UNIVERSITY OF KWAZULU-NATAL ™

INYUVESI YAKWAZULU-NATALI

STEC@UKZN

Workshops

Secondary Schools

University of KwaZulu-Natal

Science and Technology Education Centre

H1 Building, Westville Campus

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Science4U mobile outreach unit

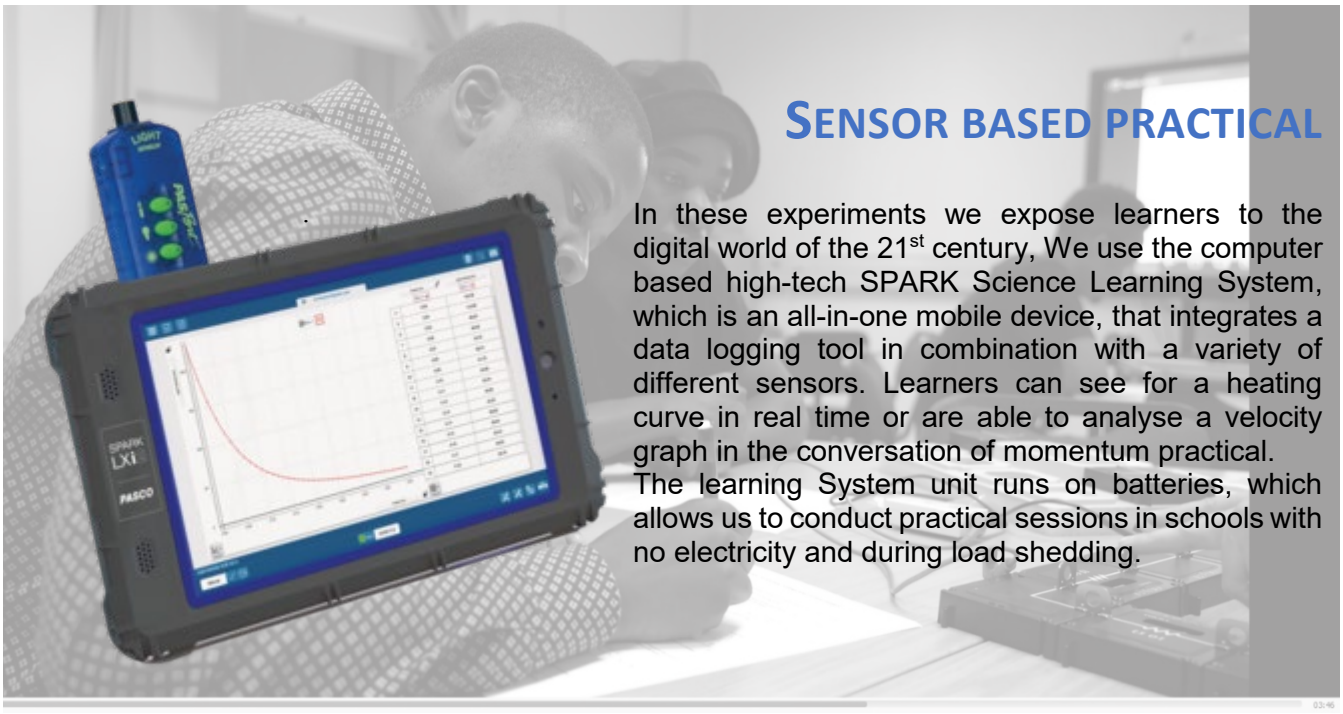
Sponsored by the Embassy of Japan, the Science4U mobile science lab is a Mercedes Vito van which is equipped with experiments in the field of, physics and chemistry that goes out to schools, to provide hands on activities and lab experiences to learners that don't have access to science labs. We offer CAPS related sensor-based practical's, coding and robotics, and numerous other workshops from different fields. Please have a look at our list of workshops. All our hands-on activities are also offered in the science centre.

Fees return trip

0-50 km return: free
50-100 km return: R 500
100-200 km return: R 800
Above 200 km: on request

We charge ***R 25 per learner*** for a workshop.*
Teachers are free.

*Special concessions can be made for non-fee-paying and low-income schools.



SENSOR BASED PRACTICAL

In these experiments we expose learners to the digital world of the 21st century, We use the computer based high-tech SPARK Science Learning System, which is an all-in-one mobile device, that integrates a data logging tool in combination with a variety of different sensors. Learners can see for a heating curve in real time or are able to analyse a velocity graph in the conversation of momentum practical.
The learning System unit runs on batteries, which allows us to conduct practical sessions in schools with no electricity and during load shedding.

