	MLT0640	Clinical Chemistry	255 hours	
	MLT0520	Immunochemistry	255 hours	
	MLT0450	Microbiology and Parasitology	275 hours	

College Credit

When offered at the college credit level, this ATD program is part of the Medical Laboratory Technology AS program (1351100405) and has a program length of 40 credits.

Standards

After successfully completing this program, the student will be able to perform the following:

- 01.0 Demonstrate knowledge of the healthcare delivery system and health occupations.
- 02.0 Demonstrate the ability to communicate and use interpersonal skills effectively.
- 03.0 Demonstrate legal and ethical responsibilities.
- 04.0 Demonstrate an understanding of and apply wellness and disease concepts.
- 05.0 Recognize and practice safety and security procedures.
- 06.0 Recognize and respond to emergency situations.
- 07.0 Recognize and practice infection control procedures.
- 08.0 Demonstrate an understanding of information technology applications in healthcare.
- 09.0 Demonstrate employability skills.
- 10.0 Demonstrate knowledge of blood borne diseases, including HIV/AIDS.
- 11.0 Apply basic math and science skills.
- 12.0 Demonstrate accepted professional, communication and interpersonal skills.
- 13.0 Discuss phlebotomy in relation to the health care setting.
- 14.0 Identify the anatomic structure and function of body systems in relation to services performed by phlebotomist.
- 15.0 Recognize and identify collection reagents supplies, equipment and interfering chemical substances.
- 16.0 Demonstrate skills and knowledge necessary to perform phlebotomy.
- 17.0 Practice infection control following standard precautions.
- 18.0 Practice accepted procedures of transporting, accessioning and processing specimens.
- 19.0 Practice quality assurance and safety.
- 20.0 Demonstrate knowledge and use of basic laboratory equipment and techniques.
- 21.0 Demonstrate basic knowledge of and perform clinical laboratory Point of Care (POC) testing (Waived).
- 22.0 Demonstrate basic knowledge of and perform Point of Care (POC) Testing using CLIA approved Waived instrumentation.
- 23.0 Discuss the general responsibilities and functions encountered by a medical technician.
- 24.0 Apply quality assurance principles and safety protocols.
- 25.0 Demonstrate knowledge of the operation of computer systems.
- 26.0 Demonstrate an understanding of the basic principles of molecular diagnostics.
- 27.0 Demonstrate knowledge of urinalysis and body fluids principles and procedures.
- 28.0 Demonstrate knowledge of hematological principles and procedures.
- 29.0 Demonstrate knowledge of hemostasis and related diagnostic principles and procedures.
- 30.0 Demonstrate knowledge of immunology principles and procedures.
- 31.0 Demonstrate knowledge of clinical chemistry principles and procedures.
- 32.0 Demonstrate knowledge of immunohematology principles and procedures.
- 33.0 Demonstrate knowledge of microbiological principles and procedures.

Florida Department of Education
Student Performance Standards

Program Title: Medical Clinical Laboratory Technician-ATD
Career Certificate Program Number: H170600

When this program is offered at the Career Certificate Program level, the following organization of courses, standards, and benchmarks apply.

The **Basic Health Care Worker (HSC0003)** is referred to as the **Health Science Core** and is the first OCP in the majority of the Career Certificate Program health science programs. Secondary and Postsecondary students completing the health science core will not have to repeat the core in any other health science program in which it is a part. When the recommended sequence is followed, the structure allows students to complete at specified points for employment or remain for advanced training or cross-training.

Career Certificate Program Course Number: HSC0003
Occupational Completion Point: A
Basic Healthcare Worker – 90 Hours – SOC Code 31-9099

To ensure consistency whenever these courses are offered, the health science core standards (1-11) have been placed in a separate document. You can access the course standards and benchmarks by visiting this link:
<http://www.fldoe.org/core/fileparse.php/5655/urlt/health-sci-core-psav-cc.rtf>

Career Certificate Program Course Number: MEA0520
Occupational Completion Point: B
Phlebotomist – 75 Hours – SOC Code 31-9097

12.0	Demonstrate accepted professional, communication, and interpersonal skills. – The student will be able to:
12.01	Demonstrate the appropriate professional behavior of a phlebotomist.
12.02	Explain to the patient the procedure to be used in specimen collection.
12.03	Explain in detail the importance of identifying patients correctly when drawing blood.
12.04	Describe the scope of practice (job skills and duties) for a phlebotomist.
12.05	List and describe professional organizations that provide accreditation for phlebotomy programs and provide certifications for phlebotomists.
12.06	Explain the importance of continuing education in relation to certification to maintain competency and skills.
13.0	Discuss phlebotomy in relation to the health care setting. – The student will be able to:

13.01	List, classify and discuss various departments and services within the health care setting in which the phlebotomist must interact with to obtain laboratory specimens from patients.
13.02	Identify the major departments/sections with the clinical laboratory, the major types of procedures run in each department/section, and their specimen requirements.
13.03	Describe roles of the major classifications of clinical laboratory personnel (i.e., pathologist, chief/administrative technologist, CLS, MLS, MLT, MT, phlebotomist, lab assistant, etc.).
14.0	Identify the anatomic structure and function of body systems in relation to services performed by phlebotomist. – The student will be able to:
14.01	Describe and define major body systems with emphasis on the circulatory system.
14.02	List and describe the main superficial veins used in performing venipuncture.
14.03	Locate the most appropriate sites(s) for capillary and venipuncture.
14.04	Describe the function of the following blood components: erythrocytes, thrombocytes, leukocytes and plasma.
14.05	Compare and contrast between serum and plasma as it relates to blood collection.
14.06	Discuss hemostasis as it relates to blood collection.
15.0	Recognize and identify collection reagents supplies, equipment and interfering chemical substances. – The student will be able to:
15.01	Identify and discuss proper use of appropriate types of equipment needed to collect various clinical laboratory blood specimens by venipuncture.
15.02	Explain the special precautions and types of equipment needed to collect blood from the pediatric patient.
15.03	Identify and discuss proper use of supplies used in collecting micro-specimens.
15.04	Identify and discuss the proper use of the various types of anticoagulants, preservatives and gels used in blood collection and the vacuum tube color-codes for these additives.
15.05	Describe the types of patient's specimens that are analyzed in the clinical laboratory and the phlebotomist's role in collecting and/or transporting these specimens to the laboratory.
15.06	Describe substances potentially encountered during phlebotomy which can interfere in analysis of blood constituents.
15.07	Define and utilize correct medical terminology and metric measurement needed for specimen collection.
16.0	Demonstrate skills and knowledge necessary to perform phlebotomy. – The student will be able to:
16.01	Follow approved procedure for completing a laboratory requisition form.
16.02	Recognize a properly completed requisition and apply established protocol for patient and specimen identification for transport to a reference lab.
16.03	Demonstrate knowledge of established protocol for patient and specimen identification.

