

# Virtual Science Laboratories

for secondary schools

2021  
**NEW!**



- 👍 4 subjects
- 👍 25 topics per program
- 👍 75 interactive lessons each
- 👍 dozens of printable worksheets

# What is VSL?

**Virtual Science Laboratories (VSL) is a set of interactive eContent for teaching biology, chemistry, physics and geography on the secondary education level. The programs provide excellent materials for teachers conducting lessons in remote, hybrid and stationary mode.**

VSL supports students in developing social and digital competencies as well as critical thinking. The programs teach the scientific method: asking questions, formulating hypotheses, conducting experiments, collecting and analyzing data, drawing conclusions. VSL applies a modern approach to learning, using flipped classroom model and blended learning.

## Why choose VSL?

VSL is an excellent teaching aid and the most secure option for uninterrupted learning in times of unexpected school closures. Teachers can easily share their screen and carry out engaging lessons, boosting students' interest in education. The VSL materials add an unparalleled value to lessons, engaging all students in active learning. Inspiring simulations, virtual tours, conducting experiments, or even frog dissections can easily take place in every virtual or stationary classroom. We recommend giving the students assignments and assessments on the multifunctional mCourser LMS platform for a complete, successful learning process.



### Modern curricula for secondary schools

VSL curricula respond to the needs of modern learners. The materials attract students' attention, develop their digital and social competencies and significantly facilitate teachers' work.



### Truly interactive resources

In contrast to static illustrations and flat PDFs, the VSL programs are filled to the brim with a variety of multimedia (videos, animations, recordings, simulations, 3D models) and engaging interactive exercises.



### Work on any device

The VSL series has been developed in a modern HTML5 environment. The programs don't require installation and can be used on virtually any device (computer, laptop, tablet, interactive whiteboard and display).



### Verified educational materials

The VSL materials have been developed in collaboration with teachers and university staff. Each lesson has been verified in terms of content and practicality, guaranteeing the highest quality of education.

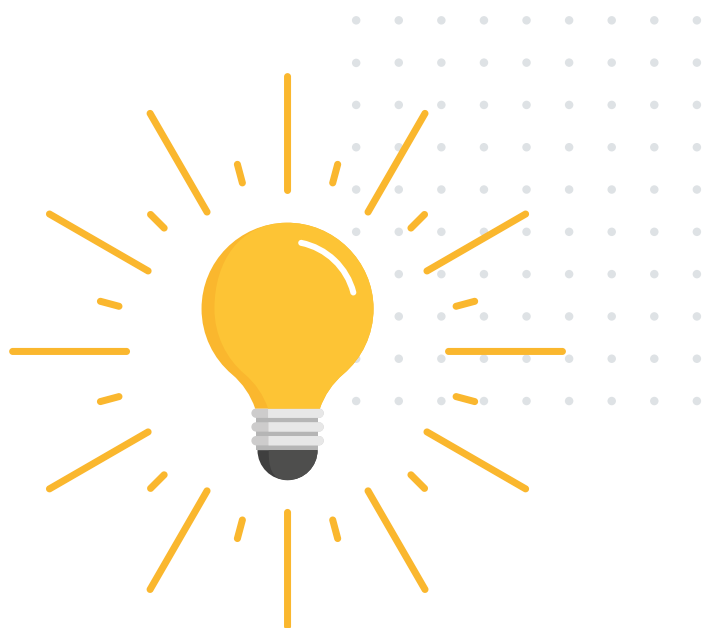
# How to work with VSL?

**The VSL programs are invaluable to teachers in covering even the most difficult topics in the core curriculum.**

Teachers introduce, present and discuss subjects in depth using an interactive whiteboard or any other multimedia player. Students work on printable worksheets, do assignments and participate in various assessment models on the mCourser LMS platform. Afterwards, teachers receive automatic, detailed reports on the results of the whole class and individual students, provided by Big Data analytics.

## What makes VSL effective?

- it is based on working with scientific methods,
- it supports students' independent thinking and their engagement through group work,
- it introduces learning by drawing conclusions from experience,
- it familiarises students with laboratory equipment,
- it combines theoretical knowledge with experiments and simulations,
- it ensures student satisfaction after experimental lessons on their own.



