

What is the purpose of the labs?
How do the labs teach this process?
Where do I get the lab information?

What's the point of PC/CP320?

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What is the purpose of the labs?
How do the labs teach this process?
Where do I get the lab information?

Why are we here?
Modular design

Why are we here?

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- CP104/164 taught the basics of *Python programming*.

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- PC/CP320 will teach how to *design and build circuits* that interact with the real world.

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- PC/CP320 will teach how to *design and build circuits* that interact with the real world.

As embedded systems become more universal, circuits which involve logic and which interact with the real world are everywhere.

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What's special about circuits that interact with the real world?

What's special about circuits that interact with the real world?

- How do you get *input* from the real world?

What's special about circuits that interact with the real world?

- How do you get *input* from the real world?
- How do you provide *output* to the real world?

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- How do you get *input* from the real world?
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- How do *adjust* voltages, etc. to match the real world?

What's special about circuits that interact with the real world?

- How do you get *input* from the real world?
- How do you provide *output* to the real world?
- How do *adjust* voltages, etc. to match the real world?

These issues apply whether you're in the digital world, the analog world, or some combination of both.

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Why are we here?

Modular design

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- Designing complex circuits is difficult.

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Building them up from smaller **modules** is essential.

Modular design

- Designing complex circuits is difficult.

Building them up from smaller **modules** is essential.

Several different approaches will be used to develop your abilities to think and work in modular terms.

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Learning Objectives

How will I learn this process?
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Learning Objectives

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Learning Objectives

There are 3 types of learning objectives:

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Learning Objectives

There are 3 types of learning objectives:

- 1 Conceptual

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Learning Objectives

There are 3 types of learning objectives:

- 1 Conceptual
understanding certain ideas

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Learning Objectives

There are 3 types of learning objectives:

- 1 Conceptual
understanding certain ideas
- 2 Practical

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There are 3 types of learning objectives:

- 1 Conceptual
understanding certain ideas
- 2 Practical
applying knowledge to specific “real-world” tasks

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- 1 Conceptual
understanding certain ideas
- 2 Practical
applying knowledge to specific “real-world” tasks
- 3 Communication

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- 1 Conceptual
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applying knowledge to specific “real-world” tasks
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presenting information and results in formats which are typical in professional settings

Learning Objectives

There are 3 types of learning objectives:

- 1 Conceptual
understanding certain ideas
- 2 Practical
applying knowledge to specific “real-world” tasks
- 3 Communication
presenting information and results in formats which are typical in professional settings

Different types of learning objectives lead to different types of assessments.

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Conceptual Learning Objectives

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Conceptual Learning Objectives

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Conceptual Learning Objectives

Important ideas to grasp include:

- 1 Using correct terminology

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Conceptual Learning Objectives

Important ideas to grasp include:

- 1 Using correct terminology
- 2 Knowing characteristics of series and parallel circuits

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Conceptual Learning Objectives

Important ideas to grasp include:

- 1 Using correct terminology
- 2 Knowing characteristics of series and parallel circuits
- 3 Understanding use and properties of circuit configurations such as voltage dividers and Wheatstone bridges

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Conceptual Learning Objectives

Important ideas to grasp include:

- 1 Using correct terminology
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- 3 Understanding use and properties of circuit configurations such as voltage dividers and Wheatstone bridges
- 4 Being familiar with analog characteristics of digital logic gates

Conceptual Learning Objectives

Important ideas to grasp include:

- 1 Using correct terminology
- 2 Knowing characteristics of series and parallel circuits
- 3 Understanding use and properties of circuit configurations such as voltage dividers and Wheatstone bridges
- 4 Being familiar with analog characteristics of digital logic gates
- 5 Identifying common operational amplifier circuits and explaining their operation

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- 5 Identifying common operational amplifier circuits and explaining their operation
- 6 Suggesting alternative ways to solve data acquisition and control problems

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These will partly be assessed using quizzes.

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Practical Learning Objectives

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Practical Learning Objectives

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Practical Learning Objectives

Tasks to become familiar with include:

- 1 Measuring DC voltages, currents, etc. using digital meters

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Tasks to become familiar with include:

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Practical Learning Objectives

Tasks to become familiar with include:

- 1 Measuring DC voltages, currents, etc. using digital meters
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- 5 Designing circuitry to convert output from a sensor to a voltage which falls within a specified range

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These will partly be assessed using lab demonstrations and the lab projects.

