

Adult Basic Education
Level II Science

**Science 2014
Electricity**

Curriculum Guide

Suggested Resources: *Discovering Science 9*

Level II Science Courses

Science 2011 Life Science

Science 2012 Physical Science

Science 2013 Chemical Science

Science 2014 Electricity

Science 2015 Earth Science



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To the Instructor

Introduction to Science 2014

This course is intended to help students acquire the basic knowledge of electricity that will prepare them for study in one of the Level III profiles (Degree and Technical, Business-Related College and General College).

Students may/may not have to complete all ABE Level II Science courses. Students are only required to complete sufficient Level II Science courses to ensure success in one of the Level III graduation profiles. For example, a Level II student intending to complete the Degree-Technical Profile (Academic) in Level III may need to complete more Level II Science courses than a student intending to complete the General College Profile (General) in Level III.

Science 2014 Electricity is divided into two units. The outcomes for this course are given below. By completing the **Required Work** in this Study Guide, students will fulfill the outcomes for this course

The first unit, *Static Electricity and Electric Circuits*, will cover the following course outcomes:

- 1.01 Define the term “static electricity”.
- 1.02 Describe the types of charges on objects. Include: positive charge, negative charge, neutral charge.
- 1.03 Define the “Laws of Electric Charges”. Include: like charges repel, unlike charges attract, and charged objects attract some neutral ones.
- 1.04 Define the term “electric circuit”.
- 1.05 Describe the flow of charge in an electric circuit.
- 1.06 Describe the parts of an electric circuit.
- 1.07 Create a circuit diagram using appropriate circuit symbols. Include symbols for: lamp, cell, battery, wires, resistors, ammeter, and voltmeter.
- 1.08 Define the term “electrical resistance”.

The second unit, *Parallel and Series Connections and Uses of Electricity*, will cover the following course outcomes:

- 2.01 Distinguish between series and parallel circuits.
- 2.02 Give examples of situations where parallel and series circuits are used.
- 2.03 Define the term “electrical energy”.
- 2.04 Define the term “electrical power”.
- 2.05 Given power rating and time, determine electrical energy used.
- 2.06 Given electrical energy used and cost of electrical energy, determine cost to consumer.
- 2.07 Recognize that electrical energy is converted to many forms.
- 2.08 Recognize that EnergyGuide labels are used to aid consumers.
- 2.09 Describe the transfer and conversion of energy from a generating station to the home.
- 2.10 Describe different types of electrical generating stations. Include: hydroelectric, thermal and nuclear.

Students are required to complete one assignment and one core lab in this course. Instructors have flexibility to substitute another assignment and/or core lab if it is felt that the ones included in the Study Guide are inappropriate. The recommended resources for this course contain additional labs and assignments which may be used.

There are a number of Blackline Masters (BLM's) contained on the website accompanying the text that can be useful in conducting lab activities. Instructors are encouraged to preview this material and to exercise professional discretion in how to use it in the ABE classroom. Also, a number of these BLM's may be appropriate for use as assignments, unit reviews and for test/exam construction.

To the Instructor

Curriculum Guide

Each new ABE Level II Science course has a Curriculum Guide for the instructor and a Study Guide for the student. The Curriculum Guide includes the specific curriculum outcomes for the course. Suggestions for teaching, learning and assessment are provided to support student achievement of the outcomes. Some suggestions for teaching, learning and assessment will be repeated in the curriculum guides for the science courses when appropriate. Each course is divided into units. Each unit is presented in the Curriculum Guide as a **two-page layout of four columns** as illustrated in the figure below.

Curriculum Guide Organization The Two-Page, Four-Column Spread

Unit Number – Unit Title		Unit Number – Unit Title	
Outcomes	Notes for Teaching and Learning	Suggestions for Assessment	Resources
Specific curriculum outcomes for the unit.	Suggested activities, elaboration of outcomes, and background information.	Suggestions for assessing students' achievement of outcomes.	Recommended resources that address outcomes.

Study Guides

The Study Guide provides the student with the name of the text(s) required for the course and specifies the sections and pages that the student will need to refer to in order to complete the **Required Work** for the course. It guides the student through the course by assigning relevant reading and providing questions and/or assigning questions from the text or some other resource. Sometimes it also provides important points for students to note. The Study Guide is designed to give students some degree of independence in their work. Instructors should note, however, that there is material in the Curriculum Guide in the *Notes for Teaching and Learning* and *Suggestions for Assessment* columns that is not included in the Study Guide and instructors will need to review this information and decide how to include it.

To the Instructor

Resources

Recommended student resources for this course:

- *Discovering Science 9*. McGraw-Hill Ryerson. 2009. <http://www.mcgrawhill.ca>
- *Website (www.discoveringscience.ca)*
 - Provides links to sites that support Internet Connect, Explore More Features, and Integrated Research Investigations in the textbook.
 - Links to interesting educational and entertaining sites that support the curriculum.

