#### What's the point of these labs?

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Why are we here?
What's different this term?
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What happens each week?
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How do I survive the lab report?

#### Why are we here?

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#### Why are we here?

PC141 labs introduced the research process;

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#### Why are we here?

PC141 labs introduced the research process;
 PC142 labs will expand on that.

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#### Why are we here?

PC141 labs introduced the research process;

PC142 labs will expand on that.

As in PC141, this process is not specific to this course;

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#### Why are we here?

PC141 labs introduced the research process;

PC142 labs will expand on that.

As in PC141, this process is not specific to this course; it isn't even specific to physics

What is the purpose of the labs?

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#### What's different this term?

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Why are we here?

#### What's different this term?

Using graphs in labs -

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#### What's different this term?

 Using graphs in labs linearizing equations to produce straight line graphs

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#### What's different this term?

Using graphs in labs linearizing equations to produce straight line graphs
 graphing and least squares fitting with a spreadsheet

#### What is the purpose of the labs? Where do I get the lab information?

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#### What's different this term?

Using graphs in labs linearizing equations to produce straight line graphs graphing and least squares fitting with a spreadsheet including determining uncertainties from graphs

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#### What's different this term?

Using graphs in labs linearizing equations to produce straight line graphs
 graphing and least squares fitting with a spreadsheet
 including determining uncertainties from graphs
 plotting curves with a spreadsheet

#### What is the purpose of the labs? Where do I get the lab information?

What about laptops in the lab?

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#### What's different this term?

Using graphs in labs -

linearizing equations to produce straight line graphs graphing and least squares fitting with a spreadsheet including determining uncertainties from graphs plotting curves with a spreadsheet

As in PC141, the finished report will illustrate the entire research process and how it leads to answering the research question(s).

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• Using graphs in labs -

linearizing equations to produce straight line graphs graphing and least squares fitting with a spreadsheet including determining uncertainties from graphs plotting curves with a spreadsheet

As in PC141, the finished report will illustrate the entire

research process and how it leads to answering the research question(s).

The specific experiment isn't that important;



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#### What's different this term?

Using graphs in labs -

linearizing equations to produce straight line graphs graphing and least squares fitting with a spreadsheet including determining uncertainties from graphs plotting curves with a spreadsheet

As in PC141, the finished report will illustrate the entire research process and how it leads to answering the research question(s).

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



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### Learning Objectives

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### 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:

Conceptual understanding certain ideas

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#### Learning Objectives

- Conceptual understanding certain ideas
- ② Practical

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#### Learning Objectives

- Conceptual understanding certain ideas
- Practical applying knowledge to specific "real-world" tasks

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#### Learning Objectives

- Conceptual understanding certain ideas
- Practical applying knowledge to specific "real-world" tasks
- 3 Communication

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#### Learning Objectives

- Conceptual understanding certain ideas
- 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:

- Conceptual understanding certain ideas
- 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 often 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:

Identifying linear relationships between variables in an equation

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#### Conceptual Learning Objectives

#### Important ideas to grasp include:

- Identifying linear relationships between variables in an equation
- ② Recognizing the significance of whether the scatter of points on a graph is large or small

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#### Conceptual Learning Objectives

#### Important ideas to grasp include:

- Identifying linear relationships between variables in an equation
- Recognizing the significance of whether the scatter of points on a graph is large or small
- Suggesting improvements to an experiment, based on graphical 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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### Practical Learning Objectives

Tasks to become familiar with include:

① Graphing data with error bars

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### Practical Learning Objectives

Tasks to become familiar with include:

- Graphing data with error bars
- Performing least squares fits on linear data

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### Practical Learning Objectives

Tasks to become familiar with include:

- ① Graphing data with error bars
- Performing least squares fits on linear data
- 3 Determining uncertainties in the slope and y-intercept of linear graphs, based on whether the scatter of points is large or small

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## Communication Learning Objectives

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#### Communication Learning Objectives

Professional forms of communication include:

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#### Communication Learning Objectives

Professional forms of communication include:

Writing a professional lab report, incorporating x-y graphs and graphical analysis

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### What happens each week?

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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

Read "Theory" section of lab manual

OR

Read alternative document

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

OR

Watch screencast (video) of 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

 Do quiz on MyLearningSpace to show that you've understood theory

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#### What happens each week? (before the lab)

#### Before the lab

Read "Theory" section of lab manual

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Watch screencast (video) of alternative document

- Do quiz on MyLearningSpace to show that you've understood theory
- Pre-lab tasks -

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### What happens each week? (before the lab)

#### Before the lab

Read "Theory" section of lab manual

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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

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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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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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### What happens each week? (during the lab)

**During** the lab

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# What happens each week? (during the lab)

During the labIn-lab tasks -

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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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#### 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 -

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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

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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
   hese have to be completed while you have the equipment in fron

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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### What happens each week? (after the lab)

#### After the lab

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

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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
- Post-lab questions questions which can be answered after the lab

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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
- 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?

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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 30% of your lab grade

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#### What is the most important lab requirement?

The lab report it's worth at least 30% of your lab grade
 it's worth at most 50% of your lab grade

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#### What is the most important lab requirement?

The lab report -

it's worth at least 30% of your lab grade it's worth at most **50%** of your lab grade

That's right; 50%!

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### How do I survive the lab report?

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#### How do I survive the lab report?

It won't be due until the 4<sup>th</sup> lab.

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#### How do I survive the lab report?

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

Why are we here?
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#### How do I survive the lab report?

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

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

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#### How do I survive the lab report?

- It won't be due until the 4<sup>th</sup> lab.
- If you're not happy with the mark, you can resubmit it at your last lab period.
  - 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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#### How do I survive the lab report?

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

# Where do I get the lab information?

# Where do I get the lab information?

• The website -

# Where do I get the lab information?

The website denethor.wlu.ca/pc142

## Where do I get the lab information?

The website denethor.wlu.ca/pc142
 Everything for the labs is there.

## Where do I get the lab information?

The website denethor.wlu.ca/pc142

Everything for the labs is there.

Bookmark the page for your labs, whether it's odd or even.

## Where do I get the lab information?

The website -

denethor.wlu.ca/pc142

Everything for the labs is there.

Bookmark the page for your labs, whether it's odd or even.

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

# What about laptops in the lab?

### What about laptops in the lab?

• Do I need a laptop?

## What about laptops in the lab?

Do I need a laptop?No

Do I need a laptop?

No

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

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?

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

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.

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.

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.