

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

What's the point of these labs?

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What is the purpose of the labs?
How do the labs teach this process?
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Why are we here?

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Why are we here?

Why are we here?

- Because my timetable says so

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Why are we here?

Why are we here?

- Because my timetable says so
- So I spend less time on Facebook

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- To get 25% of my physics mark

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- To go over some physics that was covered in class

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Why are we here?

Why are we here?

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- So I spend less time on Facebook
- To get 25% of my physics mark
- To go over some physics that was covered in class
- To learn some physics that *wasn't* covered in class

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None of the above

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- Lectures teach physics *principles*

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- Lectures teach physics *principles*
Labs teach you the *process of science research*

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Why are we here?

- Lectures teach physics *principles*
Labs teach you the *process of science research*
This process is not specific to this course;

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- Lectures teach physics *principles*
Labs teach you the *process of science research*
**This process is not specific to this course;
it isn't even specific to physics**

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Most students won't go into research careers,

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- Lectures teach physics *principles*
Labs teach you the *process of science research*
**This process is not specific to this course;
it isn't even specific to physics**

Most students won't go into research careers, **but everyone should understand how to solve problems scientifically.**

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What will I remember after I leave university?

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- Facts and Formulas -

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- Facts and Formulas -
only those you use regularly

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only those you use regularly
- Principles -
a few

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But the *process* of scientific research should stick with you

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- Facts and Formulas -
only those you use regularly
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a few

But the *process* of scientific research should stick with you **once you understand it.**

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Learning Objectives

How will I learn this process?
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Learning Objectives

There are 3 types of learning objectives:

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There are 3 types of learning objectives:

① Conceptual

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- 1 Conceptual
understanding certain ideas

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- 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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- ② Practical
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- ③ Communication

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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
- ③ Communication
presenting information and results in formats which are typical in professional settings

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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

Important ideas to grasp include:

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Conceptual Learning Objectives

Important ideas to grasp include:

- 1 uncertainties in measurement

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Conceptual Learning Objectives

Important ideas to grasp include:

- ① uncertainties in measurement
- ② error propagation, uncertainties in final results, and agreement of quantities

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Conceptual Learning Objectives

Important ideas to grasp include:

- ① uncertainties in measurement
- ② error propagation, uncertainties in final results, and agreement of quantities
- ③ basic statistical analysis of repeated measurements, including uncertainty in the average

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Conceptual Learning Objectives

Important ideas to grasp include:

- ① uncertainties in measurement
- ② error propagation, uncertainties in final results, and agreement of quantities
- ③ basic statistical analysis of repeated measurements, including uncertainty in the average
- ④ how to improve experiments based on uncertainty analysis

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Practical Learning Objectives

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Practical Learning Objectives

Tasks to become familiar with include:

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Tasks to become familiar with include:

- ① determining precision measure of various instruments

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Practical Learning Objectives

Tasks to become familiar with include:

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- ② identifying experimental factors which introduce uncertainty into measurements

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Tasks to become familiar with include:

- ① determining precision measure of various instruments
- ② identifying experimental factors which introduce uncertainty into measurements
- ③ calculating uncertainties in quantities derived from measurements

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- ④ using a spreadsheet to perform any of the required calculations

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Practical Learning Objectives

Tasks to become familiar with include:

- ① determining precision measure of various instruments
- ② identifying experimental factors which introduce uncertainty into measurements
- ③ calculating uncertainties in quantities derived from measurements
- ④ using a spreadsheet to perform any of the required calculations
- ⑤ comparing quantities based on their uncertainties

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Professional forms of communication include:

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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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Communication Learning Objectives

Professional forms of communication include:

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The lab report is the single component of the lab with the highest weight in the final lab grade.

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- Lab *exercises* -

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these show individual steps of the process

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this will give you an example of a research question to answer
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the finished report will illustrate the entire research process
and how it leads to answering the research question(s).

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- Lab *test* -

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a final written test will examine your grasp of concepts and calculations.

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The *specific* experiment isn't that important;

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- Lab *report* -
the finished report will illustrate the entire research process and how it leads to answering the research question(s).
- Lab *test* -
a final written test will examine your grasp of concepts and calculations.

The *specific* experiment isn't that important; **its value is to illustrate the process.**

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What happens each week? (before the lab)

Before the lab

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What happens each week? (before the lab)

Before the lab

- Read “*Theory*” section of lab manual

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What happens each week? (before the lab)

Before the lab

- Read “*Theory*” section of lab manual
OR

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What happens each week? (before the lab)

Before the lab

- Read “*Theory*” section of lab manual

OR

Read alternative document

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What happens each week? (before the lab)

Before the lab

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Read alternative document

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What happens each week? (before the lab)

Before the lab

- Read “*Theory*” section of lab manual

OR

Read alternative document

OR

Watch screencast (video) of alternative document

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What happens each week? (before the lab)

Before the lab

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OR
Read alternative document
OR
Watch screencast (video) of alternative document
- Do quiz on MyLearningSpace to show that you’ve understood theory

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- Pre-lab **tasks** -

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What happens each week? (before the lab)

Before the lab

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Watch screencast (video) of alternative document
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- Pre-lab **tasks** -
things which have to be done *before* the lab

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What happens each week? (before the lab)

Before the lab

- Read “*Theory*” section of lab manual

OR

Read alternative document

OR

Watch screencast (video) of alternative document

- Do quiz on MyLearningSpace to show that you’ve understood theory
- Pre-lab **tasks** -
things which have to be done *before* the lab

These ensure that you are *prepared* for the lab.

