



Western Technical College

10605206 Medical Instrumentation

Course Outcome Summary

Course Information

Description	Research and study of a variety of medical equipment devices commonly encountered in the clinical healthcare environment. The functional application, basic theory of operation, categorization, typical safety concerns, and typical maintenance of a wide variety of medical devices will be covered. Basic building blocks that make up medical devices will be investigated. For a selection of medical devices hands on experiences will include utilization of documentation, testing, safety, and maintenance. Supporting concepts in medical terminology, anatomy and physiology, and chemistry will be explored and used.
Career Cluster	Science, Technology, Engineering and Mathematics
Instructional Level	Associate Degree Courses
Total Credits	3
Total Hours	72

Pre/Corequisites

Prerequisite	10605100 Introduction to Bio-Med Technologies
Prerequisite	10806120 Body Structure and Function

Textbooks

Introduction to Biomedical Engineering Technology. 4th Edition. Copyright 2023. Street, Laurence J. Publisher: Taylor & Francis. **ISBN-13:** 978-0-367-68700-7. Required.

Open Educational Resource: *Anatomy and Physiology*. 2nd Edition. Copyright 2022. Publisher: Open Stax. **ISBN-13:** 978-1-951693-42-8. <https://openstax.org/details/books/anatomy-and-physiology-2e> Required.

Success Abilities

1. Cultivate Passion: Expand a Growth-Mindset
2. Cultivate Passion: Increase Self-Awareness
3. Refine Professionalism: Improve Critical Thinking
4. Refine Professionalism: Participate Collaboratively

Program Outcomes

1. Manage medical equipment and systems
2. Identify the function and operation of various types of imaging equipment
3. Problem-solve electronic circuits and systems
4. Demonstrate a competency with computers and networks used in medical equipment
5. Apply principles of anatomy, physiology, and medical terminology
6. Demonstrate safety precautions and practices with medical equipment
7. Demonstrate professionalism

Course Competencies

1. Communicate effectively using appropriate medical terminology.

Assessment Strategies

- 1.1. Classroom Participation.
- 1.2. Lab Participation.
- 1.3. Lab Assignment.
- 1.4. Homework Assignment.
- 1.5. Written objective Test.

Criteria

You will know you are successful when

- 1.1. You identify the following component parts: prefix, suffix, combining vowel, combining form, and root.
- 1.2. You define common: prefixes, suffixes, combining vowels, combining forms, and roots.
- 1.3. You combine component parts to determine complete term meaning.
- 1.4. You are able to use the correct medical terminology with communications about specific medical devices.

Learning Objectives

- 1.a. Break terms into component parts.
- 1.b. Define common medical terminology component parts.
- 1.c. Define complete medical terms.
- 1.d. Use correct medical terminology related to medical equipment.

2. Categorize medical equipment and systems.

Assessment Strategies

- 2.1. Classroom Participation.
- 2.2. Lab Participation.
- 2.3. Lab Assignment.
- 2.4. Homework Assignment.
- 2.5. Written objective Test.

Criteria

You will know you are successful when

- 2.1. You explain possible ways to categorize medical equipment.

- 2.2. You explain the features of each member of a category.
- 2.3. You are able to determine into which member of a category a specific medical device belongs.

Learning Objectives

- 2.a. Explain a variety of different categories for medical equipment.
- 2.b. Categorize individual medical devices into a number of different categories.

3. Explore a variety of medical devices.

Assessment Strategies

- 3.1. Classroom Participation.
- 3.2. Lab Participation.
- 3.3. Lab Assignment.
- 3.4. Homework Assignment.
- 3.5. Written objective Test.
- 3.6. Research projects

Criteria

You will know you are successful when

- 3.1. You correctly identify specific medical devices by name.
- 3.2. You describe for which purposes specific medical devices may be used.
- 3.3. You describe what a specific medical device actually does.
- 3.4. You are able to theorize what possible dangers a medical device could pose to a patient or staff member.

Learning Objectives

- 3.a. Identify a variety of medical devices by name.
- 3.b. Explain the application of a variety of medical devices.
- 3.c. Research a variety of medical devices.

4. Operate a variety of medical equipment.

Assessment Strategies

- 4.1. Classroom Participation.
- 4.2. Lab Participation.
- 4.3. Lab Assignment.
- 4.4. Homework Assignment.
- 4.5. Written objective Test.

Criteria

You will know you are successful when

- 4.1. You are able to operate a specific medical device given instruction, an operation manual, a service manual, research, or experimentation time.
- 4.2. You are able to theorize what possible dangers a medical device could pose to a patient or staff member.

Learning Objectives

- 4.a. Operate a variety of medical devices.
- 4.b. Recognize safety issues of a variety of medical devices.

5. Identify the blocks of medical equipment.

Assessment Strategies

- 5.1. Classroom Participation.
- 5.2. Lab Participation.
- 5.3. Lab Assignment.
- 5.4. Homework Assignment.
- 5.5. Written objective Test.

