

Florida Department of Education
CURRICULUM FRAMEWORK

Program Title: Biomedical Equipment Technology
Occupational Area: Industrial Education

Program Numbers	<u>PSAV</u> I150401
CIP Number	0615.040100
Grade Level	30, 31
Length	2000 hours
SOC	49-9062
Certification	TEC MED @7 G BIOMED EQ @7 G PRAC NURSE ¶7 ¶G

- I. **MAJOR CONCEPTS/CONTENT:** The purpose of this program is to prepare students for employment as electromedical and biomedical repairer, (SOC 49-9062).

The course content includes, but is not limited to, hydraulics, pneumatics, optics and mechanics to troubleshoot, service and repair equipment commonly used for treatment, diagnosis and monitoring of patients in a medical environment.

The course content should also include training in communication, leadership, human relations and employability skills; and safe, efficient work practices.

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Biomedical Equipment industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

- II. **LABORATORY ACTIVITIES:** Shop or laboratory activities are an integral part of this program. These activities provide instruction in the use of tools, equipment, materials and processes found in the industry, electronic, hydraulic, pneumatic and optical systems commonly found in treatment, diagnostic and monitoring devices.
- III. **SPECIAL NOTE:** SkillsUSA, Inc. is the appropriate Career and Technical Student Organization (CTSO) for providing leadership training and for reinforcing specific career and technical skills. Career and Technical Student Organizations, when provided, shall be an integral part of the career and technical instructional program, and the activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, FAC.

Cooperative training - OJT is appropriate for this program. Whenever cooperative training - OJT is offered, the following are required for each student: a training plan, signed by the student, teacher, and employer, which includes instructional objectives and a list of on-the-job and in-school learning experiences; a workstation that reflects equipment, skills and tasks that are relevant to the occupation which the student has chosen as a career goal. The student must receive compensation for work performed.

In accordance with Rule 6A-10.040, FAC, the minimum basic-skills grade levels required for adult vocational students to exit this program are: Mathematics 10.0, Language 10.0, Reading 10.0. These grade-level numbers correspond to grade-equivalent scores obtained on one of the state-designated basic-skills examinations. If a student does not meet the basic-skills level required for completion of the program, remediation should be provided concurrently through Vocational Preparatory Instruction (VPI). Please refer to the Rule for exemptions. Please refer to the Rule for exemptions.

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Adult students with disabilities must self-identify and request such services. 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.

SCANS Competencies: To accomplish the Secretary's Commission on Achieving Necessary Skills (SCANS) competencies, instructional strategies for this cluster must include methods that require students to identify, organize, and use resources appropriately; to work with each other cooperatively and productively; to acquire and use information; to understand social, organizational, and technological systems; and to work with a variety of tools and equipment. Instructional strategies must also incorporate methods to improve students' personal qualities and higher-order thinking skills.

To be transferable statewide between institutions, this program/course must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific program or course articulation agreements with each other.

The program may be offered in courses. Vocational credit shall be awarded to the student on a transcript in accordance with Rule 1001.44 (3) (b) F.S.

The standard length of this program is 2000 hours.

IV. **INTENDED OUTCOMES**: After successfully completing the program, the student will be able to:

OCCUPATIONAL COMPLETION POINT - A (250 Hours)

ELECTRONICS ASSEMBLER (SOC 49-9062)

- 01.0 Demonstrate proficiency in soldering and basic laboratory practices.
- 02.0 Demonstrate proficiency in basic D.C. circuits.
- 03.0 Demonstrate employability skills.
- 04.0 Demonstrate an understanding of entrepreneurship.

OCCUPATIONAL COMPLETION POINT - B (400 Hours)

ELECTRONICS TESTER (SOC 49-9062)

- 05.0 Demonstrate proficiency in knowledge of basic computer usage.
- 06.0 Demonstrate proficiency in advanced D.C. circuits.
- 07.0 Demonstrate proficiency in A.C. circuits.
- 08.0 Demonstrate proficiency in solid state devices.

OCCUPATIONAL COMPLETION POINT - C (375 Hours)

ELECTRONICS EQUIPMENT REPAIRER (SOC 49-9062)

- 09.0 Demonstrate proficiency in digital circuits.
- 10.0 Demonstrate proficiency in fundamental micro-processors.