## What is included in VSL?

**Each program package (biology, chemistry, physics, geography) contains:**

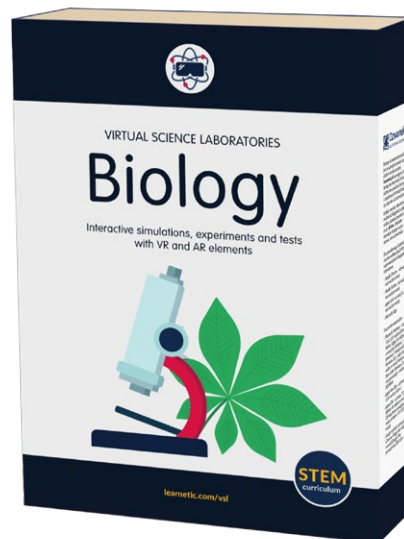
- resources compatible with STEM curriculum,
- basic and extended scope of particular subjects,
- attractive multimedia resources with virtual (VR) and augmented reality (AR) elements, 3D and 2D simulations, videos, animations, pictures and audio recordings.



# BIOLOGY

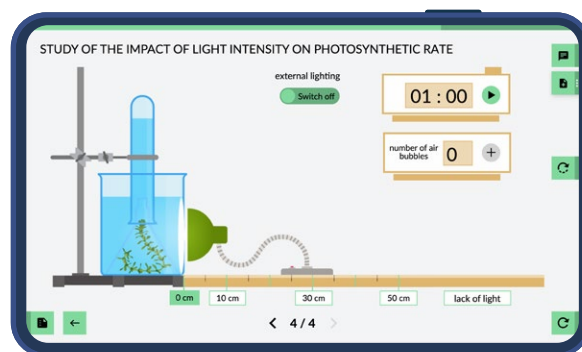
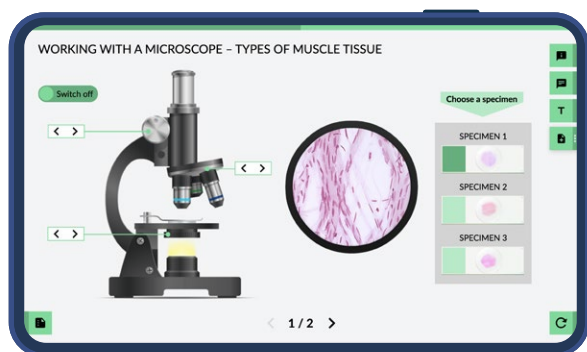
The invaluable database of materials for studying biology with the use of Virtual Science Laboratories includes:

- laboratory photographs of microscopic preparations of plant and animal tissues,
- documentation in the form of illustrations, photographs and movies of plant and animal observations as well as experiments performed in biology laboratories,
- components of an interactive human anatomy atlas with a detailed presentation of the individual structures of the human body,
- 3D models of the selected human organs,
- a possibility to model the course of experiments and selecting the appropriate reagents, equipment and examined material,
- a possibility to develop abilities to plan and conduct biological studies according to the principles of the scientific method.



## List of topics covered in VSL Biology

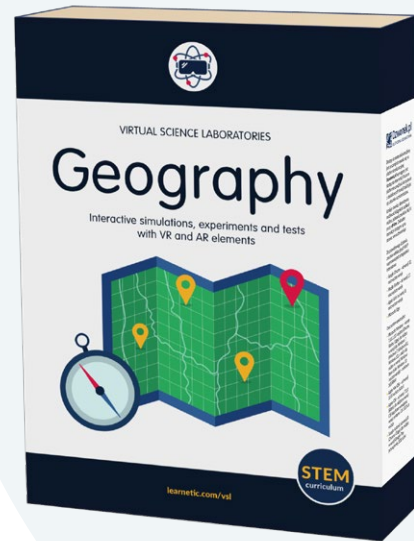
1. Starch detection in selected food products
2. Protein coagulation
3. Protein denaturation
4. Detection of peptide bonds
5. Characteristic reactions of proteins
6. Eucaryotic and procaryotic cells – similarities and differences
7. External and internal factors affecting the intensity of photosynthesis
8. Working on the microscope – plant tissue
9. Plant tissue atlas
10. Monocotyledon and dicotyledon plants
11. Water transport in a plant
12. Seed germination ability
13. Effect of deficiency of selected elements on plant growth and development
14. Phytohormones and plant movements
15. Identification of arthropods
16. Internal structure of an amphibian
17. Working on the microscope – muscle tissue
18. Gastrointestinal system
19. Lung structure and function
20. Heart structure and function
21. Nervous system
22. Eye and ear
23. Skeletal system structure
24. Structure and types of bones
25. Joints – mobile connections between bones



