

## B100 MSL Biology

### Mobile Science Laboratory

A fully featured Mobile Sciences Laboratory (MSL) for the discipline of Biology to be operated by the teacher. It's designed for the **demonstrations, experiments and laboratory work** in the secondary level Biology curriculum topics. The complex includes laboratory equipment, instruments, digital instrumentation, interactive learning resources, multimedia and test materials, interrelated and complementary to each other for the experiments and observations on the program.

The B100 complex consists of:

- 1) The Universal Mobile cart base
- 2) The experimental kits for the teacher and
- 3) The Didactic application PCB101

The B100 is supplied with special didactic software application that allows training in the disciplines of Biology in the respective training programs by using **modern technology, interactive teaching tools** and **STEM methodology**.

The PCB 101 application is based in Hypertext HTML form and includes at minimum the methods and facilities covered in the specifications of PCB 101 Index, listed further in this document.

The Biology Modules of the B100 mobile laboratory are driven by PCB 101 application which is divided into topics, each topic is divided into sections and each section to subsection. In each subsection you can find the **Presentations**, the relevant **Multimedia or Video** support content and the **Simulations**. Furthermore, lab work is divided to the **Demonstrations** for the teacher and the **Activities** for the students. This distinction is due to the different materials used in the experiments. Different kits for Teacher (**BT** series) and Student (**BS** series) are provided. The cart can incorporate the teacher set and up to 5 student sets of kits. Ideally, 4 students can work per each set.



Inside the PCB 101 application you can find different support modules such as:

The **Inventory** which contains all the materials from the specific kits that are used in each lesson divided.

The **Glossary** which contains an alphabetical keyboard and by pressing each letter you can find words-meanings and terminology.

The **Application** which has two subunits: the **Simulators** (you can find simulations of specific experiments using the exact B100 equipment or generic lab simulations related to the sub topic) and the **Multimedia** presentations (showing a relevant phenomenon in some topics).

The **Science Support** module which is also divided in two subunits: the **Curriculum** (an index and search utility to find all the demonstrations and the activities numbered with links that take you to the experiment and is also mentioned the section or subsection to which it belongs) and the electronic **Manuals**, including Safety guides, Operational Videos etc. and all the sub applications needed by the teacher (i.e. Data Acquisition application, Classroom management applications, Student response application). The provided kits and the facilities of the Mobile Science Cart offer all the equipment and support to implement the pedagogical processes in the subject of Biology. Analytically, the Biology topics, sections and subsections supported by the MSL kits and the PCB 101 application are presented below.

#### PCB 101 INDEX

##### Genetic-DNA-Microscope

Microscopic Observations – Cells – Multicellular organisms – Brain and Nerves – Genetics – Evolution – Human Reproduction – DNA

##### Plant-Osmosis-Photosynthesis

Plant Life Cycles – Reproduction In Flowering Plants – Plant Growth – Osmosis – Photosynthesis

##### Food Chain

Starch in Food – Diet – Nutrient Cycles – Food Chains –

##### Animals & Humans

Animals Classification – Human



Biology MSL kits	*
<b>BT4001</b> Microscope for Teacher	1
<b>BT4002</b> DNA Module Teacher set	1
<b>BT4003</b> Anatomy	1
<b>BT4004</b> Teacher support kit	1
<b>BT4005</b> Teacher Mini Chem Lab	1
<b>BS4010</b> Microscope for Student	1
<b>BS4030</b> Student Mini Chem Lab	1
<b>DLB100</b> Digital laboratory set	1

\* Note: Quantity of sets per MSL cart

The Didactic Application also comes with **new add-on** modules such as:

1. **Classroom management system.**
2. **Student response system** which supports Android Pad and Smartphone user interface.
3. **Classroom Performance** Evaluation and Statistics.
4. **Teacher** add-on content **Link Interface.**
5. **Voice file** add-on **Annotation** utility.

## B100 for Biology

### Mobile Science Laboratory

All experiments are conducted either with the conventional measuring devices or with the use of data acquisition system including a variety of sensors and a state of the art data loggers. This digital lab is provided with the MSL kits in order for the students to enter in the Digital laboratory Technology. Force, pressure, temperature electromagnetic field, voltage, acceleration, current, light, sound photogates are some of the sensors provided to the students to contact their experiments. More than 50 teacher and student activities are provided.

Every subsection of the PCB 101 application covers a variety of subjects with relevant experiments, some to be conducted by the **teacher (demonstrations)** and others by the **student (activities)** as well as theoretical presentations for each concerned subject. All the required equipment for the experiments are granted by the Biology MSL kits.

Analytically:

◆The **Microscopic Observations** subsection covers:

Demonstrations: Viewing Prepared Slides.

Activities: Viewing Prepared Slides.

◆The **Cell** subsection covers:

Activities: Looking at Plant and Animal Cells.

◆The **Multicellular Organisms** subsection covers:

Activities: Observing Tissue Cells.

◆The **Brain and Nerves** subsection covers:

Activities: Identifying organelles, Neural processing time.

◆The **Genetics** subsection covers:

Activities: Genetic crosses, Determining your alleles.

◆The **Evolution** subsection covers:

Activities: Hardy Weinberg Calculations, Moth Populations and Industrial Melanism.

◆The **Human Reproduction**

subsection covers:

Activities: Harmful substances -

Hormonal control for fertility.

◆The **DNA** subsection covers:  
Demonstration: Building a DNA model.

Activities: Extracting DNA From Kiwi Fruit.

◆The **Plant Life Cycle** covers:  
Activities: Adaptation of Plants on Terrestrial life.

◆The **Reproduction in Flowering Plants** subsection covers:

Demonstrations: Pollen tube growth.

Activities: Pollen tube growth.

◆The **Plant Growth** subsection covers:

Activities: Factors that Affect Plant Growth.

◆The **Osmosis** subsection covers:  
Demonstrations: Osmosis in Living Plant Cells, Membrane Permeability.

Activities: Osmosis in Eggs, Determining Solute Potential.

◆The **Photosynthesis** subsection covers:

Demonstrations: Testing Leaves for Starch, Measuring the Rate of Photosynthesis.

Activities: Testing Leaves for Starch, Measuring the Rate of Photosynthesis.

◆The **Starch In Food** subsection covers:

Demonstration: Identification of Starch in Food, Sugar in Food, Proteins in Food.

Activities: Identification of Starch in Food, Sugar in Food, Proteins in Food.

◆The **Diet** subsection covers:  
Activities: Energy Content of Food.

◆The **Nutrient Cycles** subsection covers:

Activities: Eutrophication and Hypoxia, Carbon Dioxide.

◆The **Food Chain** subsection covers:

Activities: The Human Food Chain, Bio-magnification.

◆The **Animals Classification** subsection covers:

Activities: Diversification of Animal Life.

◆The **Human** subsection covers:  
Demonstrations: Determining your Vital Capacity, Exercise and Heart Rate, ECG Demonstration.  
Activities: Structure and function, Determining your Vital Capacity, Exercise and Heart Rate, Brittle and Bendy Bones, Microscopic Bone Structure.

The B100 interconnects the teacher with the students in a uniform platform. **Theory** presentations with interfaces to any Student **Response system or Interactive board**, Teacher **Demonstrations, Lab Simulations, Virtual** measurement simulations, **Data acquisition** applications, **Multimedia** presentations, student **experiments**, student **activities** and student **quizzes and tests** jointly provide the most modern platform in Science teaching.

*As mentioned before, the cart provides besides the teacher set of kits, space of 5 student sets of kits. In case more sets are required, these are provided in a student trolley, the ST100. Each trolley can fit 3 student sets of kits.*

