Activity Classification and Learning Objectives Catalogue

(selected activities in Biology/ Health, Engineering and Physics)

Output of eSTEeM project “An investigation into the breadth of learning objectives and skills developed in OpenSTEM Labs experiments”

Contact: Helen Lockett (helen.lockett@open.ac.uk)

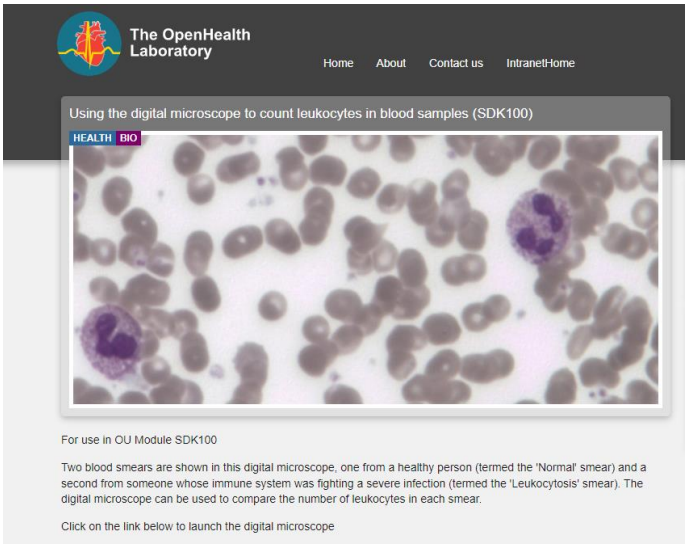
Date: 28th March 2022

Contents

Using the digital microscope to count leukocytes in blood samples (SDK100)

Experiment Details:

Equipment Name: **Virtual Microscope**
Module Reference: **SDK100**



Experiment Classification:

Experiment Type: **Virtual laboratory**
Online interaction Type: **Stored dataset**
Experimenter: **Group - informal**
Context (how life-like): **Limited context**
Learning structure: **Directed**
Pre-lab preparation: **Independent**
Pre-requisites: **Module pre-requisites**
Access type: **Open**
In-lab support: **Independent**

Learning Objectives:

By completing this OpenSTEM Labs activity students *will be able to* …

- Develop subject knowledge and show understanding
- Apply appropriate instrumentation to make measurements
- Collect data
- Analyse and interpret data
- Use human senses to gather information

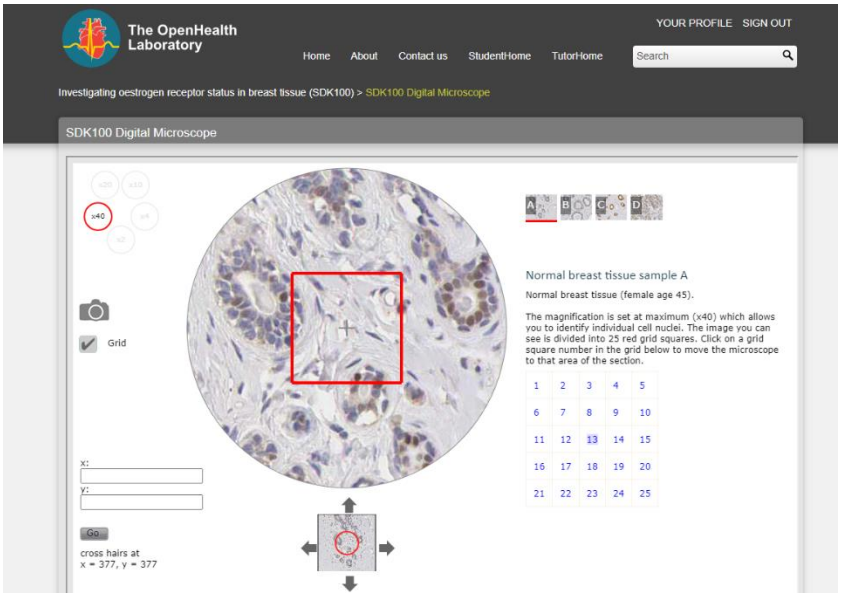
By completing this OpenSTEM Labs activity students will *to some extent* be able to …

- Devise an experimental approach
- Demonstrate creativity in problem solving
- Demonstrate competence in operating apparatus
- Communicate effectively about laboratory work
- Work effectively in teams

Investigating oestrogen receptor status in breast tissue (SDK100)

Experiment Details:

Equipment Name: **Virtual Microscope**
Module Reference: **SDK100**



Experiment Classification:

Experiment Type: **Virtual laboratory**
Online interaction Type: **Stored dataset**
Experimenter: **Individual**
Context (how life-like): **Limited context**
Learning structure: **Directed**
Pre-lab preparation: **Independent**
Pre-requisites: **Module pre-requisites**
Access type: **Open**
In-lab support: **Independent**

Learning Objectives:

By completing this OpenSTEM Labs activity students *will be able to* …

- Apply subject knowledge and show understanding
- Apply appropriate instrumentation to make measurements
- Devise experimental approaches
- Collect data
- Analyse and interpret data
- Demonstrate creativity in problem solving
- Communicate effectively about laboratory work
- Use human senses to gather information

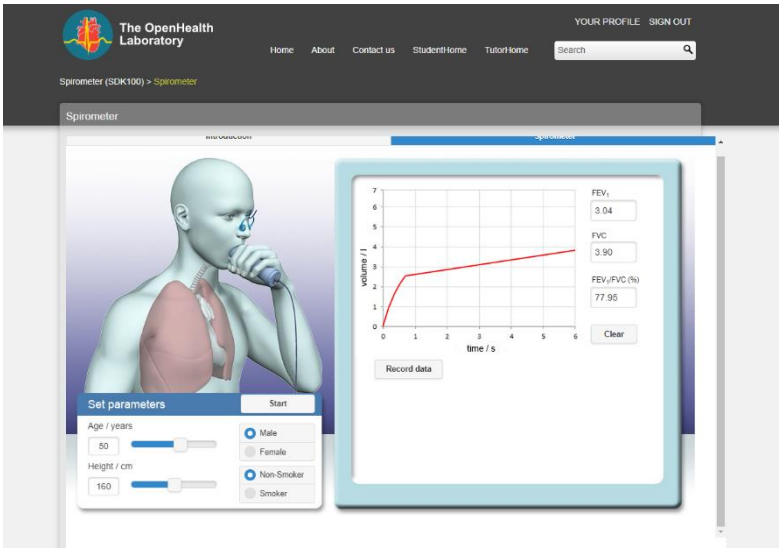
By completing this OpenSTEM Labs activity students will *to some extent* be able to …

