



9050

DIGITAL DEVICES AND
BASIC LOGIC (12A)

40S/40E/40M

An Electronics Technology Course

9050: DIGITAL DEVICES AND BASIC LOGIC (12A)

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Course Description

This course focuses on the branch of electronics technology dealing with binary states. Students will learn the difference between analog and digital signals as well as the different number systems employed in digital systems. Students will also learn the basic logic gates and how they are combined to solve digital logic problems.

Goal 1: Describe and apply appropriate **health and safety** practices.

GLO 1.1: Describe and apply appropriate **health and safety** practices.

- SLO 12A.1.1.1: Create and maintain a safe work environment.
 - SLO 12A.1.1.2: Demonstrate awareness of the rights and responsibilities of employees, employers, and supervisors under the Workplace Health and Safety Act (Manitoba).
 - SLO 12A.1.1.3: Demonstrate awareness of the rights and responsibilities of employees, employers, and supervisors as they relate to the right to refuse work as described in the Workplace Health and Safety Act (Manitoba).
 - SLO 12A.1.1.4: Describe and utilize personal protective equipment (PPE) and follow prescribed procedures.
 - SLO 12A.1.1.5: Demonstrate an awareness of electrical safety.
 - SLO 12A.1.1.6: Demonstrate an awareness of fire safety.
 - SLO 12A.1.1.7: Recognize and control hazards.
 - SLO 12A.1.1.8: Identify the safety requirements as they apply to WHMIS for products used in an electronics technology facility.
 - SLO 12A.1.1.9: Demonstrate an understanding of how Ohm's law relates to electrical safety.
 - SLO 12A.1.1.10: Demonstrate awareness of emergency procedures related to electrical shock.
 - SLO 12A.1.1.11: Demonstrate awareness of shop safety procedures.
 - SLO 12A.1.1.12: Demonstrate awareness of accident reporting procedures.
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Goal 2: Demonstrate the **identification, selection, utilization, and maintenance of **tools** and **materials**.**

GLO 2.1: Demonstrate the **identification** and **selection** of tools and materials.

SLO 12A.2.1.1: Identify and select appropriate tools and materials.

GLO 2.2: Demonstrate the **utilization** of tools and materials.

SLO 12A.2.2.1: Demonstrate the appropriate utilization of tools and materials.

GLO 2.3: Demonstrate the **maintenance** of tools and materials.

SLO 12A.2.3.1: Demonstrate the appropriate maintenance of tools and materials.

Goal 3: Demonstrate the **identification, selection, value determination, and utilization of **components**.**

GLO 3.1: Demonstrate the **identification** and **selection** of components.

SLO 12A.3.1.1: Identify and select appropriate components related to digital systems.

SLO 12A.3.1.2: Demonstrate an understanding of TTL and CMOS integrated circuits.

GLO 3.2: Demonstrate the appropriate **value determination** of components.

SLO 12A.3.2.1: Determine values of components.

GLO 3.3: Demonstrate the appropriate **utilization** of components.

SLO 12A.3.3.1: Demonstrate the appropriate utilization of components related to digital systems.

Goal 4: Demonstrate the **utilization and maintenance of equipment.**

GLO 4.1: Demonstrate the **utilization and maintenance of equipment other than diagnostic equipment.**

SLO 12A.4.1.1: Demonstrate the appropriate utilization and maintenance of equipment other than diagnostic equipment.

GLO 4.2: Demonstrate the **utilization and maintenance of diagnostic equipment.**

SLO 12A.4.2.1: Demonstrate the appropriate utilization and maintenance of diagnostic equipment related to digital systems.

Goal 5: Demonstrate **schematic reading.**

GLO 5.1: Read, understand, and interpret **schematic diagrams.**

SLO 12A.5.1.1: Read, understand, and interpret digital logic diagrams.

GLO 5.2: Demonstrate **rendering.**

SLO 12A.5.2.1: Render digital logic diagrams.

GLO 5.3: Demonstrate **breadboarding.**

SLO 12A.5.3.1: Demonstrate the appropriate use of solderless breadboards to construct digital circuits.

Goal 6: Demonstrate an understanding of **electrical theory** and the **analysis of electrical circuits**.

GLO 6.1: Demonstrate an understanding of **electrical theory**.