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Communication Learning Objectives

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Communication Learning Objectives

Professional forms of communication include:

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Professional forms of communication include:

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Professional forms of communication include:

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- 3 Sketching waveforms

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Professional forms of communication include:

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- 4 Summarizing key points related to each lab exercise

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- 4 Summarizing key points related to each lab exercise
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- 6 Creating block diagrams for circuits and sub-circuits to explain complex circuit designs

These will be assessed directly using lab summaries and the lab projects.

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- *Lab Demonstrations -*

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- *Lab Demonstrations* -
show that you've *completed and understood* specific tasks

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How will I learn this process?

- *Lab Demonstrations* -
show that you've *completed and understood* specific tasks
- *Lab Postlab Requirements* -

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How will I learn this process?

- *Lab Demonstrations* -
show that you've *completed and understood* specific tasks
- *Lab Postlab Requirements* -
show that you've *identified important ideas* from each lab

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- *Lab Demonstrations* -
show that you've *completed and understood* specific tasks
- *Lab Postlab Requirements* -
show that you've *identified important ideas* from each lab
- *Lab Quizzes* -

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- *Lab Quizzes* -
show that you have *internalized the important concepts*

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- *Lab Projects* -

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show that you've *completed and understood* specific tasks
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show that you have *internalized the important concepts*
- *Lab Projects* -
show you can *apply what you've learned to a real situation*

How will I learn this process?

- *Lab Demonstrations* -
show that you've *completed and understood* specific tasks
- *Lab Postlab Requirements* -
show that you've *identified important ideas* from each lab
- *Lab Quizzes* -
show that you have *internalized the important concepts*
- *Lab Projects* -
show you can *apply what you've learned to a real situation*

The *lectures* will prepare you for the labs.

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What is a lab notebook?

- Book- or coil-bound notebook

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What is a lab notebook?

- Book- or coil-bound notebook
Bring it to **every** lab and lecture

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What is a lab notebook?

- Book- or coil-bound notebook
Bring it to **every** lab and lecture
Record all data and observations in the lab

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Learning Objectives
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What is a lab notebook?

- Book- or coil-bound notebook
 - Bring it to **every** lab and lecture
 - Record all data and observations in the lab
 - Create a summary in the notebook *after* the lab

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What is a lab notebook?

- Book- or coil-bound notebook
 - Bring it to **every** lab and lecture
 - Record all data and observations in the lab
 - Create a summary in the notebook *after* the lab
 - Photocopy and hand in the summary as required.

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- Book- or coil-bound notebook
 - Bring it to **every** lab and lecture
 - Record all data and observations in the lab
 - Create a summary in the notebook *after* the lab
 - Photocopy and hand in the summary as required.

The lab notebook can be used for quizzes and lab tests, so it's to your benefit to keep the notebook organized and use it well.

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What are *Pre-lab requirements*?

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What are *Pre-lab requirements*?

- Usually they involve looking up information that will be used in the lab.

What are *Pre-lab requirements*?

- Usually they involve looking up information that will be used in the lab.

The background information will prepare you to get through the lab as efficiently as possible.

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What are *Post-lab requirements*?

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What are *Post-lab requirements*?

- Summary (usually handed in)

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What are *Post-lab requirements*?

- Summary (usually handed in)
- One or two other questions (sometimes)

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What are *Post-lab requirements*?

- Summary (usually handed in)
- One or two other questions (sometimes)
questions which you should be able to answer if you understood what was important in the lab

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What are *Post-lab requirements*?

- Summary (usually handed in)
- One or two other questions (sometimes)
questions which you should be able to answer if you understood what was important in the lab
- Building blocks (sometimes)

What are *Post-lab requirements*?

- Summary (usually handed in)
- One or two other questions (sometimes)
questions which you should be able to answer if you understood what was important in the lab
- Building blocks (sometimes)
circuit to be demonstrated and kept for future use

What are *Post-lab requirements*?

- Summary (usually handed in)
- One or two other questions (sometimes)
questions which you should be able to answer if you understood what was important in the lab
- Building blocks (sometimes)
circuit to be demonstrated and kept for future use
- Simulations (sometimes)

What are *Post-lab requirements*?

- Summary (usually handed in)
- One or two other questions (sometimes)
questions which you should be able to answer if you understood what was important in the lab
- Building blocks (sometimes)
circuit to be demonstrated and kept for future use
- Simulations (sometimes)
allows testing circuit performance with different parameters easily

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Where do I get the course information?

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Where do I get the course information?

- The website -

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Where do I get the course information?

- The website -
denethor.wlu.ca/pc320

Where do I get the course information?

- The website -
denethor.wlu.ca/pc320
Everything for the course is there.

Where do I get the course information?

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Everything for the course is there.

There is a lot of stuff on the webpage, so spend some time to become familiar with how it is laid out.