- Identify unsuccessful outcomes and learn from failure
- Demonstrate competence in operating apparatus

Using spirometry to assess lung function (SDK100)

Experiment Details:

Equipment Name: Spirometer
Module Reference: SDK100



Experiment Classification:

Experiment Type: **Virtual laboratory**
Online interaction Type: **Stored dataset**
Experimenter: **Individual**
Context (how life-like): **Limited context**
Learning structure: **Directed**
Pre-lab preparation: **Preparatory planning tasks**
Pre-requisites: **None**
Access type: **Open**
In-lab support: **Independent**

Learning Objectives:

By completing this OpenSTEM Labs activity students *will be able to* …

- Develop subject knowledge and show understanding
- Analyse and interpret data
- Communicate effectively about laboratory work

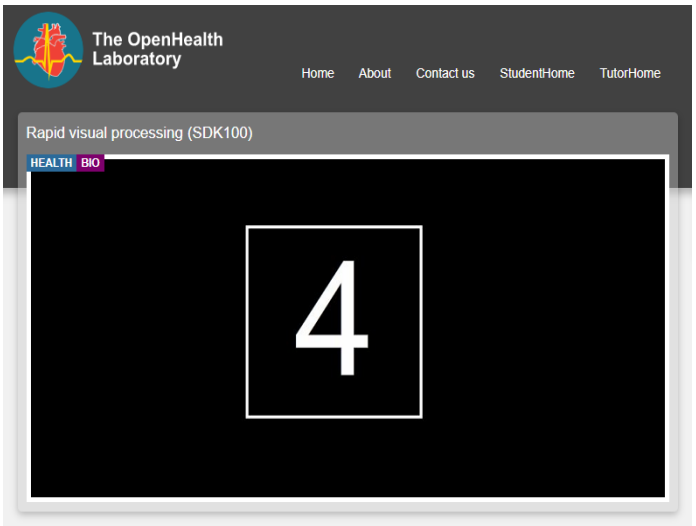
By completing this OpenSTEM Labs activity students will *to some extent* be able to …

- Collect data

An investigation into the acute effects of ethanol on attention (SDK100)

Experiment Details:

Equipment Name: **Rapid Visual Processing (RVP)**
Module Reference: **SDK100**



Experiment Classification:

Experiment Type: **Virtual laboratory**
Online interaction Type: **Algorithm generated**
Experimenter: **Group- informal**
Context (how life-like): **Limited context**
Learning structure: **Directed**
Pre-lab preparation: **Equipment training**
Pre-requisites: **Module pre-requisites**
Access type: **Open**
In-lab support: **Independent**

Learning Objectives:

By completing this OpenSTEM Labs activity students *will be able to* …

- Develop subject knowledge and understanding
- Apply appropriate instrumentation to make measurements
- Collect data
- Analyse and interpret data
- Identify unsuccessful outcomes and learn from failure
- Identify and deal with health and safety issues
- Behave with high ethical standards
- Use human senses to gather information

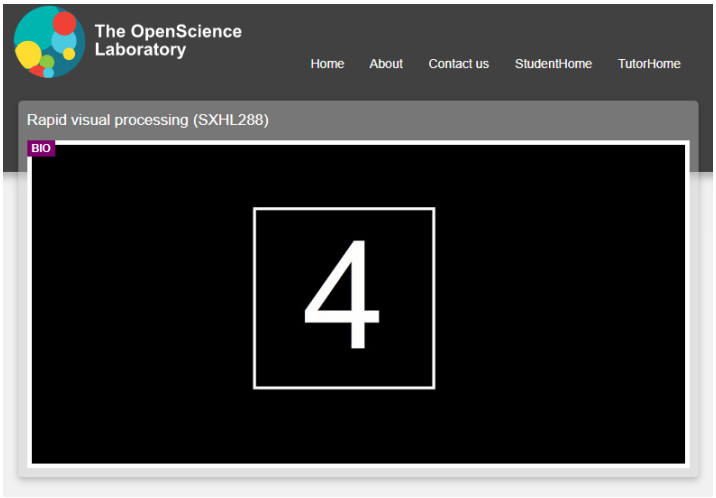
By completing this OpenSTEM Labs activity students will *to some extent* be able to …

- Devise an experimental approach
- Demonstrate creativity in problem solving
- Demonstrate competence in operating apparatus
- Communicate effectively about laboratory work
- Work effectively in teams

Investigation 1: Studying sustained attention in humans (SXHL288)

Experiment Details:

Equipment Name: **Rapid Visual Processing (RVP)**
Module Reference: **SXHL288**



Experiment Classification:

Experiment Type: **Virtual laboratory**
Online interaction Type: **Algorithm generated**
Experimenter: **Group- formal**
Context (how life-like): **Limited context**
Learning structure: **Directed**
Pre-lab preparation: **Preparatory planning tasks**
Pre-requisites: **Module pre-requisites**
Access type: **Open**
In-lab support: **Tutor guided**

Learning Objectives:

By completing this OpenSTEM Labs activity students *will be able to* …

- Develop subject knowledge and understanding
- Apply appropriate instrumentation to make measurements
- Devise an experimental approach
- Collect data
- Analyse and interpret data
- Identify unsuccessful outcomes and learn from failure
- Demonstrate creativity in problem solving
- Identify and deal with health and safety issues
- Behave with high ethical standards
- Use human senses to gather information
- Communicate effectively about laboratory work
- Work effectively in teams

By completing this OpenSTEM Labs activity students will *to some extent* be able to …

- Demonstrate competence in operating apparatus

Counting moles (SK299)

Experiment Details:

Equipment Name: **Mole counting**
Module Reference: **SK299**

Experiment Classification:

Experiment Type: **Virtual laboratory**
Online interaction Type: **Collected data**
Experimenter: **Group- formal**
Context (how life-like): **Limited context**
Learning structure: **Directed**
Pre-lab preparation: **Preparatory planning tasks**
Pre-requisites: **Module pre-requisites**
Access type: **Open**
In-lab support: **Independent**

Learning Objectives:

By completing this OpenSTEM Labs activity students *will be able to* …

- Develop subject knowledge and understanding
- Collect data
- Analyse and interpret data
- Use human senses to gather information