16.04	Discuss appropriate methods for facilitating and preparing the patient for capillary and venipuncture collection.
16.05	List appropriate antiseptic agents useful in preparing sites for capillary and venipuncture.
16.06	Know how to perform venipuncture by evacuated tube, butterfly and syringe systems.
16.07	Describe the correct order of draw according to CLSI guidelines.
16.08	Describe the use of barcoding systems used for positive patient identification and specimen identification.
16.09	Convey an understanding of capillary puncture using appropriate supplies and techniques for both adults and pediatric patients.
16.10	Describe the most common complications associated with capillary and venipuncture, their causes, prevention and treatment.
16.11	Recognize and respond to possible adverse patient reactions such as allergies, convulsions, syncope and light headedness.
16.12	Perform appropriate procedures for disposing of used or contaminated capillary and venipuncture supplies.
16.13	Perform appropriate techniques for making a peripheral blood smear for hematologic evaluation.
16.14	Demonstrate the proper procedure for collecting blood cultures.
16.15	Discuss the effects of hemolysis and methods of prevention.
16.16	Demonstrate a working understanding of how age and weight of patients impacts the maximum amount of blood that can be safely drawn.
17.0	Practice infection control following standard precautions. – The student will be able to:
17.01	Define the term "hospital acquired infection".
17.02	Demonstrate proper hand hygiene.
17.03	Comply with universal/standard precautions.
17.04	Identify potential routes of infection and their complications.
18.0	Practice accepted procedures of transporting, accessioning and processing specimens. – The student will be able to:
18.01	Follow the approved procedure for preparation and processing (e.g. - centrifugation, separation, aliquoting, labeling, and storage) of serum, plasma, urine, sputum, stool, and wound culture specimens.
18.02	Demonstrate knowledge of accessioning procedures.
18.03	Describe the significance of time constraints for specimen collection, transporting and delivery.
18.04	Describe routine procedures for transporting and processing specimens including DOT packaging requirements.

19.0	Practice quality assurance and safety. – The student will be able to:
19.01	Distinguish and perform procedures which ensure reliability of test results when collecting blood specimens.
19.02	Demonstrate knowledge of and practice appropriate patient safety.
19.03	Practice safety in accordance with OSHA (State & Federal guidelines) for chemical, biological, and PPE established procedures including proper disposal of sharps.
19.04	Follow documentation procedures for work related accidents.
19.05	Understand Joint Commission patient safety goals and other accrediting/regulatory agency guidelines.

Career Certificate Program Course Number: MLT0009	
Occupational Completion Point: C	
Introduction to Medical Laboratory Technology – 90 Hours – SOC Code 29-2012	
20.0	Demonstrate knowledge and use of basic laboratory equipment and techniques. – The student will be able to:
20.01	Identify the parts of the microscope and explain the function of each.
20.02	Demonstrate the proper technique for operation of the microscope.
20.03	Demonstrate use of standard laboratory equipment including glassware, pipettes and centrifuge.
20.04	Perform basic laboratory math calculations.
20.05	Understand the principles of quality assurance to correct problems encountered in monitoring daily quality control.
20.06	Evaluate laboratory findings to confirm results according to standard operating procedure.
20.07	Demonstrate knowledge of principles and operation of laboratory instruments.
21.0	Demonstrate basic knowledge of and perform clinical laboratory Point of Care (POC) testing (Waived). -- The student will be able to:
21.01	Demonstrate the ability to interpret instructions of point of care testing including, but not limited to the following:
21.01.1	Test principle
21.01.2	Storage & Stability
21.01.3	Internal vs. External Quality Control
21.01.4	Specimen collection & preparation
21.01.5	Directions for use
21.01.6	Interpretation of results
21.01.7	Interfering substances

21.02	Explain the purpose of lot to lot correlations.
21.03	Demonstrate knowledge of the frequency in which quality control procedures should be performed.
21.04	Understand the CLIA 88 classification of laboratory testing into waived, moderate, and highly complex including the personnel qualified to perform each.
22.0	Demonstrate basic knowledge of and perform Point of Care(POC) Testing using CLIA approved Waived instrumentation.-- The student will be able to:
22.01	Demonstrate and perform POC testing specific to microbiology, hematology, urinalysis, and clinical chemistry.
22.02	Perform instrument maintenance.
22.03	Demonstrate knowledge of quality control and calibrations involved within the POC instruments.
22.04	Identify normal limits and associate abnormal results with disease or disorders.
22.05	Discuss the significance of reporting critical values as it applies to Point of Care testing.
23.0	Discuss the general responsibilities and functions encountered by a medical technician. – The students will be able to:
23.01	Ask appropriate scientific questions and recognize what is involved in experimental approaches to the solutions of such questions.
23.02	Communicate laboratory results to healthcare professionals.
23.03	Demonstrate ability to evaluate laboratory results.
23.04	Demonstrate ability to report laboratory results in written or oral form.
23.05	Discuss the licensure and certification requirements of the major classifications of clinical laboratory personnel.
24.0	Apply quality assurance principles and safety protocols. – The student will be able to:
24.01	Assess specimen acceptability using standard operating procedure including rejection/recollection criteria.
24.02	Describe procedures for transporting and processing specimens.
24.03	Describe clinical laboratory role in providing quality assurance in laboratory testing, reporting, and use and maintenance of equipment.
24.04	Understand the need for calibration of laboratory equipment.
24.05	Demonstrate and record quality control procedures required for the tests performed and recognize unacceptable results.
24.06	Report identified problems encountered in daily quality control according to standard operating procedures.
24.07	Comply with current OSHA regulations regarding laboratory hazards.

