

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?

Terry Sturtevant

Wilfrid Laurier University

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What is the purpose of the labs?  
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Why are we here?  
Modular design

# Why are we here?

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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?



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- 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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# Modular design

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## Modular design

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- 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

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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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*understanding* certain ideas

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# Learning Objectives

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- 1 Conceptual  
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- 2 Practical

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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

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*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

Important ideas to grasp include:

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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:

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- 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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- 4 Being familiar with analog characteristics of digital logic gates

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- 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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- 4 Being familiar with analog characteristics of digital logic gates
- 5 Identifying common operational amplifier circuits and explaining their operation
- 6 Suggesting alternative ways to solve data acquisition and control problems

**These will partly be assessed using quizzes.**

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# Practical Learning Objectives

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## Practical Learning Objectives

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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## Practical Learning Objectives

Tasks to become familiar with include:

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- 2 Measuring DC and AC voltages and time intervals using oscilloscopes

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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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- 3 Setting up DC supplies and function generators to produce voltages and signals as needed

## Practical Learning Objectives

Tasks to become familiar with include:

- 1 Measuring DC voltages, currents, etc. using digital meters
- 2 Measuring DC and AC voltages and time intervals using oscilloscopes
- 3 Setting up DC supplies and function generators to produce voltages and signals as needed
- 4 Reading data sheets for electronic components to determine how to use them



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## Practical Learning Objectives (continued)

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## Practical Learning Objectives (continued)

- 5 Designing circuitry to convert output from a sensor to a voltage which falls within a specified range

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## Practical Learning Objectives (continued)

- 5 Designing circuitry to convert output from a sensor to a voltage which falls within a specified range
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## Practical Learning Objectives (continued)

- 5 Designing circuitry to convert output from a sensor to a voltage which falls within a specified range
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- 7 Writing code to read sensors and control actuators in order to perform a real-world task

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

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Professional forms of communication include:

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## Communication Learning Objectives

Professional forms of communication include:

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

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## How will I learn this process?

- *Lab Demonstrations -*

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## How will I learn this process?

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

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show that you've *completed and understood* specific tasks
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## How will I learn this process?

- *Lab Demonstrations* -  
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- *Lab Postlab Requirements* -  
show that you've *identified important ideas* from each lab

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- *Lab Quizzes* -

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show you can *apply what you've learned to a real situation*



## How will I learn this process?

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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?

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Record all data and observations in 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

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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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## 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.

**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?**  
What are Post-lab requirements?

## What are *Pre-lab requirements*?

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

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- 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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How will I learn this process?  
What is a lab notebook?  
What are Pre-lab requirements?  
What are Post-lab requirements?

## 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  
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How do the labs teach this process?  
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There is a lot of stuff on the webpage, so spend some time to become familiar with how it is laid out.