# GEOGRAPHY

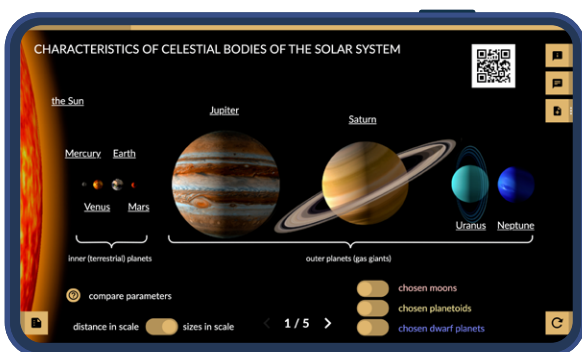
The interactive resources for geography include:

- Interactive maps, diagrams and charts, presenting topics in the field of the socio-economic geography of the world,
- animations and simulations of physical geographical phenomena and processes,
- 3D illustrations showing the celestial bodies of the Solar System and more,
- tasks requiring drawing conclusions based on analysing data from tables, graphs and maps.



## List of topics covered in VSL Geography

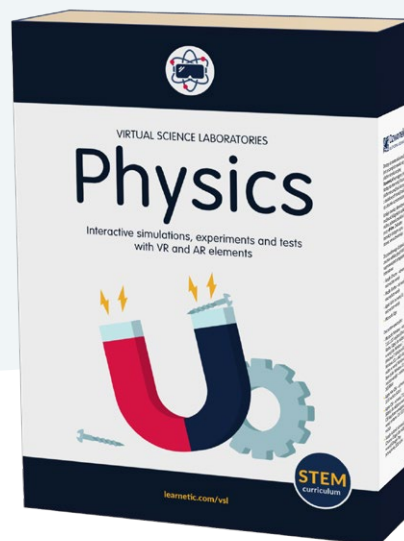
1. Maps and their use
2. Rotation of the Earth and time zones
3. Celestial bodies of the Solar System
4. Calculation of geographical coordinates based on astronomical observations
5. The Moon – a satellite of the Earth
6. Weather forecast based on synoptic maps and satellite images
7. Climates of the Earth
8. Types of lakes
9. Plutonism and volcanism
10. Geological profile analysis
11. Weathering
12. Earth sculpting factors
13. Rocks and minerals
14. Soil and soil types
15. Vertical vegetation diversity
16. Vegetation zones on the Earth
17. Analysis of socio-economic development indicators
18. Demography
19. Energy sources
20. The role of tourism in the world economy
21. Diseases of the world
22. Landscapes
23. Socio-cultural diversity
24. High technology industry
25. Pollution of the seas



# PHYSICS

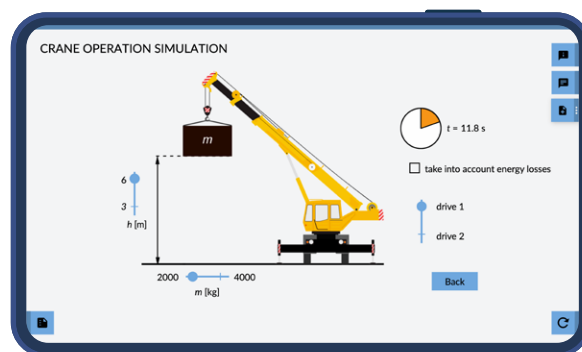
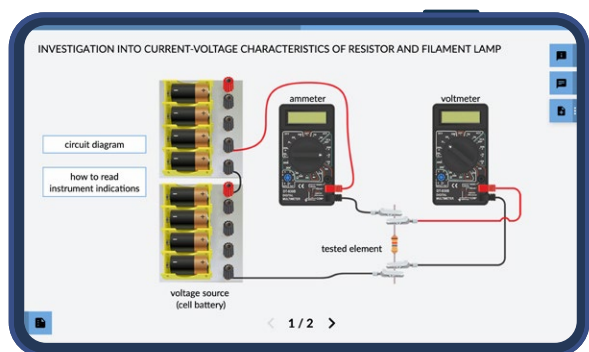
## The interactive resources for physics enable:

- carrying out measurements in simulated experiments corresponding to real-world conditions,
- processing of measurement results, including analysis of measurement uncertainty,
- simulations of physical phenomena based on parameters measured in real-world experiments,
- simulations accompanied by video commentary on real-world physics experiments,
- working on student online observation sheets for processing and presenting measurements in tables, sketches and graphs, from recording observations to drawing conclusions.