WALKING THE GRAPH

Using motion sensors, learners attempt to match the provided position vs. time graphs. This activity gives them a deeper understanding of interpreting graphs as they see their own position graphed in real time.

Grade: 10-12

Duration:
60-90 min

CAPS

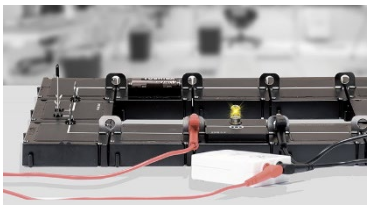
HEATING CURVE OF WATER

Learners use temperature sensors to measure and investigate the heating curve of water from ice to steam.

Grade: 10

Duration:
60 min

CAPS



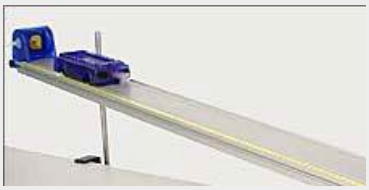
VOLTAGE AND CURRENT DIVIDERS

Learners build series and parallel circuits. They investigate what happens to the current and the voltage in series and parallel circuits when additional resistors are added

Grade: 10

Duration:
60-90 min

CAPS



ACCELERATION

In this experiment, learners will investigate how the acceleration of a cart rolling down an inclined track depends on the angle of incline. From the motion sensor data, they will calculate the acceleration of an object in free-fall.

Grade: 10

Duration:
60-90 min

CAPS

Newton's Second Law of Motion

Using motion sensors, we conduct 2 experiments to investigate Newton's second law which states that the acceleration of an object is directly proportional to the net force acting on it and inversely proportional to its mass.

Grade: 11

Duration:
60 min

CAPS

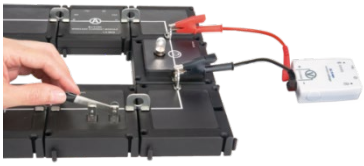
Intermolecular forces

Learners investigate how the length of a molecule and the shape of a molecule affect the strength with which molecules are held together by measuring the evaporation curve of different alcohols..

Grade: 11

Duration:
60 min

CAPS



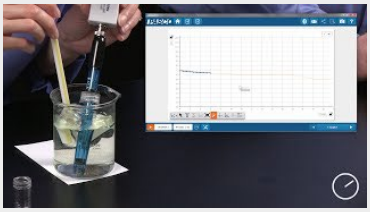
Ohm's law

Learners build and modify electric circuits to determine the relationship between the current going through a resistor and the potential difference (voltage) across the same resistor.

Grade: 11

Duration:
60 min

CAPS



pH of household items

Learners use pH sensors to determine which household chemical is an acid, a base or neutral.

Grade: 11

Duration:
60 min

CAPS

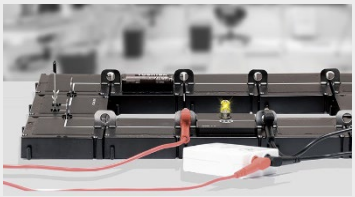
Conservation of momentum

Using motion sensors the total momentum and total energy of carts undergoing elastic and collisions are measured. The values before and after the collisions are compared to verify that momentum and energy is conserved in elastic collisions.

Grade: 12

Duration:
60 -90 min

CAPS



Internal resistance of a battery

Learners build an electric circuit and determine the internal resistance of a battery using Ammeter and Voltmeter.

Grade: 12

Duration:
60 min

CAPS

CODING AND ROBOTICS

We offer hands on workshops, from unplugged coding (coding without a computer) to block based coding. Our equipment includes LEGO 6 bricks, LEGO EV3 robots and //code.Nodes.

LEGO 6 BRICKS

In our 6 bricks workshops we introduce simple concepts such as patterns, algorithms and link them to computational thinking concepts that teach learners the foundational knowledge and skills upon which the fields of programming and robotics are built.

LEGO EV3 ROBOTS

Lego EV3 can used for both building and programming robots. The robot will only "come to life" once the learner writes a simple programme in SCRATCH (block based program). The program will give the robot's 'brain' the necessary commands to perform a specific task.