25.0	Demonstrate knowledge of the operation of computer systems.– The student will be able to:
25.01	Discuss the role of computer systems in laboratory data management.
25.02	Demonstrate knowledge of common computer terminology.
25.03	Demonstrate entry level computer operations for specimen accessioning, data reporting, and quality control recording.
25.04	Demonstrate entry level operational skills in the use of computer-interfaced analytical instrumentation.
26.0	Demonstrate an understanding of the basic principles of molecular diagnostics. – The student will be able to:
26.01	Discuss the principles and major steps of the polymerase chain reaction (PCR).
26.02	Label the organelles and important parts of a eukaryotic animal cell.
26.03	Describe the function of the organelles and important parts of a eukaryotic animal cell.
26.04	Discuss the structure, function, and components of DNA and RNA.
26.05	Define the key terms of molecular diagnostics.
26.06	Understand the principles of molecular diagnostic testing.
26.07	Compare the advantages and disadvantages of molecular techniques over traditional diagnostic tests for infectious diseases.
26.08	List molecular tests associated with the identification of microorganisms.
26.09	Identify the types of samples appropriate for molecular diagnostics.
Career Certificate Program Course Number: MLT0220	
Occupational Completion Point: C	
Urinalysis and Body Fluids – 135 Hours – SOC Code 29-2012	
27.0	Demonstrate knowledge of urinalysis and body fluids principles and procedures. – The student will be able to:
27.01	Identify the components of the urinary system and explain their functions.
27.02	Discuss diseases affecting the urinary system.
27.03	Describe collection, transport and storage procedures for random and timed urine specimens.
27.04	Discuss specific gravity techniques; calibration and use of the refractometer.
27.05	Perform dipstick or tablet (non-automated) urinalysis techniques for chemical exam of the urine and interpret results.
27.06	Demonstrate the proper use of automated urinalysis analyzers.

27.07	Describe renal function tests.
27.08	Describe principles of and perform routine physical and chemical analyses on urine.
27.09	Prepare urine sediments and perform identification and quantitation of microscopic formed elements.
27.10	Correlate abnormal physical, chemical and microscopic urine results with associated pathological conditions.
27.11	Differentiate between transudates and exudates.
27.12	Discuss miscellaneous body fluids to include cerebral spinal, serous, seminal and joint fluids.
27.13	Perform physical, chemical and microscopic evaluations of common body fluids.
Career Certificate Program Course Number: MLT0335: Occupational Completion Point: C Hematology and Hemostasis – 280 Hours – SOC Code 29-2012	
28.0	Demonstrate knowledge of hematological principles and procedures. – The student will be able to:
28.01	Discuss the organs, cells and cellular interaction of the lymphoid, myeloid and reticuloendothelial systems.
28.02	Demonstrate an understanding of basic concepts of hematopoiesis.
28.03	Identify the components of blood.
28.04	Discuss the function of formed elements of blood.
28.05	Demonstrate an understanding of the synthesis of normal and abnormal molecular structure of hemoglobin, common hemoglobinopathies, and associated tests.
28.06	Describe normal hemoglobin-oxygen function using the Oxygen Dissociation Curve (ODC).
28.07	Discuss assessment and impact of preanalytical, analytical and post-analytical factors on hematology testing.
28.08	Calculate red blood cell indices.
28.09	Discuss selected cytochemical staining and flowcytometry procedures.
28.10	Evaluate red blood cell morphology.
28.11	State the review process of histogram/scatterplot/scattergram analysis.
28.12	Describe the categories used in a morphological classification of anemias.
28.13	Correlate complete blood cell results with peripheral exam of blood smear.
28.14	List the white blood cell maturation sequence and identify distinguishing morphology for stages of developing white blood

	cells.
28.15	Discuss normal and abnormal hematology findings, reference ranges and associated diseases.
28.16	Demonstrate an understanding of normal and abnormal white cell morphology, related disease states, and associated tests.
28.17	Discuss the principles of and perform routine hematology procedures applying quality control procedures.as necessary.
28.18	Perform commonly used methods to evaluate leukocytes, correlate and verify automated cell counts with established criteria.
28.19	Identify characteristic findings of nonmalignant leukocytic disorders, e.g. shift to the left, toxic granulation, Döhle bodies, etc.
28.20	Perform techniques of manual blood smear evaluation including white blood cell differential, red cell and platelet morphology.
28.21	Correlate peripheral blood evaluation with automated cell analysis.
28.22	Perform platelet counts on patient and control specimens using manual and automated techniques and correlate counts with peripheral smear.
29.0	Demonstrate knowledge of hemostasis and related diagnostic principles and procedures. – The student will be able to:
29.01	Discuss and define the mechanisms of hemostasis including bleeding and clotting.
29.02	Discuss common coagulopathies and associated treatments.
29.03	Discuss assessment and impact of preanalytical factors on hemostasis testing.
29.04	Describe the principles of and perform routine testing used in the evaluation of primary and secondary hemostasis.
29.05	Discuss additional hemostasis tests performed to differentiate the cause of abnormal routine tests.
Career Certificate Program Course Number: MLT0505	
Occupational Completion Point: C	
Immunology – 60 Hours – SOC Code 29-2012	
30.0	Demonstrate knowledge of immunology principles and procedures. – The student will be able to:
30.01	Discuss the functions of the cells of the immune system, cytokines and regulatory molecules.
30.02	Discuss physical and chemical properties of immunogens (antigens), immunoglobulins (antibodies) and complement
30.03	Compare and contrast the principles of basic agglutination, flocculation and precipitation procedures in immunology/serology.
30.04	Perform basic procedures in immunology/serology.
30.05	Discuss principles of serum protein electrophoresis and immunofixation.
30.06	Discuss the clinical significance of the commonly performed immunological tests.