Criteria

You will know you are successful when

- 5.1. You identify medical equipment blocks such as user interface, displays, patient connections, accessories, and power connections.

- 5.2. You explain the purpose of medical equipment blocks such as user interface, displays, patient connections, accessories, and power connections.
- 5.3. You identify methods to ensure only correct connections to medical equipment.
- 5.4. You identify different accessories or applied parts and the medical equipment they belong to.

Learning Objectives

- 5.a. Examine medical devices using documentation to identify medical equipment blocks such as user interface, patient connections, displays, accessories, and power connections.
- 5.b. Examine medical devices using documentation to determine the function of medical equipment blocks such as user interface, patient connections, displays, accessories, and power connections.
- 5.c. Examine and exercise medical equipment connections for keying and color coding connection safeguards.
- 5.d. Connect equipment accessories and applied parts to a variety of medical devices.

6. Test a variety of medical equipment.

Assessment Strategies

- 6.1. Classroom Participation.
- 6.2. Lab Participation.
- 6.3. Lab Assignment.
- 6.4. Homework Assignment.
- 6.5. Written objective Test.

Criteria

You will know you are successful when

- 6.1. You utilize resources including instruction, operators and service manuals, and research to determine the expected function of an individual medical device.
- 6.2. You are able to examine specifications to determine parameters of operation for a medical device.
- 6.3. You determine if a medical device is operating correctly by running the device, testing operation with test equipment if appropriate, and comparing operation with expectations and specifications.

Learning Objectives

- 6.a. Identify the expected operation of medical equipment.
- 6.b. Determine if a medical device is operating correctly.

7. Utilize a variety of test equipment to examine medical equipment.

Assessment Strategies

- 7.1. Classroom Participation.
- 7.2. Lab Participation.
- 7.3. Lab Assignment.
- 7.4. Homework Assignment.
- 7.5. Written objective Test.

Criteria

You will know you are successful when

- 7.1. You explain the purpose of using calibrated test equipment to verify operation of other devices.
- 7.2. You explain for what purpose different types of test equipment are used.
- 7.3. You select appropriate test equipment for testing specific medical devices and functions.
- 7.4. You use test equipment effectively to operate and test medical equipment.

Learning Objectives

- 7.a. Identify what test equipment is.
- 7.b. Explain different types of test equipment.
- 7.c. Recognize what types of test equipment are used with which medical devices.

8. Review anatomy and physiology explaining the body systems interactions with associated medical equipment.

Assessment Strategies

- 8.1. Classroom Participation.
- 8.2. Lab Participation.
- 8.3. Lab Assignment.

- 8.4. Homework Assignment.
- 8.5. Written objective Test.

Criteria

You will know you are successful when

- 8.1. You identify body systems with their associated anatomy and physiological function.
- 8.2. You identify terminology commonly employed in describing the body and its systems.
- 8.3. You associate specific medical devices with the correct body system, anatomy, physiology, and organs.
- 8.4. You explain how specific medical devices interact with body system, anatomy, physiology, and organs.

Learning Objectives

- 8.a. Explain aspects of human anatomy and physiology.
- 8.b. Relate medical equipment to body systems, anatomy, physiology, and organs.
- 8.c. Identify medical devices related to specific body systems, anatomy, physiology, and organs.

9. Investigate the human body machine interface.

Assessment Strategies

- 9.1. Classroom Participation.
- 9.2. Lab Participation.
- 9.3. Lab Assignment.
- 9.4. Homework Assignment.
- 9.5. Written objective Test.

Criteria

You will know you are successful when

- 9.1. You define terminology related to transduction.
- 9.2. You explain different types of transducers by function and type.
- 9.3. You explain which transducers are used with which medical devices.
- 9.4. You describe how medical devices can affect the body.
- 9.5. You describe how the body can affect medical devices.

Learning Objectives

- 9.a. Explain the concept of transduction.
- 9.b. Explain transducers used in specific medical devices.
- 9.c. Explain how medical devices can interact with the body.

10. Explore basic chemistry.

Assessment Strategies

- 10.1. Classroom Participation.
- 10.2. Lab Participation.
- 10.3. Lab Assignment.
- 10.4. Homework Assignment.
- 10.5. Written objective Test.

Criteria

You will know you are successful when

- 10.1. you explain aspects of the periodic table.
- 10.2. you explain chemicals using their names, symbols, and atomic data.
- 10.3. you explain atomic concepts using related terms.
- 10.4. you explain chemical bonding basics.
- 10.5. you explain the applications of chemicals with medical equipment.

Learning Objectives

- 10.a. Explore aspects of the periodic table.
- 10.b. Identify terminology related to the atom.
- 10.c. Identify chemicals and the related data and symbols.
- 10.d. Identify different chemical bonds.
- 10.e. Connect chemistry concepts to their applications with medical equipment.