OCCUPATIONAL COMPLETION POINT - D (375 Hours)

ELECTRONICS TECHNICIAN (SOC 49-9062)

- 11.0 Demonstrate proficiency in analog circuits.
- 12.0 Demonstrate skills in technical recording.
- 13.0 Demonstrate appropriate communication skills.
- 14.0 Demonstrate appropriate understanding of basic math skills.
- 15.0 Demonstrate an understanding of basic science skills.

OCCUPATIONAL COMPLETION POINT - E (600 Hours)

ELECTROMEDICAL AND BIOMEDICAL REPAIRER (SOC 49-9062)

- 16.0 Demonstrate proficiency in mechanics/micromechanics.
- 17.0 Demonstrate proficiency in sensor and feedback devices.
- 18.0 Demonstrate proficiency in hydraulic vacuum systems.
- 19.0 Demonstrate proficiency in repairing optical systems.
- 20.0 Demonstrate proficiency in repairing treatment devices.
- 21.0 Demonstrate proficiency in repairing diagnostic devices.
- 22.0 Demonstrate proficiency in repairing monitoring devices.
- 23.0 Operate testers and analyzers.
- 24.0 Demonstrate knowledge of biomedical equipment hazards.
- 25.0 Demonstrate appropriate communication skills.
- 26.0 Demonstrate appropriate math skills.
- 27.0 Demonstrate appropriate understanding of basic science.
- 28.0 Demonstrate employability skills.
- 29.0 Demonstrate an understanding of entrepreneurship.

Program Title: Biomedical Equipment Technology
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OCCUPATIONAL COMPLETION POINT - A

ELECTRONICS ASSEMBLER (SOC 49-9062)

01.0 DEMONSTRATE PROFICIENCY IN SOLDERING BASIC LABORATORY PRACTICES--

The student will be able to:

- 01.01 Apply proper Occupational Safety Health Administration (OSHA) safety standards.
- 01.02 Make electrical connections.
- 01.03 Identify and use hand tools properly.
- 01.04 Identify and use power tools properly.
- 01.05 Demonstrate acceptable soldering techniques.
- 01.06 Demonstrate acceptable desoldering techniques.
- 01.07 Demonstrate electrostatic discharge (ESD) safety procedures.
- 01.08 Describe the construction of printed circuit boards (PCB's).
- 01.09 Explain the theoretical concepts of soldering.
- 01.10 Demonstrate rework and repair techniques.

02.0 DEMONSTRATE PROFICIENCY IN BASIC DIRECT CURRENT (dc) CIRCUITS--

The student will be able to:

- 02.01 Demonstrate proficiency in basic D.C. circuits.
- 02.02 Solve problems in electronic units utilizing metric prefixes.
- 02.03 Identify sources of electricity.
- 02.04 Define voltage, current, resistance, power and energy.
- 02.05 Apply Ohm's law and power formulas.
- 02.06 Read and interpret color codes and symbols to identify electrical components and values.
- 02.07 Measure properties of a circuit using volt-ohm meter (VOM) and digital volt-ohm meter (DVM) and oscilloscopes.
- 02.08 Compute conductance and compute and measure resistance of conductors and insulators.
- 02.09 Apply Ohm's law to series circuits.
- 02.10 Construct and verify operation of series circuits.
- 02.11 Analyze and troubleshoot series circuits.
- 02.12 Apply Ohm's law to parallel circuits.
- 02.13 Construct and verify the operation of parallel circuits.
- 02.14 Analyze and troubleshoot parallel circuits.

03.0 DEMONSTRATE EMPLOYABILITY SKILLS--The student will be able to:

- 03.01 Conduct a job search.
- 03.02 Secure information about a job.
- 03.03 Identify documents that may be required when applying for a job.
- 03.04 Complete a job application form correctly.
- 03.05 Demonstrate competence in job interview techniques.
- 03.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor or other persons.
- 03.07 Identify acceptable work habits.

- 03.08 Demonstrate knowledge of how to make appropriate job changes.
- 03.09 Demonstrate acceptable employee health habits.
- 03.10 Demonstrate knowledge of the "Right-to-Know Law" as recorded in (29 CFR-1910.1200).