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Learning Objectives
How will I learn this process?

What happens each week?

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How do I survive the lab report?

What happens each week? (during the lab)

During the lab

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How do the labs teach this process?
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Learning Objectives
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What is the most important lab requirement?
How do I survive the lab report?

What happens each week? (during the lab)

During the lab

- In-lab **tasks** -

What is the purpose of the labs?
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Learning Objectives
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What happens each week? (during the lab)

During the lab

- In-lab **tasks** -
things which have to be done *during* the lab

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- In-lab **tasks** -
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- In-lab **questions** -

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- In-lab **tasks** -
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- In-lab **questions** -
questions which have to be answered *during* the lab

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What happens each week? (during the lab)

During the lab

- In-lab **tasks** -
things which have to be done *during* the lab
- In-lab **questions** -
questions which have to be answered *during* the lab

These have to be completed *while you have the equipment in front of you.*

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What happens each week? (after the lab)

After the lab

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What happens each week? (after the lab)

After the lab

- Post-lab **tasks** -

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What happens each week? (after the lab)

After the lab

- Post-lab **tasks** -
things which can be completed *after* the lab

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- Post-lab **tasks** -
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- Post-lab **questions** -

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- Post-lab **tasks** -
things which can be completed *after* the lab
- Post-lab **questions** -
questions which can be answered *after* the lab

These often require *further analysis* which can be done outside the lab.

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What is the most important lab requirement?

- The **lab report** -

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What is the most important lab requirement?

- The **lab report** -
it's worth *at least* 40% of your lab grade

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What is the most important lab requirement?

- The **lab report** -
it's worth *at least* 40% of your lab grade
it's worth *at most* **60%** of your lab grade

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What is the most important lab requirement?

- The **lab report** -
it's worth *at least* 40% of your lab grade
it's worth *at most* **60%** of your lab grade

That's right; 60%!

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How do I survive the lab report?

- It won't be due until the 4th lab.

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How do I survive the lab report?

- It won't be due until the 4th lab.
- *If you're not happy with the mark, you can resubmit it at your last lab period.*

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There will be feedback on it which can help you improve it.

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There will be feedback on it which can help you improve it.
- *The better your mark on the final lab report, the more it will count toward your final lab grade.*

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There will be feedback on it which can help you improve it.
- *The better your mark on the final lab report, the more it will count toward your final lab grade.*

Since the lab report puts together all that you've learned in the process, it can replace lower marks on exercises which you got while learning the process.

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Where do I get the lab information?

- The website -

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- The website -
denethor.wlu.ca/pc131

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What about laptops in the lab?

Where do I get the lab information?

- The website -
denethor.wlu.ca/pc131
Everything for the labs is there.

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

Where do I get the lab information?

- The website -

denethor.wlu.ca/pc131

Everything for the labs is there.

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

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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?
What about laptops in the lab?

What about laptops in the lab?

- Do I need a laptop?

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

What about laptops in the lab?

- Do I need a laptop?

No

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

What about laptops in the lab?

- Do I need a laptop?

No

All of the software we use is available in the computer labs and/or has free alternatives.

What is the purpose of the labs?
How do the labs teach this process?
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What about laptops in the lab?

- Do I need a laptop?

No

All of the software we use is available in the computer labs and/or has free alternatives.

- Can I use a laptop?

What is the purpose of the labs?
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Where do I get the lab information?
What about laptops in the lab?

What about laptops in the lab?

- Do I need a laptop?

No

All of the software we use is available in the computer labs and/or has free alternatives.

- Can I use a laptop?

Yes

What about laptops in the lab?

- Do I need a laptop?

No

All of the software we use is available in the computer labs and/or has free alternatives.

- Can I use a laptop?

Yes

You can save trees and possibly time.

What about laptops in the lab?

- Do I need a laptop?

No

All of the software we use is available in the computer labs and/or has free alternatives.

- Can I use a laptop?

Yes

You can save trees and possibly time.

Wireless access in the labs means that the website and thus everything needed for the labs is available if you're using a laptop.

What about laptops in the lab?

- Do I need a laptop?

No

All of the software we use is available in the computer labs and/or has free alternatives.

- Can I use a laptop?

Yes

You can save trees and possibly time.

Wireless access in the labs means that the website and thus everything needed for the labs is available if you're using a laptop. Windows, Mac, and Linux should all be fine.