30.07 Discuss selected serological tests such as immunoassays.

Career Certificate Program Course Number: MLT0640

Occupational Completion Point: C

Clinical Chemistry – 255 Hours – SOC Code 29-2012

31.0 Demonstrate knowledge of clinical chemistry principles and procedures. – The student will be able to:

31.01 Identify the chemistry analytes used to evaluate various organ function.

31.02 Discuss the renal system and related analytes.

31.03 Discuss principles of and perform common renal function tests.

31.04 Discuss carbohydrate, protein and lipid metabolism.

31.05 Discuss principles of and perform commonly ordered tests related to carbohydrate, protein and lipid metabolism.

31.06 Discuss the liver and its functions and related analytes.

31.07 Discuss principles of and perform commonly ordered liver function tests.

31.08 Discuss enzyme classification, origin, activity and function.

31.09 Discuss principles of and perform commonly ordered enzyme procedures.

31.10 Discuss electrolyte balance as related to health and disease.

31.11 Discuss principles of and perform electrolyte analyses.

31.12 Discuss principles of and perform commonly ordered tests to evaluate cardiac function.

31.13 Discuss the physiology of the endocrine system and the principal tests used to evaluate endocrine function.

31.14 Discuss the role of the laboratory in therapeutic drug monitoring and toxicology.

31.15 Discuss and perform general electrophoresis techniques.

31.16 Discuss the clinical significance of commonly ordered clinical chemistry tests.

31.17 Demonstrate knowledge of principles of instrumentation as related to the clinical chemistry laboratory.

31.18 Discuss techniques of clinical chemistry related to standardization of procedure and use of standards and controls.

31.19 Discuss other techniques of clinical chemistry.

31.20 Discuss basic techniques of clinical chemistry related to normal and abnormal physiology.

Career Certificate Program Course Number: MLT0520
Occupational Completion Point: C
Immunohematology – 255 Hours – SOC Code 29-2012

32.0	Demonstrate knowledge of immunohematology principles and procedures. – The student will be able to:
32.01	Discuss donor interview, criteria for selection, phlebotomy preparation, and donor blood processing.
32.02	Discuss blood component collection and, preparation, storage, and use.
32.03	Describe the roles of FDA, AABB, and state agencies and how to contact each.
32.04	Compare advantages and disadvantages for autologous, versus homologous (allogenic) blood collection, and transfusion.
32.05	Discuss basic genetics of the blood group antigens
32.06	Discuss the ABO blood group systems testing procedures and recognize ABO discrepancies.
32.07	Describe required tests on recipient blood samples.
32.08	Discuss and differentiate other blood group systems such as Duffy, Kell, Kidd, S,s, Lu and the common cold-reacting antibodies such as Le, P, I, M and N.
32.09	Perform Rh testing to determine Rh phenotypes.
32.10	Perform and interpret antibody screening.
32.11	Perform antibody identification tests to detect clinically significant antibodies.
32.12	Discuss the safety and determine compatibility of blood components for transfusion.
32.13	Discuss and perform routine compatibility testing including the immediate spin crossmatch and the electronic crossmatch.
32.14	Discuss and perform phenotyping on recipient and donor specimens.
32.15	Identify symptoms of the suspected transfusion reaction and the required laboratory work-up.
32.16	Discuss immune hemolytic disorders and perform the direct antiglobulin test.
32.17	Discuss specialized techniques.
32.18	Perform quality control (QC) on reagents.
32.19	Describe the pathophysiology of hemolytic disease of the fetus and newborn.

Career Certificate Program Course Number: MLT0450
Occupational Completion Point: C
Microbiology and Parasitology – 275 Hours – SOC Code 29-2012

33.0	Demonstrate knowledge of microbiological principles and procedures. – The student will be able to:
33.01	Discuss microbial taxonomy and nomenclature.
33.02	Discuss bacterial metabolism, reproduction, cell structures, and their functions.
33.03	Discuss classification, composition and preparation of culture media.
33.04	Discuss the human pathogenesis of bacteria.
33.05	Discuss and perform sterilization techniques.
33.06	Perform culturing techniques for urine, stool, wound, respiratory, body fluids, and blood specimens.
33.07	Perform techniques of microbiology related to inoculation and transfer of cultures.
33.08	Discuss the principles of Gram and AFB stains.
33.09	Accurately perform, read and report gram stains.
33.10	Perform techniques necessary for isolation and identification of aerobic and anaerobic bacterial organisms.
33.11	Identify commonly encountered aerobic bacteria through morphological, physical and biochemical properties.
33.12	Perform and interpret antimicrobial susceptibility tests.
33.13	Discuss collection and handling of specimens for fungal, mycobacterial and viral culture.
33.14	Prepare and examine specimens, and identify ova and parasites when present.

**Florida Department of Education
Student Performance Standards**

Program Title: Medical Clinical Laboratory Technician - ATD
ATD CIP Number: 0351100401
SOC Code(s): 31-9099, 31-9097, 29-2012

When this program is offered at the college level, the following standards and benchmarks apply:

Standards 1-11 are referred to as the **Health Science Core** and are required standards in this program. Secondary and Postsecondary students completing the health science core will not have to repeat the core in any other health science program in which it is a part. When the recommended sequence is followed, the structure allows students to complete at specified points for employment or remain for advanced training or cross-training.