04.0 DEMONSTRATE AN UNDERSTANDING OF ENTREPRENEURSHIP--The student will be able to:

- 04.01 Define entrepreneurship.
- 04.02 Describe the importance of entrepreneurship to the American economy.
- 04.03 List the advantages and disadvantages of business ownership.
- 04.04 Identify the risks involved in ownership of a business.
- 04.05 Identify the necessary personal characteristics of a successful entrepreneur.
- 04.06 Identify the business skills needed to operate a small business efficiently and effectively.

OCCUPATIONAL COMPLETION POINT - B
ELECTRONICS TESTER

05.0 DEMONSTRATE PROFICIENCY IN KNOWLEDGE OF BASIC COMPUTER USAGE--The student will be able to:

- 05.01 Demonstrate the use of a micro-computer operating system.
- 05.02 Demonstrate the use of a high level computer language.
- 05.03 Demonstrate the use of micro-computer application programs (i.e., word processing, data base and spreadsheet).

06.0 DEMONSTRATE PROFICIENCY IN D.C. CIRCUITS--The student will be able to:

- 06.01 Solve algebraic problems to include exponentials to DC.
- 06.03 Relate electricity to the nature of matter.
- 06.16 Apply Ohm's law to series-parallel and parallel-series circuits.
- 06.17 Construct and verify the operation of series-parallel and parallel-series and bridge circuits.
- 06.18 Troubleshoot series-parallel and parallel-series and bridge circuits.
- 06.19 Identify and define voltage divider circuits (loaded and unloaded).
- 06.20 Construct and verify the operation of voltage divider circuits (loaded and unloaded).
- 06.21 Analyze and troubleshoot voltage divider circuits (loaded and unloaded).
- 06.22 Apply maximum power transfer theory.
- 06.23 Construct and verify the operation of DC circuits that demonstrate the maximum power transfer theory.
- 06.24 Describe magnetic properties of circuits and devices.
- 06.25 Determine the physical and electrical characteristics of capacitors and inductors.
- 06.26 Define resistor-capacitor (R-C) and resistor-inductor (R-L) time constants and classify the output of differentiators and integrators.
- 06.27 Set up and operate power supplies for DC circuits.

07.0 DEMONSTRATE PROFICIENCY IN A.C. CIRCUITS--The student will be able to:

- 07.01 Solve basic trigonometric problem as applicable to electronics.
 - 07.05 Define the characteristics of AC capacitive circuits.
 - 07.06 Construct and verify the operation of AC capacitive circuits.
 - 07.07 Analyze and troubleshoot AC capacitive circuits.
 - 07.08 Define the characteristics of AC inductive circuits.
 - 07.09 Construct and verify the operation of AC inductive circuits.
 - 07.10 Analyze and troubleshoot AC inductive circuits.
 - 07.11 Define and apply the principles of transformers to AC circuits.
 - 07.12 Construct and verify the operation of AC circuits utilizing transformers.
 - 07.13 Analyze and troubleshoot AC circuits utilizing transformers.
 - 07.14 Construct and verify the operation of differentiators and integrators to determine R-C and R-L time constraints.
 - 07.15 Analyze and troubleshoot differentiators and integrators circuits.
 - 07.16 Define the characteristics of resistive, inductive, and capacitive (RLC) circuits (series, parallel and complex).
 - 07.17 Construct and verify the operation of the operation of series and parallel resonant circuits.
 - 07.18 Define the characteristics of series and parallel resonant circuits.
 - 07.19 Construct and verify the operation of series and parallel resonant circuits.
 - 07.20 Analyze and troubleshoot R-C, R-L, and RLC circuits.
 - 07.21 Define the characteristics of frequency selective filter circuits.
 - 07.22 Construct and verify the operation of frequency selective filter circuits.
 - 07.23 Analyze and troubleshoot frequency selective filter circuits.
 - 07.24 Define the characteristics of polyphase circuits.
 - 07.25 Define basic motor theory and operation.
 - 07.26 Define basic generator theory and operation.
 - 07.27 Set up and operate power supplies for AC circuits.
 - 07.28 Analyze and measure power in AC circuits.
 - 07.29 Set up and operate capacitor and inductor analyzers for AC circuits.
- 08.0 DEMONSTRATE PROFICIENCY IN SOLID STATE DEVICES--The student will be able to:
- 08.01 Identify and define properties of semiconductor materials.
 - 08.02 Identify and define operating characteristics and applications of junction diodes.
 - 08.03 Identify and define operating characteristics and applications of special diodes.
 - 08.04 Construct diode circuits.
 - 08.05 Analyze and troubleshoot diode circuits.
 - 08.06 Identify and define operating characteristics and applications of bipolar transistors.

