



9048

SEMICONDUCTOR TECHNOLOGY  
AND SIGNAL DEVICES (11B)

30S/30E/30M

An Electronics Technology Course



# 9048: SEMICONDUCTOR TECHNOLOGY AND SIGNAL DEVICES (11B) 30S/30E/30M

## Course Description

Students will learn about semiconductor materials and device construction, and how they affect current flow. They will also learn about low power signal devices, such as diodes and transistors, and how they are used in simple circuits.

---

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

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

- SLO 11B.1.1.1: Create and maintain a safe work environment.
  - SLO 11B.1.1.2: Describe and utilize personal protective equipment (PPE) and follow prescribed procedures.
  - SLO 11B.1.1.3: Demonstrate an awareness of electrical safety.
  - SLO 11B.1.1.4: Demonstrate an awareness of fire safety.
  - SLO 11B.1.1.5: Recognize and control hazards.
  - SLO 11B.1.1.6: Demonstrate an understanding of how Ohm's law relates to electrical safety.
  - SLO 11B.1.1.7: Demonstrate awareness of emergency procedures related to electrical shock.
  - SLO 11B.1.1.8: Demonstrate awareness of shop safety procedures.
  - SLO 11B.1.1.9: Demonstrate awareness of accident reporting procedures.
  - SLO 11B.1.1.10: Demonstrate awareness of the rights and responsibilities of employees, employers, and supervisors under the Workplace Health and Safety Act (Manitoba).
  - SLO 11B.1.1.11: 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 11B.1.1.12: Identify the safety requirements as they apply to WHMIS for products used in an electronics technology facility.
-

---

**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 11B.2.1.1: Identify and select appropriate tools and materials.

---

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

SLO 11B.2.2.1: Demonstrate the appropriate utilization of tools and materials.

---

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

SLO 11B.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 11B.3.1.1: Identify and select appropriate semiconductor signal devices.

---

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

SLO 11B.3.2.1: Determine values of components.

---

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

SLO 11B.3.3.1: Demonstrate the appropriate utilization of semiconductor signal devices.

---

---

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

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

SLO 11B.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.**

No applicable SLOs.

---

**Goal 5:** Demonstrate **schematic reading.**

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

SLO 11B.5.1.1: Read, understand, and interpret schematic diagrams related to semiconductor signal devices.

---

**GLO 5.2:** Demonstrate **rendering.**

SLO 11B.5.2.1: Render schematic diagrams.

---

**GLO 5.3:** Demonstrate **breadboarding.**

SLO 11B.5.3.1: Demonstrate the appropriate use of solderless breadboards.

---

---

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

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

- SLO 11B.6.1.1: Demonstrate an understanding of semiconductor theory.
  - SLO 11B.6.1.2: Demonstrate an understanding of the difference between N-type and P-type semiconductor material.
  - SLO 11B.6.1.3: Demonstrate an understanding of how the junction between N-type and P-type material influences current flow.
  - SLO 11B.6.1.4: Demonstrate an understanding of how a signal diode works.
  - SLO 11B.6.1.5: Demonstrate an understanding of how zener diodes work.
  - SLO 11B.6.1.6: Demonstrate an understanding of how rectification is accomplished with diodes (i.e., full wave, half wave).
  - SLO 11B.6.1.7: Demonstrate an understanding of how a zener diode regulates power supply output.
  - SLO 11B.6.1.8: Demonstrate an understanding of how transistors operate (i.e., bipolar, field effect, and unijunction, MOSFET).
- 

**GLO 6.2:** Demonstrate the procedures for **analyzing electrical circuits**.

- SLO 11B.6.2.1: Analyze basic diode circuits.
  - SLO 11B.6.2.2: Analyze basic power supply circuits.
  - SLO 11B.6.2.3: Analyze basic power regulation with zener diodes.
  - SLO 11B.6.2.4: Analyze basic transistor circuits.
- 

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

**GLO 7.1:** Demonstrate **soldering skills**.

- SLO 11B.7.1.1: Demonstrate appropriate soldering skills.
- 

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

- SLO 11B.7.2.1: Appropriately select and install components.
- 

**GLO 7.3:** Demonstrate the procedures for **fabricating printed circuit boards**.

- SLO 11B.7.3.1: Fabricate circuit boards.
-

---

**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.

SLO 11B.8.1.1: Read, interpret, and communicate information related to electronics technology.

---

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

SLO 11B.8.2.1: Demonstrate an understanding of the mathematics required in semiconductor technology.

---

**GLO 8.3:** Apply the knowledge and skills from the **sciences**.

SLO 11B.8.3.1: Demonstrate an understanding of the chemistry of semiconductor materials.

---

**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 11B.9.1.1: Discuss various career opportunities in electronics technology (i.e., engineer, technician, and technologist).

---

**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.

SLO 11B.10.1.1: Discuss how semiconductor technology has made electronics technology more accessible for people.

---

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

No applicable SLOs.

---

---

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

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

No applicable SLOs.

---

**Goal 12:** Demonstrate **employability skills**.

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

SLO 11B.12.1.1: Demonstrate regular and punctual attendance.

SLO 11B.12.1.2: Demonstrate the ability to communicate respectfully and effectively with teachers, supervisors, co-workers, and students.

SLO 11B.12.1.3: Demonstrate accountability by taking responsibility for one's actions.

SLO 11B.12.1.4: Demonstrate adaptability, initiative, and effort.

SLO 11B.12.1.5: Demonstrate the ability to accept and follow direction and feedback.

SLO 11B.12.1.6: Demonstrate teamwork skills.

SLO 11B.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 11B.12.2.1: Discuss the diversity of cultures in society.

---

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

SLO 11B.12.3.1: Demonstrate critical thinking skills.

SLO 11B.12.3.2: Demonstrate problem-solving skills.

---

**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 11B.13.1.1: Demonstrate awareness of the evolution, technological progression, and emerging trends in semiconductors.

---