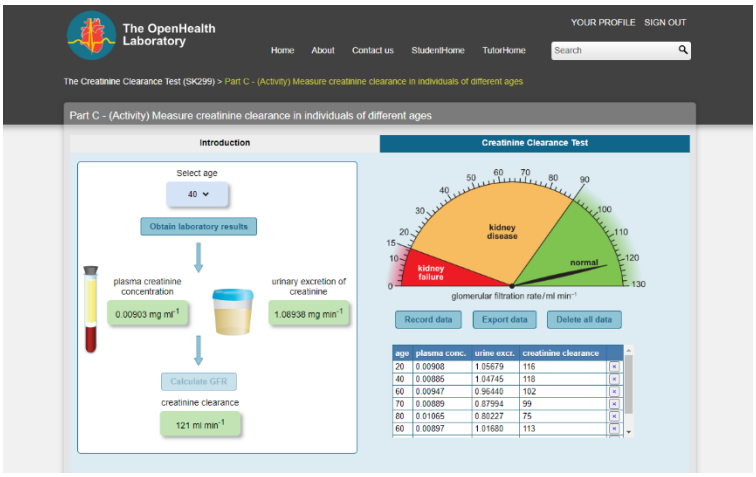
By completing this OpenSTEM Labs activity students will *to some extent* be able to …

- Work effectively in teams
- Communicate effectively about laboratory work

The Creatinine clearance test (SK299)

Experiment Details:

Equipment Name: **Creatinine clearance test**
Module Reference: **SK299**



Experiment Classification:

Experiment Type: **Virtual laboratory**
Online interaction Type: **Stored dataset**
Experimenter: **Individual**
Context (how life-like): **Limited context**
Learning structure: **Directed**
Pre-lab preparation: **Preparatory planning tasks**
Pre-requisites: **None**
Access type: **Open**
In-lab support: **Independent**

Learning Objectives:

By completing this OpenSTEM Labs activity students *will be able to* …

- Develop subject knowledge and understanding
- Collect data
- Analyse and interpret data

By completing this OpenSTEM Labs activity students will *to some extent* be able to …

- Communicate effectively about laboratory work

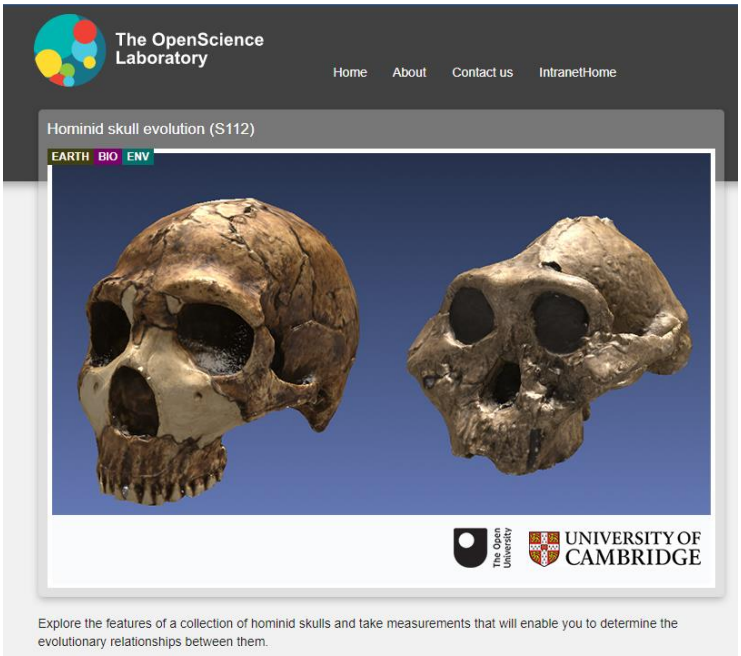
Hominid skull evolution (S112)

Experiment Details:

Equipment Name: **Hominid Skulls**
Module Reference: **S112**
Topics: **Earth, Biology**

Experiment Classification:

Experiment Type: **Virtual laboratory**
Remote Interaction Type: **Stored dataset**
Experimenter: **Individual**
Context (how life-like): **3D/ Immersive**
Learning structure: **Directed**
Pre-lab preparation: **N/A**
Pre-requisites: **None**
Access type: **Open**
In-lab support: **Independent**



Learning Objectives:

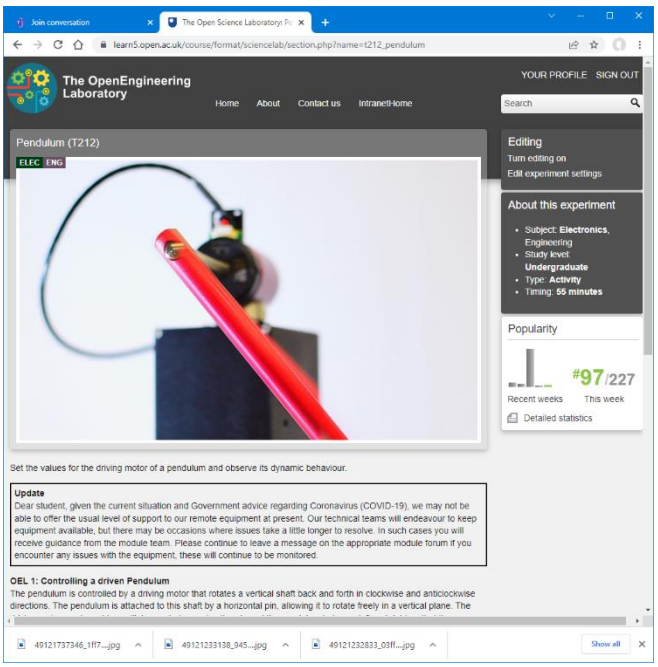
By completing this OpenSTEM Labs activity students *will be able to* …

- Develop subject knowledge and understanding
- Apply appropriate instrumentation to make measurements
- Collect data
- Analyse and interpret data
- Communicate effectively about laboratory work
- Use human senses to gather information

Controlling a driven pendulum (T212)

Experiment Details:

Equipment Name: **Pendulum**
Module Reference: **T212**
Topics: **Electronics, Engineering**



Experiment Classification:

Experiment Type: **Remote laboratory**
Remote Interaction Type: **Fixed**
Experimenter: **Individual**
Context (how life-like): **Realtime video**
Learning structure: **Directed**
Pre-lab preparation: **Exploratory (in the lab)**
Pre-requisites: **None**
Access type: **Bookable**
In-lab support: **Assisted - asynchronous**