- 08.07 Identify and define operating characteristics and applications of field effective transistors.
- 08.08 Identify and define operating characteristics and applications of single-stage amplifiers.
- 08.09 Construct single-stage amplifiers.
- 08.10 Analyze and troubleshoot single-stage amplifiers.
- 08.11 Construct thyristor circuitry.
- 08.12 Analyze and troubleshoot thyristor circuitry.
- 08.13 Set up and operate VOM for solid-state devices.
- 08.14 Set up and operate DVM for solid-state devices.
- 08.15 Set up and operate power supplies for solid-state devices.
- 08.16 Set up and operate oscilloscopes for solid-state devices.
- 08.17 Set up and operate function generators for solid-state devices.
- 08.18 Set up and operate capacitor and inductor analyzers for solid-state devices.
- 08.19 Set up and operate curve tracers.
- 08.20 Set up and operate transistor testers.

OCCUPATIONAL COMPLETION POINT - C

ELECTRONIC EQUIPMENT REPAIRER (SOC 49-9062)

09.0 DEMONSTRATE PROFICIENCY IN DIGITAL CIRCUITS--The student will be able to:

- 09.01 Define and apply numbering systems to codes and arithmetic operations.
- 09.02 Analyze and minimize logic circuits using Boolean operations.
- 09.03 Set up and operate logic probes for digital circuits.
- 09.04 Set up and operate power supplies for digital circuits and solve power distribution and noise problems.
- 09.05 Set up and operate pulsers for digital circuits.
- 09.06 Set up and operate oscilloscopes for digital circuits.
- 09.07 Set up and operate logic analyzers for digital circuits.
- 09.08 Set up and operate pulse generators for digital circuits.
- 09.09 Identify types of logic gates and their truth tables.
- 09.10 Construct combinational logic circuits using integrated circuits.
- 09.11 Troubleshoot logic circuits.
- 09.12 Analyze types of flip-flops and their truth tables.
- 09.13 Construct flip-flops using integrated circuits.
- 09.14 Troubleshoot flip-flops.
- 09.15 Identify, define and measure characteristics of integrated circuit (IC) logic families.
- 09.16 Identify types of resistors and counters.
- 09.17 Construct registers and counters using flip-flops and logic gates.
- 09.18 Troubleshoot registers and counters.
- 09.19 Analyze clock and timing circuits.
- 09.20 Construct clock and timing circuits.
- 09.21 Troubleshoot clock and timing circuits.
- 09.22 Identify types of arithmetic-logic circuits.
- 09.23 Construct arithmetic-logic circuits.
- 09.24 Troubleshoot arithmetic-logic circuits.
- 09.25 Identify types of encoding and decoding devices.
- 09.26 Construct encoders and decoders.
- 09.27 Troubleshoot encoders and decoders.
- 09.28 Identify types of multiplexer and demultiplexer circuits.
- 09.29 Construct multiplexer and demultiplexer circuits using integrated circuits.
- 09.30 Troubleshoot multiplexer and demultiplexer circuits
- 09.31 Identify types of memory circuits.
- 09.32 Relate the uses of digital-to-analog and analog-to-digital circuits.
- 09.33 Construct digital-to-analog and analog-to-digital circuits.
- 09.34 Troubleshoot digital-to-analog and analog-to-digital circuits
- 09.35 Identify types of digital displays.
- 09.36 Construct digital display circuits.
- 09.37 Troubleshoot digital display circuits.