//CODE.NODE

Wireless and easy-to-use, the //code.Node includes six sensor inputs, a speaker, RGB light, and an LED array that enables students to explore exciting phenomena using block-based programs that collect, display, and respond to data.

ENQUIRE ABOUT OUR TEACHER TRAINING WORKSHOPS

//CODE.NODE: MAGNETISM

Learners program the //code.Node in block coding to determine the polarity of a magnet, using the build in magnetic field sensor.

Grade: 7+

Duration: 60 min

CAPS

//CODE.NODE: RGB LED COLOUR PROGRAMMING

Using the //code.Node, learners will alter the intensity of the individual lights on the RGB LED to create an array of colors and demonstrate knowledge of color mixing using the RGB color model.

Grade: 7+

Duration: 60 min

CAPS

//CODE.NODE: CLAP ON

Learners are introduced to an invention from the 1980's that allows you to turn lights on and off by clapping your hands. Learners then use Blockly to program their //code.Node to behave in the same way.

Grade: 7+

Duration: 60 min

CAPS

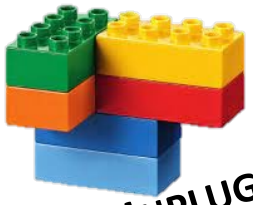
LEGO 6 BRICKS 1: CROSSING THE LINE

Just like robots are provided with basic instructions, learners will receive a series of instructions (moves). The learners carry out the instruction by moving the corresponding brick to the required new position. A great introductory activity into robotics.

Grade: 1+

Duration:
30 min

CAPS



LEGO 6 BRICKS 2: PATTERNS

In this workshop we explore the concept of patterns and the decomposition of patterns.

Grade: 1+

Duration:
30 min

CAPS

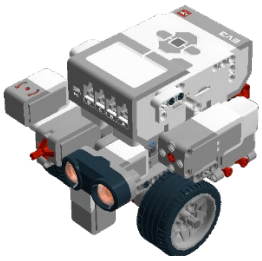
CODING UNPLUGGED: CUP STACKING

Using a predefined “Robot Vocabulary” the learners have to give instructions to one another on how to stack cups in a specific way. The learner will be introduced to concept of symbols and actions, as well as the valuable skill of debugging..

Grade: 1+

Duration:
30 min

CAPS



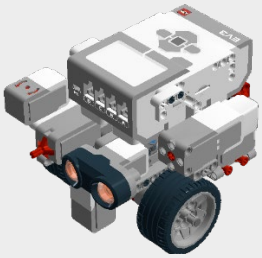
EV3 – PROGRAMMING A ROBOT – LEVEL 1

LEARN HOW TO PROGRAM A ROBOT TO MOVE AND PERFORM A NUMBER OF TASKS USING EASY-TO-USE CODING SOFTWARE.

Age:
9+

Duration:
60-120 min

CAPS



EV3 – PROGRAMMING A ROBOT – LEVEL 2

IN THIS WORKSHOP LEARNERS WILL PROGRAM VARIOUS SENSORS TO MAKE THE ROBOT SENSE ITS ENVIRONMENT AND RESPONDS WITH SOUND AND LIGHT .

Age:
9+

Duration:
60-120 min

CAPS

STEC@UKZN WORKSHOPS

We offer a variety of different workshops for all age groups and across all STEAMI subjects. This includes or sensor-based practical's (page 2). and coding/ robotics workshops (page 3).

Can't find the workshop you are looking for? Speak to us and we can see if we can custom make a workshop for you.

Please note that we also offer all workshops in our Science4U section in the science centre.

We charge ***R 25 per person/ learner*** for a workshop.*
Teachers don't have to pay.

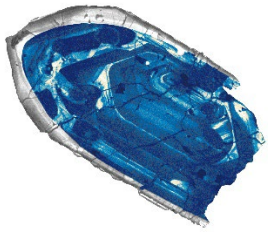
*Special concessions can be made for non-fee-paying and low-income schools.

Understanding geological time

Many incredible events have occurred from the beginning of the Earth until now – the formation of the oceans, the origin of life, the first animals, the rise and fall of dinosaurs, and the appearance and evolution of our own species, just to name a few. It is hard for us to understand the vast amount of time Earth has been in existence. This workshop will give you a perspective on the immensity of geological time. You will sort important geological and evolutionary events on 'the washing line of time'.