Recommended instructor resources:

- *Teacher's Resource* (print)
- *Teacher's Resource* (CD-ROM)
 - Contains complete text of print Teacher's Resource in PDF format.
 - Contains modifiable Blackline Masters in both English and French.
 - Contains assessment checklists and rubrics.
- *Computerized Assessment Bank* (CD-ROM) in both English and French
 - Contains 1200 questions
 - Contains a variety of question types
 - All answers are provided
 - User-friendly ExamView software
- *Website (www.discoveringscience.ca)*
 - Contains additional interactive on-line resources for instructors.
 - Contains additional links for instructors.

Note: Instructors may have to adapt the content of these instructor resources to meet the needs of their individual ABE students.

The *Discovering Science* series of texts is a brand new science resource for Newfoundland and Labrador. The student and teacher resources contained in this series are designed to provide 100% alignment with Newfoundland and Labrador's intermediate science curriculum, on which the ABE Level II Science curriculum is based. These resources have been reviewed by Newfoundland and Labrador educators for their usefulness, content, design, relevancy and readability.

The *Teacher's Resource* for this series contains valuable resources for instructors. Like the texts, these resources were developed with the Newfoundland and Labrador intermediate science curriculum in mind as well as the principles of scientific literacy.

Instructors are encouraged to utilize the *Teacher's Resource* and have the flexibility to adapt any material contained in the resources to better meet the needs of adult learners.

Recommended Evaluation

Written Notes	20%
Labs/Assignments/Test(s)	30%
Final Exam (entire course)	<u>50%</u>
	100%

The overall pass mark for the course is 50%.

Note: The evaluation scheme recommended above is presented as a suggestion. Institutions may choose an alternate evaluation scheme in order to meet the individual needs of adult learners. The Department of Education has no requirement that a final exam must be given in this course. Instructors/institutions can decide if a final exam is necessary based on their own policies and procedures.

Unit 1: Static Electricity and Electric Circuits—Suggestions for Teaching, Learning and Assessment

Outcomes	Notes for Teaching and Learning
<p>1.01 Define the term “static electricity”.</p> <p>1.02 Describe the types of charges on objects. Include: positive charge, negative charge, neutral charge.</p> <p>1.03 Define the “Laws of Electric Charges”. Include: like charges repel, unlike charges attract, and charged objects attract some neutral ones.</p> <p>1.04 Define the term “electric circuit”.</p> <p>1.05 Describe the flow of charge in an electric circuit.</p> <p>1.06 Describe the parts of an electric circuit.</p> <p>1.07 Create a circuit diagram using appropriate circuit symbols. Include symbols for: lamp, cell, battery, wires, resistors, ammeter, and voltmeter.</p> <p>1.08 Define the term “electrical resistance”.</p>	<ul style="list-style-type: none"> • Instructors may encourage students to read “A Tour of Your Textbook” located on pages x-xvi of the student textbook. This tour explains in detail the key structural features of the textbook. • Instructors may point out the Internet Connect feature of the textbook. This may be helpful for students. This feature uses www.discoveringscience.ca to learn more about the topic being studied. • The username and password for www.discoveringscience.ca are in the accompanying <i>Teacher’s Resource</i>. • Instructors are encouraged to read and become familiar with pages TR-1 to TR-17 in the <i>Teacher’s Resource</i>. Although the information contained in these pages are written for intermediate science teachers, there is sufficient information presented in these pages to be of use to ABE instructors as well. • The <i>Teacher’s Resource</i> contains notes for teaching and learning. Instructors can read through this material for information to supplement their teaching. Instructors can use their professional judgment in determining what information is useful. • Students will be introduced to many new terms throughout this course. Instructors may wish to have students start a vocabulary list and add to it regularly as they work through this unit. The Glossary can be useful to provide definitions. • Students can be encouraged to prepare Key Word Concept Maps. • Instructors may wish to encourage students to keep work organized, neat and legible. Although not mandatory, students can be encouraged to type all written response work on a computer if resources allow.

Unit 1: Static Electricity and Electric Circuits—Suggestions for Teaching, Learning and Assessment

Outcomes	Notes for Teaching and Learning
	<ul style="list-style-type: none">• www.discoveringscience.ca contains the following BLM's under the <i>Discovering Science 9</i> link (Note that instructors need to be registered in order to access this material. Register by following the prompts and provide all required information):<ul style="list-style-type: none">○ Unit Summaries○ Key Terms○ Key Terms Word Puzzles○ Charge Transfer Diagrams○ Charging Insulators and Conductors○ Obeying the Laws of Static Charge○ Conduction/Induction Venn Diagram○ Conduction/Induction Charge Diagram○ Forces and Electrical Charges○ Pop Can Race○ Investigating Static Electricity○ Chapter Review○ Fruit Battery○ Making Light Bulbs Glow○ Make Your Own Dimmer Switch○ Drawing Circuit Diagrams○ Circuit Symbols○ Calculate the Current○ Calculate the Potential Difference○ Find Out Activity 8-2D, Measuring Current○ Resist Your Thirst○ Ohm's Law○ Resistor Colour Code○ Practising Calculating Resistance○ Electricity Crossword Puzzle○ Calculating Resistance○ Resistors and Ohm's Law○ Note: Instructors may have to adapt some of this material. Use of this material is at the discretion of the instructor.