10.0 DEMONSTRATE PROFICIENCY IN FUNDAMENTAL MICRO PROCESSORS--The student will be able to:

- 10.01 Identify central processing unit (CPU) building blocks and their uses (architecture).
- 10.02 Analyze bus concepts.
- 10.03 Analyze various memory schemes.
- 10.04 Use memory devices in circuits.
- 10.05 Troubleshoot memory device circuits.
- 10.06 Set up and operate oscilloscopes for microprocessor systems.
- 10.07 Set up and operate logic-data analyzers to troubleshoot microprocessor systems.
- 10.08 Identify types of input and output devices and peripherals.
- 10.09 Interface input and output ports to peripherals.
- 10.10 Analyze and troubleshoot input and output ports.
- 10.11 Write a macro processor program in assembly language.
- 10.12 Write a macro processor program in machine language.
- 10.13 Execute micro processor instruction sets.

OCCUPATIONAL COMPLETION POINT - D

ELECTRONIC TECHNICIAN (SOC 49-9062)

11.0 DEMONSTRATE PROFICIENCY IN ANALOG CIRCUITS--The student will be able to:

- 11.01 Identify and define operational characteristics and applications of multistage amplifiers.
- 11.02 Construct multistage amplifiers.
- 11.03 Analyze and troubleshoot multistage amplifiers.
- 11.04 Identify and define operating characteristics and applications of linear integrated circuits.
- 11.05 Identify and define operating characteristics and applications of basic power supplies and filters.
- 11.06 Construct basic power supplies and filters.
- 11.07 Identify and define operating characteristics and applications of differential and operational amplifiers.
- 11.08 Construct differential and operational amplifier circuits.
- 11.09 Analyze and troubleshoot differential and operational amplifier circuits.
- 11.10 Identify and define operating characteristics of audio power amplifiers.
- 11.11 Construct audio power amplifiers.
- 11.12 Analyze and troubleshoot audio power amplifiers.
- 11.13 Identify and define operating characteristics and applications of power supply regulator circuits.
- 11.14 Construct power supply regulator circuits.
- 11.15 Analyze and troubleshoot power supply regulator circuits.
- 11.16 Identify and define operating characteristics and applications of active filters.
- 11.17 Construct active filter circuits.
- 11.18 Analyze and troubleshoot active filter circuits.
- 11.19 Identify and define operating characteristics and applications of
- 11.20 Construct oscillator circuits.
- 11.21 Analyze and troubleshoot oscillator circuits.
- 11.22 Identify and define operating characteristics and applications of cathode ray tubes.

- 11.23 Identify and define operating characteristics and applications of opto-electronic devices.
- 11.24 Set up and operate measuring instruments for analog circuits.

- 12.0 DEMONSTRATE SKILLS IN TECHNICAL RECORDING-The student will be able to:
 - 12.01 Draw and interpret electronic schematics.
 - 12.02 Record data and design curves and graphs.
 - 12.03 Write reports and make oral presentations.
 - 12.04 Maintain test logs.
 - 12.05 Make equipment failure reports.
 - 12.06 Specify and requisition simple electronic components.
 - 12.07 Compose technical letters and memoranda.
 - 12.08 Write formal reports of laboratory experiences.
 - 12.09 Draft preventive maintenance and calibration procedures.

13.0 DEMONSTRATE APPROPRIATE COMMUNICATION SKILLS--The student will be able to:

- 13.01 Write logical and understandable statements. Or phrases to accurately fill out forms/invoices commonly used in business and industry.
- 13.02 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
- 13.03 Read and follow written instructions.
- 13.04 Answer and ask questions coherently and concisely.
- 13.05 Read critically by recognizing assumptions and implications and by evaluating ideas.
- 13.06 Demonstrate appropriate telephone/communication skills.

14.0 DEMONSTRATE APPROPRIATE UNDERSTANDING OF BASIC MATH SKILLS--The student will be able to:

- 14.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares and cylinders.
- 14.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet, and inches.
- 14.03 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
- 14.04 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
- 14.05 Demonstrate an understanding of federal, state, and local taxes and their computation.

