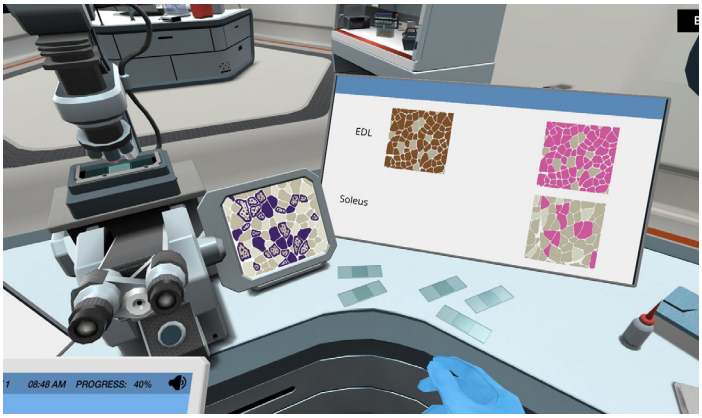
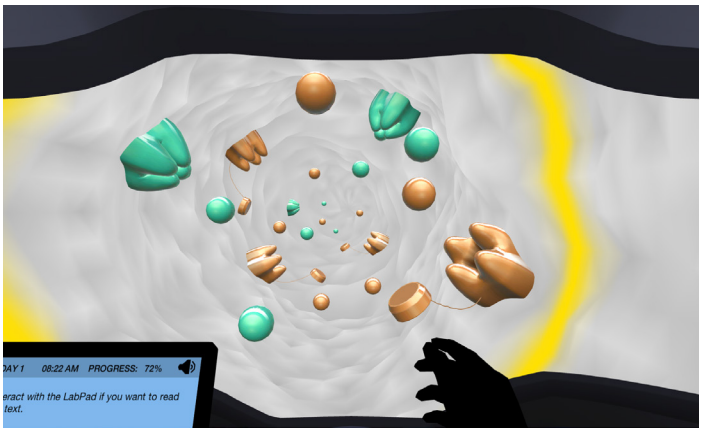
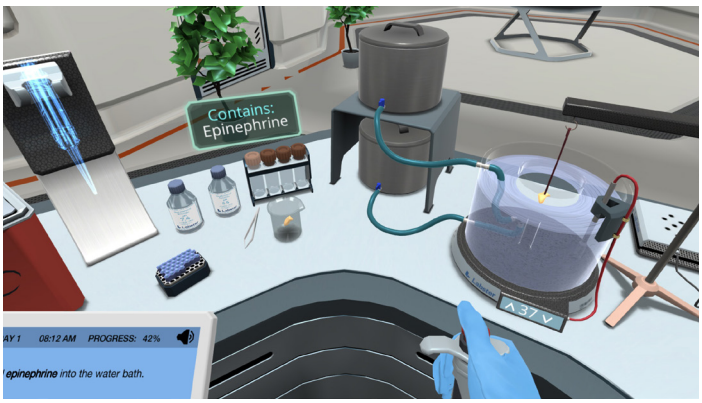
Labster Virtual Lab Simulations for Animal Physiology







Labster is a world-leading provider of virtual lab simulations for higher education and high schools.

The simulations are designed to let students learn by doing in a virtual laboratory, solving real-case problems. Quiz questions test the students' knowledge, supporting an inquiry-based and deep-learning approach. The students will train real lab skills in a safe virtual environment where they can safely make mistakes, and learn at their own pace.

The most basic simulations are ideal as a self-study activity since the students will review essential concepts. The more advanced simulations are designed to support the course syllabus, reinforcing concepts and giving the students an innovative tool to deepen their learning.

Labster

University Animal Physiology Simulations

Includes 10 simulations:

- Action Potential
- Cardio-Respiratory Physiology
- Cardiovascular Function During Exercise
- Endocrinology
- Intestinal Glucose Transport
- Renal Physiology
- Sensory Transduction
- Skeletal Muscle
- Smooth Muscle
- Thermal Homeostasis

Ready to learn more?

Bring the world of science into the classroom and enable students to bring learning home with Labster's virtual science lab content. No need for additional hardware or lab equipment; access these labs on Chromebooks or any other laptops, and spark creativity in students with this innovative and interactive way to explore science.

It's a million-dollar lab, one click away.

To learn more about how you can incorporate Labster virtual labs in your teaching, visit us at www.labster.com.