Learning Objectives:

By completing this OpenSTEM Labs activity students *will be able to* …

- Develop subject knowledge and understanding
- Use theoretical models to predict behaviour
- Collect data
- Analyse and interpret data
- Demonstrate competence in operating apparatus
- Use human senses to gather information

By completing this OpenSTEM Labs activity students will *to some extent* be able to …

- Apply appropriate instrumentation to make measurements
- Devise experimental approach
- Identify unsuccessful outcomes and learn from failure
- Demonstrate creativity in problem solving

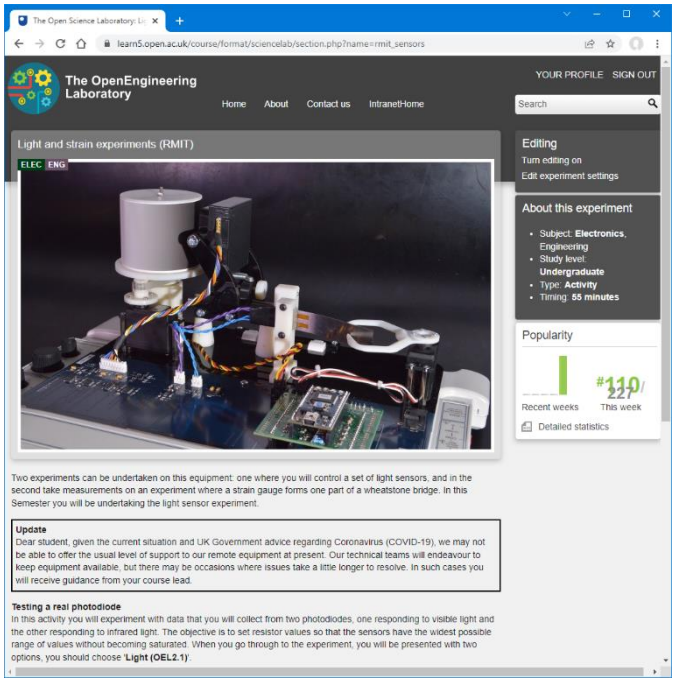
Testing a real photodiode (T212)

Experiment Details:

Equipment Name: **Light and strain experiments**
Module Reference: **T212**
Topics: **Electronics, Engineering**

Experiment Classification:

Experiment Type: **Remote laboratory**
Remote Interaction Type: **Fixed**
Experimenter: **Individual**
Context (how life-like): **Realtime video**
Learning structure: **Directed**
Pre-lab preparation: **Exploratory (in the lab)**
Pre-requisites: **Module pre-requisites**
Access type: **Bookable**
In-lab support: **Assisted - asynchronous**



Learning Objectives:

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- Analyse and interpret data
- Demonstrate competence in operating apparatus
- Use human senses to gather information

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- Apply appropriate instrumentation to make measurements
- Use theoretical models to predict behaviour
- Devise experimental approach
- Identify unsuccessful outcomes and learn from failure
- Demonstrate creativity in problem solving

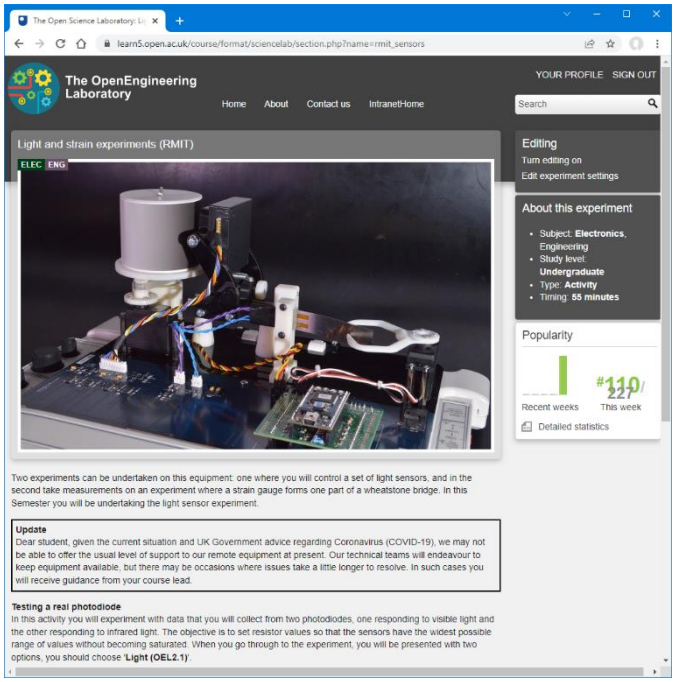
Strain Gauge experiment (T212)

Experiment Details:

Equipment Name: **Light and strain experiments**
Module Reference: **T212**
Topics: **Electronics, Engineering**

Experiment Classification:

Experiment Type: **Remote laboratory**
Remote Interaction Type: **Fixed**
Experimenter: **Individual**
Context (how life-like): **Realtime video**
Learning structure: **Directed**
Pre-lab preparation: **Exploratory (in the lab)**
Pre-requisites: **Module pre-requisites**
Access type: **Bookable**
In-lab support: **Assisted - asynchronous**



Learning Objectives:

By completing this OpenSTEM Labs activity students *will be able to* …

- Develop subject knowledge and understanding
- Use theoretical models to predict behaviour
- Devise experimental approach
- Collect data
- Analyse and interpret data
- Use human senses to gather information

By completing this OpenSTEM Labs activity students will *to some extent* be able to …

- Apply appropriate instrumentation to make measurements
- Demonstrate creativity in problem solving
- Demonstrate competence in operating apparatus

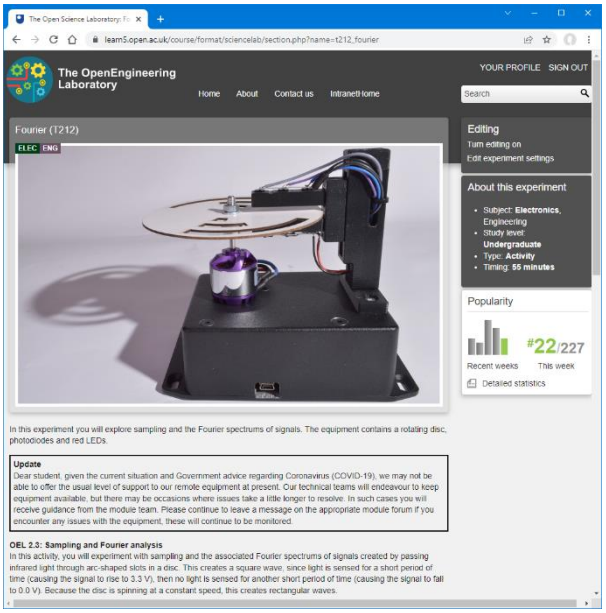
Sampling and Fourier analysis (T212)