15.0 DEMONSTRATE AN UNDERSTANDING OF BASIC SCIENCE SKILLS--The student will be able to:

- 15.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
- 15.02 Draw conclusions or make inferences from data.
- 15.03 Identify health-related problems which, may result from exposure to work related chemicals and hazardous materials, and know the proper precautions required for handling such materials.
- 15.04 Understand pressure measurement in terms of P.S.I., inches of mercury, and K.P.A.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Program Title: Biomedical Equipment Technology
Secondary Number:
Postsecondary Number: I150401

OCCUPATIONAL COMPLETION POINT - E

- 16.0 DEMONSTRATE PROFICIENCY IN MECHANICS/MICROMECHANICS--The student will be able to:
- 16.01 Analyze, troubleshoot, repair and align power transmission components (gears, belts, chains, couplings, clutches and screw systems).
 - 16.02 Analyze, troubleshoot, and repair bearings.
 - 16.03 Apply lubrication specifications to mechanical systems.
 - 16.04 Analyze, troubleshoot, repair, and align linkages and hoses.
 - 16.05 Analyze, troubleshoot, repair, and align cams.
 - 16.06 Analyze and troubleshoot materials to static's and material specifications.
 - 16.07 Analyze, troubleshoot, and repair metals to heat treating specifications.
 - 16.08 Clean components and systems.
- 17.0 DEMONSTRATE PROFICIENCY IN SENSOR AND FEEDBACK DEVICES--The student will be able to:
- 17.01 Analyze, troubleshoot and align transducers.
 - 17.02 Analyze, troubleshoot, repair, and align motor controls.
 - 17.03 Analyze, troubleshoot and align synchros and resolvers.
 - 17.04 Analyze, troubleshoot and align pulse encoders.
 - 17.05 Analyze, troubleshoot and align farrand scales.
- 18.0 DEMONSTRATE PROFICIENCY IN HYDRAULIC VACUUM SYSTEMS--The student will be able to:
- 18.01 Clean components and systems.
 - 18.02 Analyze, troubleshoot, and align pumps (positive and negative pressures).
 - 18.03 Analyze, troubleshoot, and repair control and metering devices.
 - 18.04 Analyze, troubleshoot, and repair electromechanical valves (directional and control).
 - 18.05 Analyze, troubleshoot, and repair valve actuators (solenoid, servo, flow-control).
 - 18.06 Analyze, troubleshoot, and repair linear and rotary actuators.
 - 18.07 Analyze, troubleshoot, and repair pressure and flow regulators.
 - 18.08 Analyze and troubleshoot hydraulic and pneumatic circuits and systems.
 - 18.09 Analyze, troubleshoot, and repair piping reservoirs and fittings.

19.0 DEMONSTRATE PROFICIENCY IN REPAIRING OPTICAL SYSTEMS--The student will be able to:

- 19.01 Analyze, troubleshoot and repair optics systems.
- 19.02 Analyze, troubleshoot and repair laser detectors.
- 19.03 Set up and operate laser alignment equipment.
- 19.04 Set up and operate laser interferometers.

20.0 DEMONSTRATE PROFICIENCY IN REPAIRING TREATMENT DEVICES--The student will be able to:

- 20.01 Troubleshoot and repair surgical lasers.
- 20.02 Perform operating systems check and make minor adjustments of surgical lasers.
- 20.03 Troubleshoot and repair dialysis machines.
- 20.04 Perform operating systems check and make minor adjustments of dialysis machines.
- 20.05 Troubleshoot and repair diathermy machines.
- 20.06 Perform operating systems check and make minor adjustments of diathermy machines.
- 20.07 Troubleshoot and repair anesthesiologist devices.
- 20.08 Perform operational systems check and make minor adjustments of anesthesiologist devices.
- 20.09 Troubleshoot and repair infusion control devices.
- 20.10 Perform operating systems check and make minor adjustments of infusion control devices.
- 20.11 Troubleshoot and repair pacemaker support equipment.
- 20.12 Perform operating systems check and make minor adjustments of pacemaker support equipment.
- 20.13 Troubleshoot and repair respiration therapy devices.
- 20.14 Perform operating systems check and make minor adjustments of respiration therapy devices.
- 20.15 Troubleshoot and repair surgical microscopes.
- 20.16 Perform operating systems check and make minor adjustments of surgical microscopes.
- 20.17 Troubleshoot and repair sterilizer (gas & EtO) devices.
- 20.18 Perform operating systems check and make minor adjustments of gas and EtO sterilizers.
- 20.19 Troubleshoot and repair defibrillators.
- 20.20 Perform operating systems check and make minor adjustments of defibrillator devices.
- 20.21 Troubleshoot and repair electrosurgical devices.
- 20.22 Perform operating systems check and make minor adjustments of electrosurgical devices.
- 20.23 Troubleshoot and repair portable X-ray machines (simple).
- 20.24 Perform operating systems check and make minor adjustments of portable X-ray machines (simple).
- 20.25 Troubleshoot and repair electrical bed stations.
- 20.26 Perform operating systems check and make minor adjustments of electrical bed stations.
- 20.27 Troubleshoot and repair hypothermia and hypothermia devices.
- 20.28 Perform operating systems check and make minor adjustments of hyper/hypothermia devices.
- 20.29 Troubleshoot and repair radiant warmers.
- 20.30 Perform operating systems check and make minor adjustments of radiant warmers.
- 20.31 Troubleshoot and repair incubators.
- 20.32 Perform operating systems check and make minor adjustments of incubators.
- 20.33 Troubleshoot and repair fetal monitors.
- 20.34 Perform operating systems check and make minor adjustments of fetal monitors.
- 20.35 Troubleshoot and repair chun guns.