Learning objectives covered in Labster's animal physiology simulations

Action Potential

- Dissect a squid to extract a giant neuron
- Learn the ionic and electrical characteristics of a single action potential.
- Understand the role electrical potentials and voltage-gated channels play in determining the shape of an action potential.
- Measure the resting membrane potential and then observe an action potential.
- Record membrane current under voltage clamp and at different concentrations of extracellular sodium and potassium.

Cardio-Respiratory Physiology

- Explain physiological adaptations of the cardio-respiratory system of seals to deep diving
- Point out differences between human and seal physiology during long, deep dives without oxygen
- Evaluate respiratory and cardiovascular function
- Measure oxygen consumption and calculate the total amount of oxygen needed for dives of various durations, and compare this to estimated oxygen stores in the lungs, blood, and tissues of seals
- Use graphing approaches to relate type of exercise to metabolic and heart rates
- Compare energy costs of different forms of locomotion

Cardiovascular Function During Exercise

- Understand how the respiratory and cardiovascular system responds during exercise.
- Understand how cardiac output and blood pressure can be measured.
- Understand how heart rate, stroke volume, cardiac output and total peripheral resistance change with exercise.
- Interpret data to assess possible cardiovascular problems during exercise.

Endocrinology: control of reproduction

- Understand how hormonal feedback mechanisms among LH, FSH progesterone and estrogen control fertility and ovulation in females
- Understand how hormonal feedback mechanisms among LH, FSH, and testosterone
- control fertility in males.
- Demonstrate how interference in these hormonal signaling loops can inhibit ovulation
- in females and sperm viability in males.
- Use physiological methods to assess fertility in
- males and females.
- Understand the use of radioimmunoassays for measuring serum hormone levels.

Intestinal Glucose Transport

- Understand the epithelial model for how glucose is transported across the mammalian small intestine
- Perform a glucose assay method
- Use an animal model to study the transport of materials across the intestine
- Describe the effect of blocker ouabain on glucose transport by the small intestine
- Explain the effect of manipulations of mucosal concentrations of glucose and sodium on glucose intestinal transport
- Interpret physiological data and apply to clinical cases

Renal Physiology

- Understand the conceptual outline of the different bodily processes behind body water regulation
- Understand some of the mechanisms of epithelial transport in kidney tubules, and how these are studied
- Be able to interpret and analyze experimental data in the context of body water regulation and epithelial water and ion transport
- Learn the morphological relationships between the kidney tubules and the circulatory system.
- Analyze experimental data for calculating glomerular filtration rate
- Set up and perform a perfusion of renal tubules, including the calculation of liquid absorption rates.
- Learn about the epithelial transport mechanism in the kidney tubules
- Use experimental data to assess the mode of action of a diuretic drug

Sensory Transduction

- Describe the response of a sensory receptor to chemical stimuli at the cellular and organismal level
- Demonstrate how nociception can be inhibited by sodium channel blockers
- Analyze and interpret patch clamp and live animal data demonstrating how two anesthetics affect nociception
- Understand the types and responses of sensory neurons
- Demonstrate how nociceptors sense temperature and chemical stimuli to generate pain
- Contrast how two sodium channel blockers inhibit capsaicin-induced excitability
- Set up voltage-clamp experiment and measure changes in current in response to chemical stimuli
- Interpret changes in membrane potential in response to chemical stimuli using current-clamp method
- Collect data on withdraw reflex time in an acute pain model
- Analyze experimental data testing motor function

Skeletal Muscle

- Explain length tension relationships of a skeletal muscle
- Understand how twitch and tetanus, the force-frequency relationship and the response to fatigue differs for two specific muscles
- Measure physiological properties of isolated EDL and soleus muscles
- Quantify the proportion of fibers found in both muscles
- Understand where the above muscles are found

Smooth Muscle

- Describe smooth muscle characteristics
- Explain the autonomous nervous system (sympathetic and parasympathetic) control of smooth muscle
- Identify which neurotransmitters and receptors are involved in smooth muscle contraction
- Use the equipment and interpret the results from the performed experiments

Thermal Homeostasis

- Understand the principles of heat balance and thermoregulation
- Compare mammalian methods of heat gain and heat loss used to regulate body temperature
- Interpret how vasoconstriction and vasodilation contribute to thermoregulation
- Demonstrate how counter-current exchanges regulate extremity temperatures
- Analyze the impact of thermogenic heat production and heat loss on survival capabilities of reindeer
- Quantify the metabolic rate of reindeer at different temperatures
- Compare the thermoneutral zones of summer and winter reindeer