Grade: 8-12

Duration: 60 min



Reading the chapter of time

Learn how geologist can tell the age of rocks. In this workshop you will study the distribution of a fake naturally occurring isotopes and determine the half life of the isotope.

Grade: 8-12

Duration: 60 min

Wandering continents

Come and catch the drift! Using "playtectonics" we embark on a journey through time to explore Wegener's hypothesis of the wandering continents and as shift happened on how geological evidence was used to support the theory of plate tectonics.

Grade: 9-12

Duration: 60 min

CAPS

Earthquakes

In this workshop learners will use and interpret real earthquake data. By analysing the data learners are able to recognize plate boundaries and to develop a basic tectonic map. They will also be able to make deductions on the location and the type of plate boundaries. This workshop will be in conjunction with a basic lecture on earthquake.

Grade: 8-12

Duration: 60-90 min

Maximum: 70

CAPS

Inside world of minerals

Crystallography is the science that examines the arrangements of atoms in solids. It helps scientist to understand the relationship between the atomic structures and the properties of for example minerals. In our workshop we let you rebuild the atomic arrangement of a mineral using "special atoms" and you have to find out what mineral we are looking at.

Grade: 8-12

Duration: 60-90 min

What rock is it?

Using tools provided (glass, hand lenses/ magnifying glasses, diluted HCL acid, steel nail) the learners determine the characteristics of different rock samples and try to identify the various rocks. Challenge your learners. Who can identify most of the rocks?

Grade: all

Duration: 60-90 min

Secret message

Ever wanted to become a spy? One of the main tasks of spies is to exchange messages, while at the same time keeping the contents a secret from anyone who may intercept it. Make you own encryption machine and learn how to encrypt and decrypt secret messages using for example Caesar's cypher and the Enigma machine.

Grade: 8+

Duration: 60 min

Renewable Energy

What is renewable energy and how can ecological electric power be produced? In this workshop learners will investigate the various ways on how to generate electricity from non-renewable and renewable energy sources. The workshop will help learners to understand the energy forms of the future by building a model such as a car driven by renewable sources such as the sun.

Grade: 7+

Duration: ~120 min

CAPS

Why does some food taste sour?

Can we tell how sour food is, without tasting it? Do you know how antacids work? In this workshop the learners measure the pH of various household chemicals and learn more about the pH of sour food and other household chemicals.

Grade: 3+

Duration: 60 min

Sizing up the solar system

Our solar system is an exciting place. It is full of planets and other strange objects. Some are big and some are small. Some are close and some are very far away. Let's find out how big is big, and how far away we really are from our neighbouring planets. And where our space in the solar system is.

Grade: 4+

Duration: 60 min

CAPS

Sustainability

Everybody is using the term sustainability. But what does this really mean. This interactive workshop will explore the basic concepts of sustainability.

Grade: 10+

Duration:
About 3 h

Smart materials

In modern times, scientists have learned more about what gives materials their unique properties, and this has opened up possibilities for designing materials with interesting properties .In this workshop we will explore some of these exciting materials and will investigate what happens to these materials when we change the temperature or expose the material to water and UV light.

Grade: 1+

Duration:
60 min

The power of insulation

Can we stop ice from melting? Do you want to learn about materials and their special powers? Who can make their ice last longer? Explore the world of insulation, in a fun and exciting way.

Grade: 3+

Duration:
60 min

Design your own crazy machine

Get crazy and make your own machine that can pop balloons, push a toy car or other silly things. The more complicated the better. See magic happening with just one touch and help building an awesome, Rube Goldberg Machine.

Grade:
5 – 99 years

Duration:
60 min

Things that fly

Fasten your seatbelt and be ready for take-off. In this workshop you will launch objects into the air and find out, what keeps them in the air. Build various objects that fly (paper helicopter, hoop glider and paper planes) and explore how those different kind of objects can fly.

Age:
5+

Duration:
60 min

Separating Materials

In the first part of the practical the learners separate dry material using a sieve and a magnet. In the second part learners separate the pigment components mixed in ink using the chromatography process.

Grade: 7

Duration:
60-90 min

CAPS

DNA

All living organisms, such as humans store genetic information using the same molecules — DNA. Your DNA determines what you look like. Learn how to extract DNA and see what DNA looks like. Extract DNA from a banana, using simple household items. Decode a skeletons DNA to recreate the appearance.

Age:
10+

Duration:
60 min