20.36 Perform operating systems check and make minor adjustments of chun guns.

21.0 DEMONSTRATE PROFICIENCY IN REPAIRING DIAGNOSTIC DEVICES--The student will be able to:

- 21.01 Troubleshoot and repair blood cell counters.
- 21.02 Perform operating systems check and make minor adjustments of blood cell counters.
- 21.03 Troubleshoot and repair centrifuge devices.
- 21.04 Perform operating systems check and make minor adjustments of centrifuge devices.
- 21.05 Troubleshoot and repair nephelometry devices.
- 21.06 Perform operating systems check and make minor adjustments of nephelometry devices.
- 21.07 Troubleshoot and repair automated chemistry analyzers.
- 21.08 Perform operating systems check and make minor adjustments of automated chemistry analyzers.
- 21.09 Troubleshoot and repair simple scintillation counters.
- 21.10 Perform operating systems check and make minor adjustments of simple scintillation counters.
- 21.11 Troubleshoot and repair audiometers.
- 21.12 Perform operating systems check and make minor adjustments of audiometers.
- 21.13 Troubleshoot and repair electrophoresis equipment.
- 21.14 Perform operating systems check and make minor adjustments of electrophoresis equipment.
- 21.15 Troubleshoot and repair blood gas analyzers.
- 21.16 Perform operating systems check and make minor adjustments of blood gas analyzers.
- 21.17 Troubleshoot and repair HPLC and gas chromatography equipment.
- 21.18 Perform operating systems check and make minor adjustments of HPLC and gas chromatography equipment.
- 21.19 Troubleshoot and repair simple refractometers.
- 21.20 Perform operating systems check and make minor adjustments of refractometers.
- 21.21 Troubleshoot and repair spectrophotometers.
- 21.22 Perform operating systems check and make minor adjustments of spectrophotometer.
- 21.23 Troubleshoot and repair laboratory microscopes.
- 21.24 Perform operating systems check and make minor adjustments of laboratory microscopes.
- 21.25 Troubleshoot and repair EEG devices.
- 21.26 Perform operating systems check and make minor adjustments of EEG devices.
- 21.27 Troubleshoot and repair EMG devices.
- 21.28 Perform operating systems check and make minor adjustments of EMG devices.
- 21.29 Troubleshoot and repair ENG devices.
- 21.30 Perform operating systems check and make minor adjustments of ENG devices.
- 21.31 Troubleshoot and repair transcutaneous devices.
- 21.32 Perform operating systems check and make minor adjustments of transcutaneous devices.