## List of topics covered in VSL Physics

1. Second law of motion
2. Circular motion
3. Determination of the coefficient of friction
4. Buoyancy force
5. Torque
6. Characteristics of celestial bodies of the Solar System
7. Properties of a mathematical pendulum. Determination of standard acceleration due to gravity
8. Work, power, energy
9. Determination of the specific heat of solids
10. Temperature changes during phase transitions
11. Heat engines
12. Capacitors
13. Kirchhoff's first law
14. What the electrical resistance of a conductor depends on
15. A study of the current-voltage characteristics of a resistor and an incandescent lamp
16. Determination of SEM and internal resistance
17. Diodes in an electrical circuit
18. Domestic electricity networks
19. Motion of an electric charge in a magnetic field
20. Magnetic field generated by moving electric charges
21. Transformers
22. Determination of the refractive index
23. Diffraction grating
24. Polarisation of light
25. Decay of a radioactive isotope

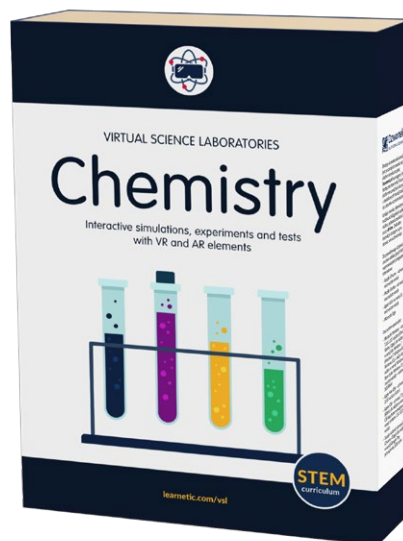




# CHEMISTRY

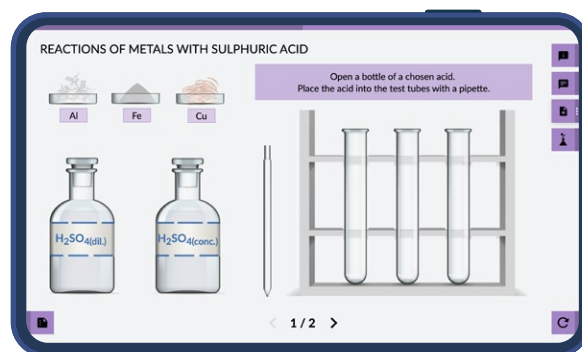
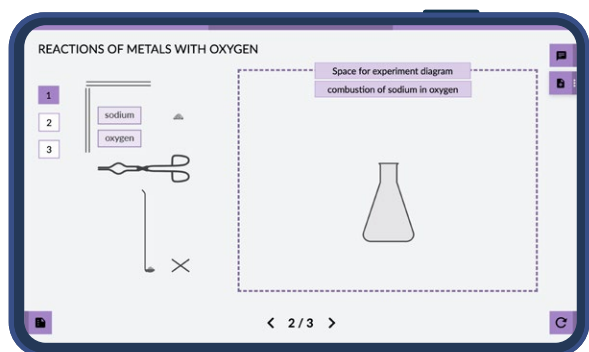
Make studying chemistry interesting and accessible! The VSL Chemistry package provides:

- development of the ability to design and describe chemical experiments: construction of schemes of chemical experiments, selection of reagents, laboratory glassware and equipment,
- simulations with animations and graphics showing the course of chemical experiments,
- short videos of real-world chemical experiments accompanied by helpful commentary,
- instructions on how to perform experiments,
- development of the ability to record observations and draw conclusions from conducted chemical experiments,
- 3D models of chemical structures.



## List of topics covered in VSL Chemistry

1. Natural radioactivity
2. Preparation of solutions with a specific percent concentration
3. Preparation of solutions with a specific molar concentration
4. Reaction and pH of solutions
5. Alkacymetric titration
6. Reactions of precipitate formation
7. Ammonia properties
8. Distinguishing calcareous rocks from other rocks
9. Catalytic reactions
10. Hydrogen production
11. Oxygen production
12. Metal reactions with oxygen
13. Metal reactions with hydrochloric acid
14. Metal reactions with sulphuric(VI) acid and nitric(V) acid
15. Chemical activity of metals
16. Oxidation numbers of manganese
17. Galvanic cells
18. Water electrolysis
19. Mono- and polyhydroxy alcohols
20. Tollens' test
21. Trommer's test
22. Soap receiving reaction
23. Detection of proteins
24. Sucrose properties
25. Fibres





### **Learnetic SA**

Azymutalna 9 B1, 80-298 Gdansk, Poland  
[www.learnetic.com](http://www.learnetic.com)  
[sales@learnetic.com](mailto:sales@learnetic.com)  
+48 58 764 75 00