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Phlebotomy: (12-19)

12.0 Demonstrate accepted professional, communication, and interpersonal skills. – The student will be able to:

12.01 Demonstrate the appropriate professional behavior of a phlebotomist.

12.02 Explain to the patient the procedure to be used in specimen collection.

12.03 Explain in detail the importance of identifying patients correctly when drawing blood.

12.04 Describe the scope of practice (job skills and duties) for a phlebotomist.

12.05 List and describe professional organizations that provide accreditation for phlebotomy programs and provide certification for phlebotomists.

12.06 Explain the importance of continuing education in relation to certification to maintain competency and skills.

13.0 Discuss phlebotomy in relation to the health care setting. – The student will be able to:

13.01 List, classify and discuss various departments and services within the health care setting in which the phlebotomist must interact with to obtain laboratory specimens from patients.

13.02 Identify the major departments/sections with the clinical laboratory, the major types of procedures run in each department/section, and their specimen requirements.

13.03	Describe roles of the major classifications of clinical laboratory personnel (i.e., pathologist, chief/administrative technologist, CLS, MLS, MLT, MT, phlebotomist, lab assistant, etc.).
14.0	Identify the anatomic structure and function of body systems in relation to services performed by phlebotomist. – The student will be able to:
14.01	Describe and define major body systems with emphasis on the circulatory system.
14.02	List and describe the main superficial veins used in performing venipuncture.
14.03	Locate the most appropriate sites(s) for capillary and venipuncture.
14.04	Describe the function of the following blood components: erythrocytes, thrombocytes, leukocytes and plasma.
14.05	Compare and contrast between serum and plasma as it relates to blood collection.
14.06	Discuss hemostasis as it relates to blood collection.
15.0	Recognize and identify collection reagents supplies, equipment and interfering chemical substances. – The student will be able to:
15.01	Identify and discuss proper use of appropriate types of equipment needed to collect various clinical laboratory blood specimens by venipuncture.
15.02	Explain the special precautions and types of equipment needed to collect blood from the pediatric patient.
15.03	Identify and discuss proper use of supplies used in collecting micro-specimens.
15.04	Identify and discuss the proper use of the various types of anticoagulants, preservatives and gels used in blood collection and the vacuum tube color-codes for these additives.
15.05	Describe the types of patient's specimens that are analyzed in the clinical laboratory and the phlebotomist's role in collecting and/or transporting these specimens to the laboratory.
15.06	Describe substances potentially encountered during phlebotomy which can interfere in analysis of blood constituents.
15.07	Define and utilize correct medical terminology and metric measurement needed for specimen collection.
16.0	Demonstrate skills and knowledge necessary to perform phlebotomy. – The student will be able to:
16.01	Follow approved procedure for completing a laboratory requisition form.
16.02	Recognize a properly completed requisition and apply established protocol for patient and specimen identification for transport to a reference lab.
16.03	Demonstrate knowledge of established protocol for patient and specimen identification.
16.04	Discuss appropriate methods for facilitating and preparing the patient for capillary and venipuncture collection.
16.05	List appropriate antiseptic agents useful in preparing sites for capillary and venipuncture.
16.06	Know how to perform venipuncture by evacuated tube, butterfly and syringe systems.

16.07	Describe the correct order of draw according to CLSI guidelines.
16.08	Describe the use of barcoding systems used for positive patient identification and specimen identification.
16.09	Convey an understanding of capillary puncture using appropriate supplies and techniques for both adults and pediatric patients.
16.10	Describe the most common complications associated with capillary and venipuncture, their causes, prevention and treatment.
16.11	Recognize and respond to possible adverse patient reactions such as allergies, convulsions, syncope and light headedness.
16.12	Perform appropriate procedures for disposing of used or contaminated capillary and venipuncture supplies.
16.13	Perform appropriate techniques for making a peripheral blood smear for hematologic evaluation.
16.14	Demonstrate the proper procedure for collecting blood cultures.
16.15	Discuss the effects of hemolysis and methods of prevention.
16.16	Demonstrate a working understanding of how age and weight of patients impacts the maximum amount of blood that can be safely drawn.
17.0	Practice infection control following standard precautions. – The student will be able to:
17.01	Define the term "hospital acquired infection".
17.02	Demonstrate proper hand hygiene.
17.03	Comply with universal/standard precautions.
17.04	Identify potential routes of infection and their complications.
18.0	Practice accepted procedures of transporting, accessioning and processing specimens. – The student will be able to:
18.01	Follow the approved procedure for preparation and processing (e.g. - centrifugation, separation, aliquoting, labeling, and storage) of serum, plasma, urine, sputum, stool, and wound culture specimens.
18.02	Demonstrate knowledge of accessioning procedures.
18.03	Describe the significance of time constraints for specimen collection, transporting and delivery.
18.04	Describe routine procedures for transporting and processing specimens including DOT packaging requirements.
19.0	Practice quality assurance and safety. – The student will be able to:
19.01	Distinguish and perform procedures which ensure reliability of test results when collecting blood specimens.
19.02	Demonstrate knowledge of and practice appropriate patient safety.