Unit 1: Static Electricity and Electric Circuits—Suggestions for Teaching, Learning and Assessment

Suggestions for Assessment

- Instructors should ensure that students understand the reading material presented in the text. Although the text is written for students at a junior high reading level, adult learners may have some difficulty understanding the language.
- The *Teacher's Resource* provides an explanation concerning the relationship between assessment and evaluation. Instructors may wish to read page 2 in the *Teacher's Resource* for material on this relationship.
- Instructors should review all written responses completed by students based on the **Required Work** in the Study Guide. Ideally, this should be reviewed prior to students writing any tests/exams. Instructors may discuss both strengths and weaknesses based on this review. It is suggested that instructors allow students to re-do any items that may be incorrect or incomplete.
- Instructors are encouraged to become familiar with the assessment tools provided in the *Teacher's Resource*. Instructors can exercise professional judgement in determining how to integrate these assessment tools in their teaching practice. These assessment tools include such things as rubrics, checklists, observation notes, and self-assessment. These tools are also available on the accompanying website and CD and website.
- Instructors will find answers to some of the written work assigned in the Study Guide contained in the *Teacher's Resource*.
- Instructors will find Blackline Masters (BLM's) on the website www.discoveringscience.ca. Instructors will have to register in order to gain access to the teacher resources on this site. Follow the prompts and complete all required fields. Instructors can exercise professional judgement in determining how they wish to integrate these BLM's into their teaching.

Recommended resources that address outcomes

- Many of the written response items contained in the Study Guide are based on the **Reading Check** exercises from the text. Instructors may use the **Checking Concepts** and **Understanding Key Ideas** sections in the text for supplemental study and evaluation material..
- See page 2 in the *Teacher's Resource* for information on the relationship between assessment and evaluation.
- See page 6 in the *Teacher's Resource* for information on some suggested assessment methods.
- See page 7 in the *Teacher's Resource* for material on assessment tools.
- Page 11 in the *Teacher's Resource* contains a sample recording keeping tool that instructors may find helpful.
- The username and password for www.discoveringscience.ca are in the accompanying *Teacher's Resource*.

Unit 2: Parallel and Series Connections and Uses of Electricity—Suggestions for Teaching, Learning and Assessment

Outcomes	Notes for Teaching and Learning
<p>2.01 Distinguish between series and parallel circuits.</p> <p>2.02 Give examples of situations where parallel and series circuits are used.</p> <p>2.03 Define the term “electrical energy”.</p> <p>2.04 Define the term “electrical power”.</p> <p>2.05 Given power rating and time, determine electrical energy used.</p> <p>2.06 Given electrical energy used and cost of electrical energy, determine cost to consumer.</p> <p>2.07 Recognize that electrical energy is converted to may forms.</p> <p>2.08 Recognize that Energuide labels are used to aid consumers.</p> <p>2.09 Describe the transfer and conversion of energy from a generating station to the home.</p> <p>2.10 Describe different types of electrical generating stations. Include: hydroelectric, thermal and nuclear.</p>	<ul style="list-style-type: none"> • Same general comments as for Unit 1. • Instructors are encouraged to read the notes for teaching and learning contained in the <i>Discovering Science 9 Teacher’s Resource</i>. Instructors can use professional judgement in determining what information is useful. This resource is also available online at www.discoveringscience.ca. • www.discoveringscience.ca contains the following useful BLM’s under the <i>Discovering Science 9</i> link. (Note that instructors need to be registered in order to access this material. Register by following the prompts and provide all required information): <ul style="list-style-type: none"> ○ Series Circuits ○ Parallel Circuits ○ Comparing Series and Parallel Circuits ○ Designing Circuits ○ Drawing Series and Parallel Circuit Diagrams ○ Understanding Circuit Diagrams ○ Calculate Voltage and Current ○ Compound Circuits ○ A Series of Lights and Cells ○ Parallel Lights and Cells ○ Resistors in Series and Parallel ○ Energy Transformations in Resistors ○ Calculating Power ○ Electrical Power and Energy ○ Power Problems ○ Calculating Energy Consumption ○ The Price of Energy ○ The Cost of Electricity ○ A Current View of Power ○ Putting Energy Conversions to Good Use ○ Calculating Energy Efficiency ○ Calculating Energy Input or Output ○ Generating and Electric Current ○ The Efficiency of Producing and Transmitting Electrical Energy ○ Review Concept Map ○ Note: Instructors may have to adapt some of this material. Use of this material is at the discretion of the instructor.

Unit 2: Parallel and Series Connections and Uses of Electricity—Suggestions for Teaching, Learning and Assessment

Suggestions for Assessment	Recommended resources that address outcomes
<ul style="list-style-type: none">• Same general comments as for Unit 1.	<p>Same general comments as for Unit 1.</p> <ul style="list-style-type: none">• Additional resources for the instructor is available online at www.discoveringscience.ca• The username and password for www.discoveringscience.ca are in the accompanying <i>Teacher's Resource</i>.