Experiment Details:

Equipment Name: **Fourier (T212)**
Module Reference: **T212**
Topics: **Electronics, Engineering**

Experiment Classification:

Experiment Type: **Remote laboratory**
Remote Interaction Type: **Fixed**
Experimenter: **Individual**
Context (how life-like): **Realtime video**
Learning structure: **Directed**
Pre-lab preparation: **Exploratory (in the lab)**
Pre-requisites: **Module pre-requisites**
Access type: **Bookable**
In-lab support: **Assisted - asynchronous**



Learning Objectives:

By completing this OpenSTEM Labs activity students *will be able to* …

- Develop subject knowledge and understanding
- Use theoretical models to predict behaviour
- Collect data
- Analyse and interpret data
- Use human senses to gather information

By completing this OpenSTEM Labs activity students will *to some extent* be able to …

- Apply appropriate instrumentation to make measurements
- Devise experimental approach
- Demonstrate creativity in problem solving
- Demonstrate competence in operating apparatus

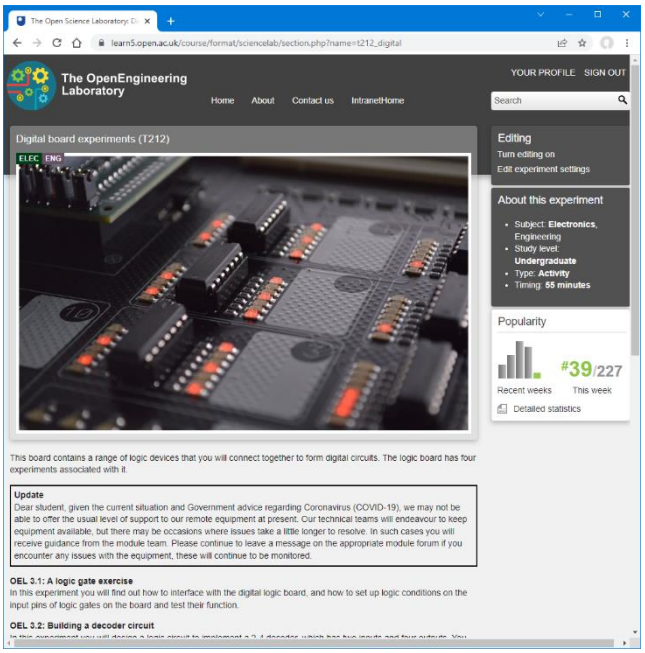
A Logic gate exercise (T212)

Experiment Details:

Equipment Name: **Digital Board Experiments**
Module Reference: **T212**
Topics: **Electronics, Engineering**

Experiment Classification:

Experiment Type: **Remote laboratory**
Remote Interaction Type: **Fixed**
Experimenter: **Individual**
Context (how life-like): **Realtime video**
Learning structure: **Directed**
Pre-lab preparation: **N/A**
Pre-requisites: **Module pre-requisites**
Access type: **Bookable**
In-lab support: **Assisted - asynchronous**



Learning Objectives:

By completing this OpenSTEM Labs activity students *will be able to* …

- Develop subject knowledge and understanding
- Demonstrate competence in operating apparatus

By completing this OpenSTEM Labs activity students will *to some extent* be able to …

- Analyse and interpret data
- Identify unsuccessful outcomes and learn from failure
- Use human senses to gather information
- Design, build, or assemble a product

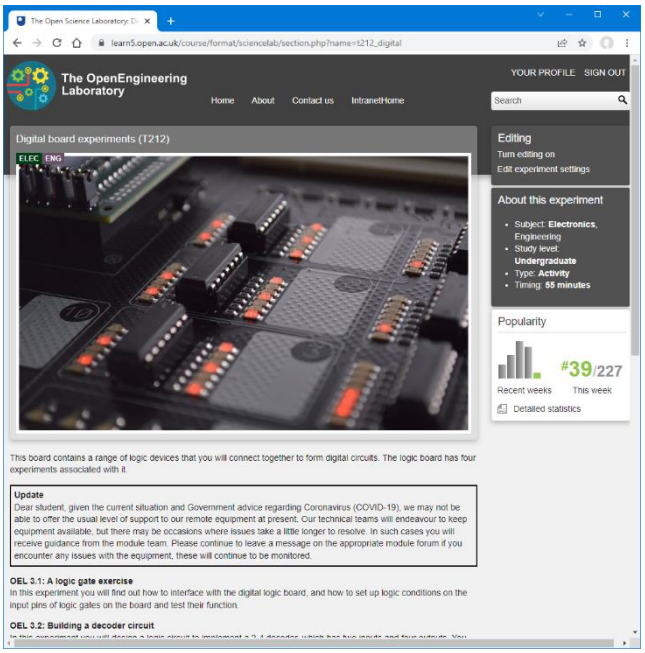
Building a decoder circuit (T212)

Experiment Details:

Equipment Name: **Digital Board Experiments**
Module Reference: **T212**
Topics: **Electronics, Engineering**

Experiment Classification:

Experiment Type: **Remote laboratory**
Remote Interaction Type: **Fixed**
Experimenter: **Individual**
Context (how life-like): **Realtime video**
Learning structure: **Directed**
Pre-lab preparation: **N/A**
Pre-requisites: **Module pre-requisites**
Access type: **Bookable**
In-lab support: **Assisted - asynchronous**



Learning Objectives:

By completing this OpenSTEM Labs activity students *will be able to* …

- Develop subject knowledge and understanding
- Demonstrate competence in operating apparatus
- Design, build, or assemble a product

By completing this OpenSTEM Labs activity students will *to some extent* be able to …

- Devise experimental approach
- Analyse and interpret data
- Identify unsuccessful outcomes and learn from failure
- Demonstrate creativity in problem solving
- Use human senses to gather information