19.03	Practice safety in accordance with OSHA (State & Federal guidelines) for chemical, biological, and PPE established procedures including proper disposal of sharps.
19.04	Follow documentation procedures for work related accidents.
19.05	Understand Joint Commission patient safety goals and other accrediting/regulatory agency guidelines.
Medical Laboratory Technician: (20-33)	
20.0	Demonstrate knowledge and use of basic laboratory equipment and techniques. – The Student will be able to:
20.01	Identify the parts of the microscope and explain the function of each.
20.02	Demonstrate the proper technique for operation of the microscope.
20.03	Demonstrate use of standard laboratory equipment including glassware, pipettes and centrifuge.
20.04	Perform basic laboratory math calculations.
20.05	Understand the principles of quality assurance to correct problems encountered in monitoring daily quality control.
20.06	Evaluate laboratory findings to confirm results according to standard operating procedure.
20.07	Demonstrate knowledge of principles and operation of laboratory instruments.
21.0	Demonstrate basic knowledge of and perform clinical laboratory Point of Care (POC) testing (Waived). -- The student will be able to
21.01	Demonstrate the ability to interpret instructions of point of care testing including , but not limited to the following:
21.01.1	Test principle
21.04.2	Storage & Stability
21.04.3	Internal vs. External Quality Control
21.04.4	Specimen collection & preparation
21.04.5	Directions for use
21.04.6	Interpretation of results
21.01.7	Interfering substances
21.02	Explain the purpose of performing lot to lot correlations.
21.03	Demonstrate knowledge of the frequency in which quality control procedures should be performed.

21.04	Understand the CLIA 88 classification of laboratory testing into waived, moderate, and highly complex including the personnel qualified to perform each.
22.0	Demonstrate basic knowledge of and perform Point of Care (POC) Testing using CLIA approved Waived instrumentation. -- The student will be able to:
22.01	Demonstrate and perform POC testing specific to microbiology, hematology, urinalysis, and clinical chemistry.
22.02	Perform instrument maintenance.
22.03	Demonstrate knowledge of quality control and calibrations involved within the POC instruments.
22.04	Identify normal limits and associate abnormal results with disease or disorders.
22.05	Discuss the significance of reporting critical values as it applies to Point of Care testing.
23.0	Discuss the general responsibilities and functions encountered by a medical technician. – The students will be able to:
23.01	Ask appropriate scientific questions and recognize what is involved in experimental approaches to the solutions of such questions.
23.02	Communicate laboratory results to healthcare professionals.
23.03	Demonstrate ability to evaluate laboratory results.
23.04	Demonstrate ability to report laboratory results in written or oral form.
23.05	Discuss the licensure and certification requirements of the major classifications of clinical laboratory personnel.
24.0	Apply quality assurance principles and safety protocols. – The student will be able to:
24.01	Assess specimen acceptability using standard operating procedure including rejection/recollection criteria.
24.02	Describe procedures for transporting and processing specimens.
24.03	Describe clinical laboratory role in providing quality assurance in laboratory testing, reporting, and use and maintenance of equipment.
24.04	Understand the need for calibration of laboratory equipment.
24.05	Demonstrate and record quality control procedures required for the tests performed and recognize unacceptable results.
24.06	Report identified problems encountered in daily quality control according to standard operating procedures.
24.07	Comply with current OSHA regulations regarding laboratory hazards.
25.0	Demonstrate knowledge of the operation of computer systems. – The student will be able to:
25.01	Discuss the role of computer systems in laboratory data management.

25.02	Demonstrate knowledge of common computer terminology.
25.03	Demonstrate entry level computer operations for specimen accessioning, data reporting, and quality control recording.
25.04	Demonstrate entry level operational skills in the use of computer-interfaced analytical instrumentation.
26.0	Demonstrate an understanding of the basic principles of molecular diagnostics. – The student will be able to:
26.01	Discuss the principles and major steps of the polymerase chain reaction (PCR).
26.02	Label the organelles and important parts of a eukaryotic animal cell.
26.03	Describe the function of the organelles and important parts of a eukaryotic animal cell.
26.04	Discuss the structure, function, and components of DNA and RNA.
26.05	Define the key terms of molecular diagnostics.
26.06	Understand the principles of molecular diagnostic testing.
26.07	Compare the advantages and disadvantages of molecular techniques over traditional diagnostic tests for infectious diseases.
26.08	List molecular tests associated with the identification of microorganisms.
26.09	Identify the types of samples appropriate for molecular diagnostics.
26.10	Discuss the ethical impact of genetic technologies.
26.11	Outline requirements for reducing contamination in a molecular lab.
26.12	Discuss nucleic acid probes and their role in clinical laboratory diagnostics.
27.0	Demonstrate knowledge of urinalysis and body fluids principles and procedures. – The student will be able to:
27.01	Identify the components of the urinary system and explain their functions.
27.02	Discuss diseases affecting the urinary system.
27.03	Describe collection, transport and storage procedures for random and timed urine specimens.
27.04	Discuss specific gravity techniques; calibration and use of the refractometer.
27.05	Perform dipstick or tablet (non-automated) urinalysis techniques for chemical exam of the urine and interpret results.
27.06	Demonstrate the proper use of automated urinalysis analyzers.

27.07	Describe renal function tests.
27.08	Describe principles of and perform routine physical and chemical analyses on urine.
27.09	Prepare urine sediments and perform identification and quantitation of microscopic formed elements.
27.10	Correlate abnormal physical, chemical and microscopic urine results with associated pathological conditions.
27.11	Differentiate between transudates and exudates.
27.12	Discuss miscellaneous body fluids to include cerebral spinal, serous, seminal and joint fluids.
27.13	Perform physical, chemical and microscopic evaluations of common body fluids.
28.0	Demonstrate knowledge of hematological principles and procedures. – The student will be able to:
28.01	Discuss the organs, cells and cellular interaction of the lymphoid, myeloid and reticuloendothelial systems.
28.02	Demonstrate an understanding of basic concepts of hematopoiesis.
28.03	Identify the components of blood.
28.04	Discuss the function of formed elements of blood.
28.05	Demonstrate an understanding of the synthesis of normal and abnormal molecular structure of hemoglobin, common hemoglobinopathies, and associated tests.
28.06	Describe normal hemoglobin-oxygen function using the Oxygen Dissociation Curve (ODC).
28.07	Discuss assessment and impact of preanalytical, analytical and post-analytical factors on hematology testing.
28.08	Calculate red blood cell indices.
28.09	Discuss selected cytochemical staining and flowcytometry procedures.
28.10	Evaluate red blood cell morphology.
28.11	State the review process of histogram/scatterplot/scattergram analysis.
28.12	Describe the categories used in a morphological classification of anemias.
28.13	Correlate complete blood cell results with peripheral exam of blood smear.
28.14	List the white blood cell maturation sequence and identify distinguishing morphology for stages of developing white blood cells.
28.15	Discuss normal and abnormal hematology findings, reference ranges and associated diseases.