- SLO 12A.6.1.1: Demonstrate an understanding of the differences between digital and analog signals.
 - SLO 12A.6.1.2: Demonstrate an understanding of the number systems used in digital logic.
 - SLO 12A.6.1.3: Demonstrate an understanding of the various coding schemes used in digital logic (i.e., ASCII, gray).
 - SLO 12A.6.1.4: Demonstrate an understanding of binary logic (i.e., 0, 1, low, high).
 - SLO 12A.6.1.5: Demonstrate an understanding of how voltage levels relate to logic states.
 - SLO 12A.6.1.6: Demonstrate an understanding of the three basic logic gates.
 - SLO 12A.6.1.7: Demonstrate an understanding of truth table construction.
 - SLO 12A.6.1.8: Demonstrate an understanding of the inverted gates.
 - SLO 12A.6.1.9: Demonstrate an understanding of exclusive OR and NOR gates.
 - SLO 12A.6.1.10: Perform conversions between logic circuits, Boolean equations, and truth tables.
 - SLO 12A.6.1.11: Perform simplifications using Karnaugh maps.
 - SLO 12A.6.1.12: Demonstrate an understanding of various flip-flops (i.e., D-type, JK, RS).
 - SLO 12A.6.1.13: Demonstrate an understanding of clocked and unclocked (synchronous, asynchronous) logic.
 - SLO 12A.6.1.14: Demonstrate an understanding of various clock circuits (i.e., 555 timer).
 - SLO 12A.6.1.15: Demonstrate an understanding of astable and monostable multivibrators.
 - SLO 12A.6.1.16: Demonstrate an understanding of “debouncing.”
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GLO 6.2: Demonstrate the procedures for **analyzing electrical circuits**.

SLO 12A.6.2.1: Analyze the operation of basic logic gates constructed from diodes and transistors.

SLO 12A.6.2.2: Analyze the operation of basic logic gates in TTL CMOS ICs.

SLO 12A.6.2.3: Analyze the operation of flip-flops.

SLO 12A.6.2.4: Analyze the operation of different flip-flops constructed from basic gates.

GLO 6.3: Demonstrate an understanding of applied **programming** of microprocessors.

No applicable SLOs.

Goal 7: Demonstrate **soldering skills, fabricating printed circuit boards, and selecting and installing** components.

GLO 7.1: Demonstrate **soldering skills**.

SLO 12A.7.1.1: Demonstrate appropriate soldering skills.

GLO 7.2: Demonstrate the procedures for **selecting and installing components**.

SLO 12A.7.2.1: Appropriately select and install components.

Goal 8: Describe and demonstrate the transferable **cross-curricular** knowledge and skills as they apply to electronics technology.

GLO 8.1: **Read, interpret, and communicate** information.

No applicable SLOs.

GLO 8.2: Apply the knowledge and skills from **mathematics**.

SLO 12A.8.2.1: Convert between base 10 and the number systems used in digital logic.

Goal 9: Understand **education, career opportunities, employment conditions,** and **professional organizations** in the electronics industry.

GLO 9.1: Understand **education, career opportunities, employment conditions,** and **professional organizations** in the electronics industry.

SLO 12A.9.1.1: Demonstrate awareness of the education opportunities in electronics technology.

Goal 10: Demonstrate awareness of **sustainability** as it pertains to electronics technology.

GLO 10.1: Describe the impact of **human sustainability** on the health and well-being of electronics technicians and those who use their products.

No applicable SLOs.

GLO 10.2: Describe the electronic technology's sustainability practices and impact on the **environment.**

SLO 12A.10.2.1: Demonstrate an understanding of the use of electronics in reducing harmful emissions.

Goal 11: Demonstrate awareness of the **ethical standards and legal issues.**

GLO 11.1: Demonstrate awareness of the **ethical standards and legal issues.**

SLO 12A.11.1.1: Discuss ethical standards as they relate to current issues in electronics technology (e.g., cell phone contracts, cablevision or Internet packages, pirating music or videos).

Goal 12: Demonstrate employability skills.**GLO 12.1: Demonstrate fundamental employability skills.**

SLO 12A.12.1.1: Demonstrate regular and punctual attendance.

SLO 12A.12.1.2: Demonstrate the ability to communicate respectfully and effectively with teachers, supervisors, co-workers, and students.

SLO 12A.12.1.3: Demonstrate accountability by taking responsibility for one's actions.

SLO 12A.12.1.4: Demonstrate adaptability, initiative, and effort.

SLO 12A.12.1.5: Demonstrate the ability to accept and follow direction and feedback.

SLO 12A.12.1.6: Demonstrate teamwork skills.

SLO 12A.12.1.7: Demonstrate the ability to stay on task and effectively use time in class and work environments.

GLO 12.2: Demonstrate an awareness of cultural proficiency, and its importance in the workplace.

SLO 12A.12.2.1: Discuss the diversity of cultures in the workplace.

GLO 12.3: Demonstrate critical thinking skills in planning, procedures, analysis, and diagnosis.

SLO 12A.12.3.1: Demonstrate critical thinking skills.

SLO 12A.12.3.2: Use a variety of strategies in order to diagnose and solve problems.

Goal 13: Understand the evolution, technological progression, and emerging trends in electronics technology.**GLO 13.1: Describe the evolution, technological progression, and emerging trends in electronics technology.**

SLO 12A.13.1.1: Discuss the effect of large scale integration on digital technology.