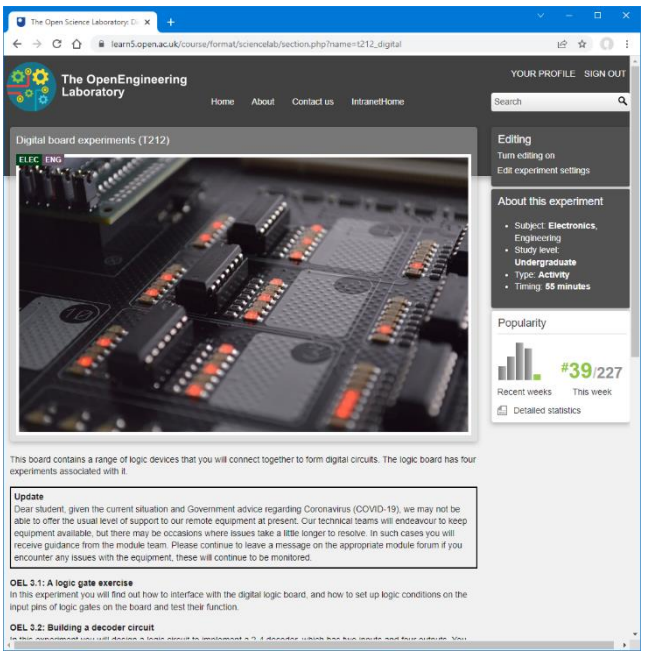
Designing a combinational circuit (T212)

Experiment Details:

Equipment Name: **Digital Board Experiments**
Module Reference: **T212**
Topics: **Electronics, Engineering**

Experiment Classification:

Experiment Type: **Remote laboratory**
Remote Interaction Type: **Fixed**
Experimenter: **Individual**
Context (how life-like): **Realtime video**
Learning structure: **Directed**
Pre-lab preparation: **N/A**
Pre-requisites: **Module pre-requisites**
Access type: **Bookable**
In-lab support: **Assisted - asynchronous**



Learning Objectives:

By completing this OpenSTEM Labs activity students *will be able to* …

- Develop subject knowledge and understanding
- Demonstrate competence in operating apparatus
- Use human senses to gather information
- Design, build, or assemble a product

By completing this OpenSTEM Labs activity students will *to some extent* be able to …

- Apply appropriate instrumentation to make measurements
- Use theoretical models to predict behaviour
- Identify unsuccessful outcomes and learn from failure
- Demonstrate creativity in problem solving

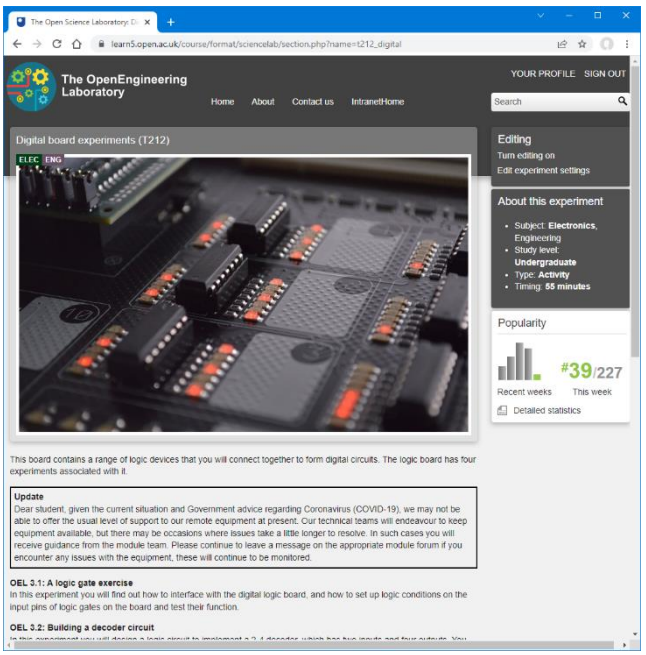
Implementing and testing a sequential circuit (T212)

Experiment Details:

Equipment Name: **Digital Board Experiments**
Module Reference: **T212**
Topics: **Electronics, Engineering**

Experiment Classification:

Experiment Type: **Remote laboratory**
Remote Interaction Type: **Fixed**
Experimenter: **Individual**
Context (how life-like): **Realtime video**
Learning structure: **Directed**
Pre-lab preparation: **N/A**
Pre-requisites: **Module pre-requisites**
Access type: **Bookable**
In-lab support: **Assisted - asynchronous**



Learning Objectives:

By completing this OpenSTEM Labs activity students *will be able to* …

- Develop subject knowledge and understanding
- Demonstrate competence in operating apparatus
- Use human senses to gather information
- Design, build, or assemble a product

By completing this OpenSTEM Labs activity students will *to some extent* be able to …

- Apply appropriate instrumentation to make measurements
- Use theoretical models to predict behaviour
- Identify unsuccessful outcomes and learn from failure

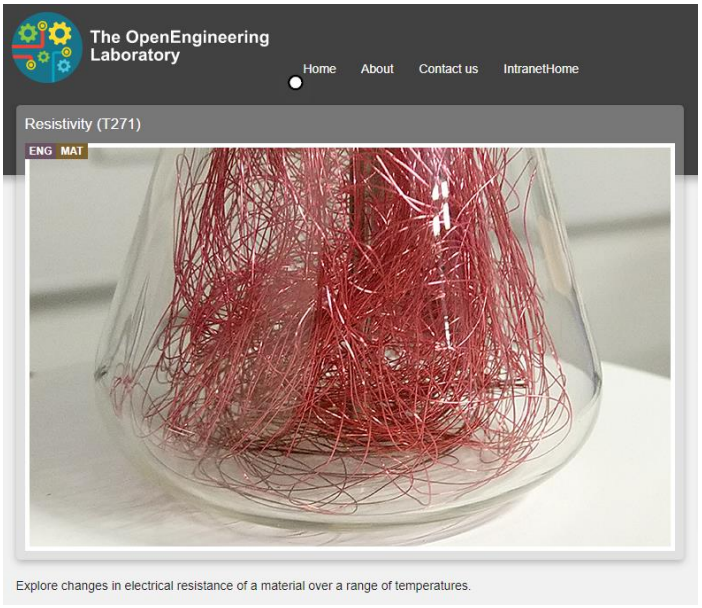
Explore changes in electrical resistance of a material over a range of temperatures (T271)

Experiment Details:

Equipment Name: **Resistivity**
Module Reference: **T271**
Topics: **Engineering**

Experiment Classification:

Experiment Type: **Remote laboratory**
Remote Interaction Type: **Observation**
Experimenter: **Other**
Context (how life-like): **Realtime video**
Learning structure: **Directed**
Pre-lab preparation: **N/A**
Pre-requisites: **None**
Access type: **Open**
In-lab support: **Assisted - asynchronous**



Learning Objectives:

By completing this OpenSTEM Labs activity students *will be able to* …

- Develop subject knowledge and understanding
- Analyse and interpret data
- Communicate effectively about laboratory work
- Use human senses to gather information

By completing this OpenSTEM Labs activity students will *to some extent* be able to …

- Apply appropriate instrumentation to make measurements
- Collect data

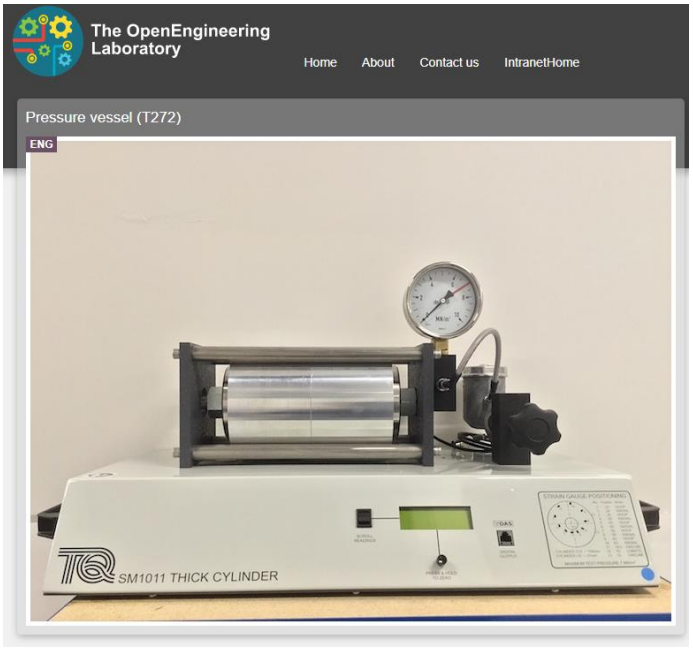
Investigating strain in a thick-walled pressure vessel (T272)

Experiment Details:

Equipment Name: **Pressure Vessel**
Module Reference: **T272**
Topics: **Engineering**

Experiment Classification:

Experiment Type: **Remote laboratory**
Remote Interaction Type: **Fixed**
Experimenter: **Individual**
Context (how life-like): **Realtime video**
Learning structure: **Directed**
Pre-lab preparation: **N/A**
Pre-requisites: **None**
Access type: **Bookable**
In-lab support: **Assisted - asynchronous**



Learning Objectives:

By completing this OpenSTEM Labs activity students *will be able to* …

- Develop subject knowledge and understanding
- Apply appropriate instrumentation to make measurements
- Use theoretical models to predict behaviour
- Collect data
- Analyse and interpret data
- Demonstrate competence in operating apparatus
- Communicate effectively about laboratory work
- Use human senses to gather information

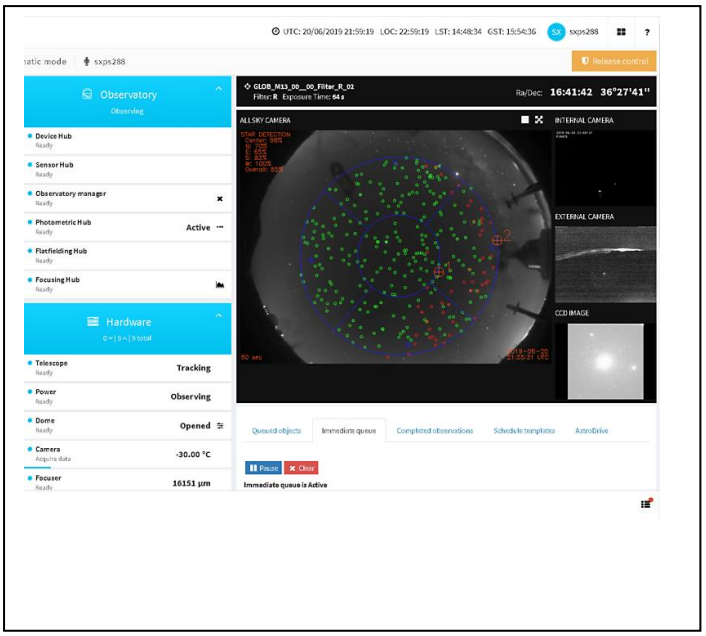
By completing this OpenSTEM Labs activity students will *to some extent* be able to …

Identify and deal with health and safety issues

PIRATE and COAST (SXPS288)

Experiment Details:

Equipment Name: **Remote Telescope**
Module Reference: **SXPS288**



Experiment Classification:

Experiment Type: **Remote laboratory**
Remote Interaction Type: **Adaptive**
Experimenter: **Group - informal**
Context (how life-like): **Real-time video**
Learning structure: **Directed**
Pre-lab preparation: **Preparatory planning tasks**
Pre-requisites: **Module pre-requisites**
Access type: **Bookable**
In-lab support: **Assisted - asynchronous**

Learning Objectives:

By completing this OpenSTEM Labs activity students *will be able to* …

- Develop subject knowledge and understanding
- Apply appropriate instrumentation to make measurements
- Collect data
- Analyse and interpret data
- Demonstrate competence in operating apparatus
- Communicate effectively about laboratory work and work effectively in teams

By completing this OpenSTEM Labs activity students will *to some extent* be able to …

- Devise an experimental approach
- Identify unsuccessful outcomes and learn from failure

Compton Scattering (SXPS288)

Experiment Details:

Equipment Name: X-ray scattering
Module Reference: SXPS288

Experiment Classification:

Experiment Type: Remote laboratory
Remote Interaction Type: Fixed
Experimenter: Group - informal
Context (how life-like): Real-time video
Learning structure: Directed
Pre-lab preparation: Preparatory planning tasks
Pre-requisites: Module pre-requisites
Access type: Bookable
In-lab support: Independent

Learning Objectives:

By completing this OpenSTEM Labs activity students *will be able to* …

- Develop subject knowledge and understanding
- Apply appropriate instrumentation to make measurements
- Use theoretical models to predict behaviour
- Collect data
- Analyse and interpret data
- Identify unsuccessful outcomes and learn from failure
- Demonstrate competence in operating apparatus
- Communicate effectively about laboratory work

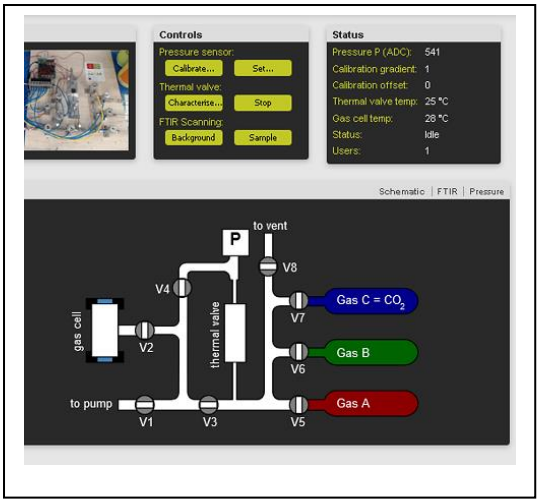
By completing this OpenSTEM Labs activity students will *to some extent* be able to …

- Identify and deal with health and safety issues
- Work effectively in teams

Gas Cell (SXPS288)

Experiment Details:

Equipment Name: **Gas Cell and Lines**
Module Reference: **SXPS288**



Experiment Classification:

Experiment Type: **Remote laboratory**
Remote Interaction Type: **Adaptive**
Experimenter: **Individual**
Context (how life-like): **Real-time video**
Learning structure: **Directed**
Pre-lab preparation: **Exploratory (in the lab)**
Pre-requisites: **Module pre-requisites**
Access type: **Bookable**
In-lab support: **Independent**

Learning Objectives:

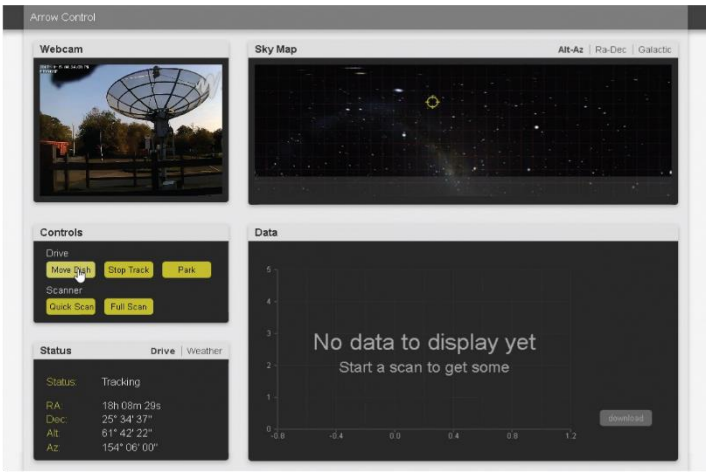
By completing this OpenSTEM Labs activity students *will be able to* …

- Develop subject knowledge and understanding
- Apply appropriate instrumentation to make measurements
- Use theoretical models to predict behaviour
- Collect data
- Analyse and interpret data
- Identify unsuccessful outcomes and learn from failure
- Demonstrate competence in operating apparatus
- Communicate effectively about laboratory work

By completing this OpenSTEM Labs activity students will *to some extent* be able to …

- Identify and deal with health and safety issues
- Devise an experimental approach

ARROW (SXPS288)



Experiment Details:

Equipment Name: **Remote Telescope**
Module Reference: **SXPS288**

Experiment Classification:

Experiment Type: **Remote laboratory**
Remote Interaction Type: **Adaptive**
Experimenter: **Group- informal**
Context (how life-like): **Real-time video**
Learning structure: **Directed**
Pre-lab preparation: **Preparatory planning tasks**
Pre-requisites: **Module pre-requisites**
Access type: **Bookable**
In-lab support: **Assessed-asynchronous**

Learning Objectives:

By completing this OpenSTEM Labs activity students *will be able to* …

- Develop subject knowledge and understanding
- Apply appropriate instrumentation to make measurements
- Use theoretical models to predict behaviour
- Collect data
- Analyse and interpret data
- Demonstrate competence in operating apparatus
- Communicate effectively about laboratory work
- Work effectively in teams

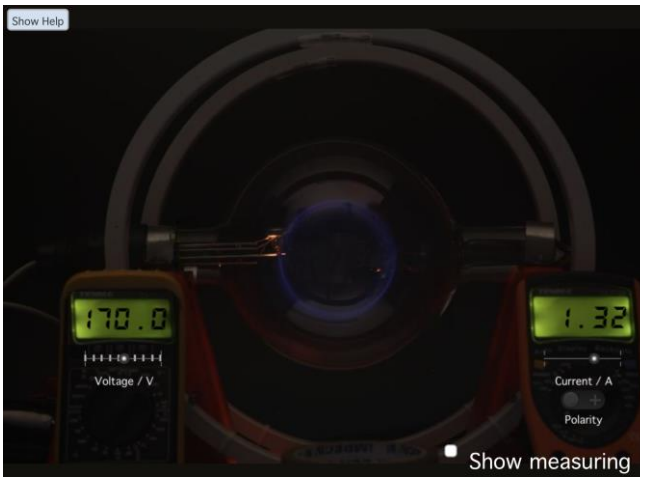
By completing this OpenSTEM Labs activity students will *to some extent* be able to …

- Devise an experimental approach
- Identify unsuccessful outcomes and learn from failure

Mass to Charge (SXPS288)

Experiment Details:

Equipment Name: **Fine beam tube**
Module Reference: **SXPS288**



Experiment Classification:

Experiment Type: **Virtual laboratory**
Online Interaction Type: **Immersive**
Experimenter: **Individual**
Context (how life-like): **3D/Immersive**
Learning structure: **Open**
Pre-lab preparation: **Exploratory (in the lab)**
Pre-requisites: **Module pre-requisites**
Access type: **Open**
In-lab support: **Independent**

Learning Objectives:

By completing this OpenSTEM Labs activity students *will be able to* …

- Develop subject knowledge and understanding
- Use theoretical models to predict behaviour
- Collect data
- Identify unsuccessful outcomes and learn from failure

By completing this OpenSTEM Labs activity students will *to some extent* be able to …

- Devise an experimental approach
- Analyse and interpret data