28.16	Demonstrate an understanding of normal and abnormal white cell morphology, related disease states and associated tests.
28.17	Discuss the principles of and perform routine hematology procedures applying quality control procedures.as necessary.
28.18	Perform commonly used methods to evaluate leukocytes, correlate and verify automated cell counts with established criteria.
28.19	Identify characteristics findings of nonmalignant leukocytic disorders, e.g. shift to the left, toxic granulation, Döhle bodies, etc.
28.20	Perform techniques of manual blood smear evaluation including white blood cell differential, red cell and platelet morphology.
28.21	Correlate peripheral blood evaluation with automated cell analysis.
28.22	Perform platelet counts on patient and control specimens using manual and automated techniques and correlate counts with peripheral smear.
29.0	Demonstrate knowledge of hemostasis and related diagnostic principles and procedures. – The student will be able to:
29.01	Discuss and define the mechanisms of hemostasis including bleeding and clotting.
29.02	Discuss common coagulopathies and associated treatments.
29.03	Discuss assessment and impact of preanalytical factors on hemostasis testing.
29.04	Describe the principles of and perform routine testing used in the evaluation of primary and secondary hemostasis.
29.05	Discuss additional hemostasis tests performed to differentiate the cause of abnormal routine tests.
30.0	Demonstrate knowledge of immunology principles and procedures. – The student will be able to:
30.01	Discuss the functions of the cells of the immune system, cytokines and regulatory molecules.
30.02	Discuss physical and chemical properties of immunogens (antigens), immunoglobulins (antibodies) and complement.
30.03	Compare and contrast the principles of basic agglutination, flocculation and precipitation procedures in immunology/serology.
30.04	Perform basic procedures in immunology/serology.
30.05	Discuss principles of serum protein electrophoresis and immunofixation.
30.06	Discuss the clinical significance of the commonly performed immunological tests.
30.07	Discuss selected serological tests such as immunoassays.
31.0	Demonstrate knowledge of clinical chemistry principles and procedures. – The student will be able to:
31.01	Identify the chemistry analytes used to evaluate various organ function.

31.02	Discuss the renal system and related analytes.
31.03	Discuss principles of and perform common renal function tests.
31.04	Discuss carbohydrate, protein and lipid metabolism.
31.05	Discuss principles of and perform commonly ordered tests related to carbohydrate, protein and lipid metabolism.
31.06	Discuss the liver and its functions and related analytes.
31.07	Discuss principles of and perform commonly ordered liver function tests.
31.08	Discuss enzyme classification, origin, activity and function.
31.09	Discuss principles of and perform commonly ordered enzyme procedures.
31.10	Discuss electrolyte balance as related to health and disease.
31.11	Discuss principles of and perform electrolyte analyses.
31.12	Discuss principles of and perform commonly ordered tests to evaluate cardiac function.
31.13	Discuss the physiology of the endocrine system and the principal tests used to evaluate endocrine function.
31.14	Discuss the role of the laboratory in therapeutic drug monitoring and toxicology.
31.15	Discuss and perform general electrophoresis techniques.
31.16	Discuss the clinical significance of commonly ordered clinical chemistry tests.
31.17	Demonstrate knowledge of principles of instrumentation as related to the clinical chemistry laboratory.
31.18	Discuss techniques of clinical chemistry related to standardization of procedure and use of standards, blanks and controls.
31.19	Discuss other techniques of clinical chemistry related to visual colorimetry; calibration and use of the spectrophotometer.
31.20	Discuss basic techniques of clinical chemistry related to normal and abnormal physiology.
32.0	Demonstrate knowledge of immunohematology principles and procedures. – The student will be able to:
32.01	Discuss donor interview, criteria for selection, phlebotomy preparation, and donor blood processing.
32.02	Discuss blood component collection and, preparation, storage and use.
32.03	Describe the roles of FDA, AABB, and state agencies and how to contact each.

32.04	Compare advantages and disadvantages for autologous, versus homologous (allogenic) blood collection and transfusion.
32.05	Discuss basic genetics of the blood group antigens.
32.06	Discuss the ABO blood group system testing procedures and recognize ABO discrepancies.
32.07	Describe required tests on recipient blood samples.
32.08	Discuss and differentiate other blood group systems such as Duffy, Kell, Kidd, S,s, Lu and the common cold-reacting antibodies such as Le, P, I, M, and N.
32.09	Perform Rh testing to determine Rh phenotypes.
32.10	Perform and interpret antibody screening.
32.11	Perform antibody identification tests to detect clinically significant antibodies.
32.12	Discuss the safety and determine compatibility of blood components for transfusion.
32.13	Discuss and perform routine compatibility testing including the immediate spin crossmatch and the electronic crossmatch.
32.14	Discuss and perform phenotyping on recipient and donor specimens.
32.15	Identify symptoms of the suspected transfusion reaction and the required laboratory work-up.
32.16	Discuss immune hemolytic disorders and perform the direct antiglobulin test.
32.17	Discuss specialized techniques.
32.18	Perform quality control (QC) on reagents.
32.19	Describe pathophysiology of hemolytic disease of the fetus and newborn.
33.0	Demonstrate knowledge of microbiological principles and procedures. – The student will be able to:
33.01	Discuss microbial taxonomy and nomenclature.
33.02	Discuss bacterial metabolism, reproduction, cell structures and their functions.
33.03	Discuss classification, composition and preparation of culture media.
33.04	Discuss the human pathogenesis of bacteria.
33.05	Discuss and perform sterilization techniques.
33.06	Perform culturing techniques for urine, stool, wound, respiratory, body fluids, and blood specimens.