- 22.0 DEMONSTRATE PROFICIENCY IN REPAIRING MONITORING DEVICES--The student will be able to:
- 22.01 Troubleshoot and repair EKG devices.
 - 22.02 Perform operating systems check and make minor adjustments of EKG devices.
 - 22.03 Troubleshoot and repair pressure devices.
 - 22.04 Perform operating systems check and make minor adjustments of pressure devices.
 - 22.05 Troubleshoot and repair temperature devices.
 - 22.06 Perform operating systems check and make minor adjustments of temperature devices.
 - 22.07 Troubleshoot and repair respiration devices.
 - 22.08 Perform operating systems check and make minor adjustments of respiration devices.
 - 22.09 Troubleshoot and repair fluid output devices.
 - 22.10 Perform operating systems check and make minor adjustments of fluid output devices.
 - 22.11 Troubleshoot and repair halter monitors.
 - 22.12 Perform operating systems check and make minor adjustments of holler monitors.
 - 22.13 Troubleshoot and repair telemetry systems.
 - 22.14 Perform operating systems check and make minor adjustments of telemetry systems.
 - 22.15 Troubleshoot and repair doppler blood flow devices.
 - 22.16 Perform operating systems check and make minor adjustments of doppler blood flow devices.
 - 22.17 Troubleshoot and repair in vivo pressure transducers.
 - 22.18 Perform operating systems check and make minor adjustments of in vivo pressure transducers.
 - 22.19 Troubleshoot and repair chart recorders.
 - 22.20 Perform operating systems check and make minor adjustments of chart recorders.
- 23.0 OPERATE TESTERS AND ANALYZERS--The student will be able to:
- 23.01 Operate safety analyzer.
 - 23.02 Operate defibrillator tester.
 - 23.03 Operate electrosurgical analyzer.
 - 23.04 Operate EKG simulator.
 - 23.06 Operate pressure simulator.
 - 23.06 Operate temperature simulator.
- 24.0 DEMONSTRATE KNOWLEDGE OF BIOMEDICAL EQUIPMENT HAZARDS--The student will be able to:
- 24.01 Perform safety checks on electrical devices.
 - 24.02 Maintain leakage records on electrical devices.
 - 24.03 Recognize and correctly respond to radiation hazards.
 - 24.04 Perform safety checks on radiation devices.
 - 24.05 Recognize and correctly respond to biological hazards.
 - 24.06 Recognize and correctly respond to chemical hazards.
 - 24.07 Recognize and correctly respond to mechanical hazards.
 - 24.08 Perform safety checks on mechanical devices.
 - 24.09 Recognize and correctly respond to fluid discs device hazards.

25.0 DEMONSTRATE APPROPRIATE COMMUNICATION SKILLS--The student will be able to:

25.01 Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.

25.02 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.

25.03 Read and follow written and oral instructions.

25.04 Answer and ask questions coherently and concisely.

25.05 Read critically by recognizing assumptions and implications and by evaluating ideas.

25.06 Demonstrate appropriate telephone/communication skills.

26.0 DEMONSTRATE APPROPRIATE MATH SKILLS--The student will be able to:

26.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.

26.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.

26.03 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.

26.04 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.

26.05 Demonstrate an understanding of federal, state and local taxes and their computation.

27.0 DEMONSTRATE APPROPRIATE UNDERSTANDING OF BASIC SCIENCE--The student will be able to:

27.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.

27.02 Draw conclusions or make inferences from data.

27.03 Identify health-related problems which, may result from exposure to work related chemicals and hazardous materials, and know the proper precautions required for handling such materials.

27.04 Understand pressure measurement in terms of P.S.I., inches of mercury, and K.P.A.

28.0 DEMONSTRATE EMPLOYABILITY SKILLS--The student will be able to:

28.01 Conduct a job search.

28.02 Secure information about a job.

28.03 Identify documents, which may be required when applying for a job interview.

28.04 Complete a job application form correctly.

28.05 Demonstrate competence in job interview techniques.

28.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.

28.07 Identify acceptable work habits.

28.08 Demonstrate knowledge of how to make appropriate job changes.

28.09 Demonstrate acceptable employee health habits.

28.10 Demonstrate knowledge of the "Right-To-Know Law" as recorded in (29 CFR-1910.1200).

29.0 DEMONSTRATE AN UNDERSTANDING OF ENTREPRENEURSHIP--The student will be able to:

- 29.01 Identify characteristics of the American enterprise system.
- 29.02 Define inflation and deflation.
- 29.03 Illustrate the basic economic questions facing any society.
- 29.04 Determine the results of a change in demand or a change in supply.
- 29.05 List factors, which contribute to economic growth.
- 29.06 Identify characteristics of different types of business ownership.
- 29.07 Choose appropriate action in a situation requiring application of business ethics.