33.07	Perform techniques of microbiology related to inoculation and transfer of cultures.
33.08	Discuss the principles of Gram and AFB stains.
33.09	Accurately perform, read and report gram stains.
33.10	Perform techniques necessary for isolation and identification of aerobic and anaerobic bacterial organisms.
33.11	Identify commonly encountered aerobic bacteria through morphological, physical and biochemical properties.
33.12	Perform and interpret antimicrobial susceptibility tests.
33.13	Discuss collection and handling of specimens for fungal, mycobacterial and viral culture.
33.14	Prepare and examine specimens, and identify ova and parasites when present.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Clinical learning experiences in a clinical laboratory and related areas are an integral part of this program. Clinical learning experiences should reflect the full breadth of responsibilities expected of a Medical Laboratory Technician and should include appropriate experience in each of the areas of the laboratory described herein. The specified length for each of the courses listed is inclusive of clinical experience for each of the respective laboratory sections.

Special Notes

This program meets the Department of Health HIV/AIDS Domestic Violence and Prevention of Medical Errors education requirements. Upon completion of this program, the instructor will provide a certificate to the student verifying that these requirements have been met.

If students in this program are seeking a licensure, certificate or registration through the Department of Health, please refer to 456.0635 F.S. for more information on disqualification for a license, certificate, or registration through the Department of Health.

Either a community college or school district may offer the ATD program. When offered at the community college, college credit shall be awarded for completion of this program. When offered at the school district, vocational credit will be awarded. Vocational credit will be converted to college credit upon transfer to the AS degree at the community college.

In accordance with Rule 6A-10.024, F.A.C. all faculty providing instruction must have at least a baccalaureate degree or an associate degree with demonstrated competencies in the specific instructional program as defined by the Southern Association of Colleges and Schools. The programs should be accredited by:

The Accrediting Bureau of Health Education Schools (ABHES)
7777 Leesburg Pike, Suite 314
North Falls Church, VA 22403
(703) 917-9503 Fax (703) 917-4109
info@abhes.org

Or any other agency as specified by the Division of Medical Quality Administration, Board of Clinical Laboratory Personnel Chapter 483 F.S., Rule 590 FAC, "Florida Clinical Laboratory Personnel Law". The graduate of a board approved program should be prepared to take the appropriate licensing examination to practice in Florida and an appropriate national certifying examination. For further information contact:

Board of Clinical Laboratory Personnel
4052 Bald Cypress Way, Bin CO7
Tallahassee, FL 32399-3257
(850) 245-4444 x3625

National Certification is voluntary and may be obtained from the:

American Medical Technologists
710 Higgins Rd.
Park Ridge, IL. 60068
(847) 823-5169 or
800-275-1268

Or

National Healthcareer Association
7500 West 160th Street
Stilwell, Kansas 66085
800-499-9092
(973) 644-4797
www.nhanow.com

Outcomes 01-11 are referred to as the Health Careers Core and do not have to be completed if the student has previously completed the Core in another health science program. The Core should be taken first or concurrently with the first course in the program. Following the successful completion of the core, the student is eligible to take the National Health Care Foundation Skill Standards Assessment with instructor approval and the completion of a portfolio

Career and Technical Student Organization (CTSO)

HOSA: Future Health Professionals is the intercurricular career and technical student organization providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Basic Skills

In a Career Certificate Program offered for 450 hours or more, in accordance with Rule 6A-10.040, F.A.C. the minimum basic skills grade levels required for postsecondary adult career and technical students to complete this program are: Mathematics 10, Language 11, and Reading 11. These grade level numbers correspond to a grade equivalent score obtained on a state designated basic skills examination.

Adult students with disabilities, as defined in Section 1004.02(7), Florida Statutes, may be exempted from meeting the Basic Skills requirements (Rule 6A-10.040). Students served in exceptional student education (except gifted) as defined in s. 1003.01(3) (a), F.S., may also be exempted

from meeting the Basic Skills requirement. Each school district and Florida College must adopt a policy addressing procedures for exempting eligible students with disabilities from the Basic Skills requirement as permitted in Section 1004.91(3), F.S.

Students who possess a college degree at the Associate of Applied Science level or higher; who have completed or are exempt from the college entry-level examination; or who have passed a state, national, or industry licensure exam are exempt from meeting the Basic Skills requirement (Rule 6A-10.040, F.A.C.) Exemptions from state, national or industry licensure are limited to the certifications listed on the Basic Skills and Licensure Exemption List which may be accessed from the CTE Program Resources page.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Program Length

In accordance with Rule 6A-10.024, F.A.C. an ATD program consists of a course of study that is part of an AS or AAS degree program, is less than 60 credit hours, is approximately 50% of the technical component (non-general education), and leads to employment in a specific occupation. An ATD program may consist of either technical credit or college credit.

Students must have a high school diploma, a GED, or a certificate of completion to be admitted to an ATD program. Within six weeks of entry, students in ATD programs of 450 or more hours must be tested pursuant to Rule 6A-10.040, F.A.C. and if below minimum standards for completion from the program, must receive remedial instruction. The minimum standards must be at least the equivalent of a score of ten (10) on all sections of basic skills test approved in Rule 6A-10.040, F.A.C. Students must successfully complete all remedial instruction before completing the ATD.

Community Colleges may offer either college or career credit toward the ATD. A Career Center in a public school district may offer an ATD program only as technical credit, with college credit awarded to a student upon articulation to a community college (Section 1004.02, F.S.)

When offered at a community college the standard length of this program is 40 credits. When offered at a technical center the standard length of this program is 1515 clock hours.

In accordance with Rule 6A-10.024, F.A.C. all faculty providing instruction must have at least a baccalaureate degree or an associate degree with demonstrated competencies in the specific instructional program as defined by the Southern Association of Colleges and Schools.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.shtml>