Cardiovascular

The BSL System covers a wide range of cardiovascular measures based on the heart’s electrical signal. Record standard (I, II, III) or augmented (aVR, aVL or aVF) leads; add a multi-lead ECG cable to simultaneously record a pre-cordial lead. Students attach Leads I and III and the software uses Einthoven’s law to display Lead II. Identify, isolate and measure components of the ECG complex under varying conditions. Use the averaging features to automate ECG analysis. View arrhythmia data obtained from the NIH PhysioBank archive. Calculate R-R interval to display heart rate variability or determine vagal tone. Use the electronic stethoscope to listen to and record heart sounds and then correlate the sounds with the mechanical and electrical events of the cardiac cycle. Record cuff pressure and Korotkoff sounds to measure systolic and diastolic blood pressure. Determine pulse wave velocity. For advanced studies, use the noninvasive cardiac output sensor to record stroke volume and cardiac output.

Respiratory & Pulmonary Function

The BSL provides an excellent introduction to volumes and capacities, respiratory flow rates, breathing mechanics, and ventilation. Display and/or print a clinical grid on the data for effective interpretation and training. The software guides the student in measuring FVC and in calculating FEV and MVV. The airflow transducer is hand-held, lightweight, easy to clean and very easy to use. Take measures before, during and after exercise to study ventilation and heat exchange. The new Gas Analysis module provides online measures of CO₂ and O₂ levels for Respiratory Exchange Ratio, O₂ Consumption and Basal/Resting Metabolic Rate lessons. Non-rebreathing T-valves, air chambers, facemasks, and tubing options provide setup options to suit any protocol.
**Muscular**

Record EMG data to investigate the properties of skeletal muscle. Record and display raw and integrated EMG signals; overlap the signals for better correlation of the data. Measure strength and repeat trials for motor unit recruitment, summation and fatigue. Use the reflex hammer transducer to study reflex response (neural control), or add the dynamometer to study handgrip strength profiles. Use the new Finger Twitch transducer for threshold, summation, tetanus and fatigue analysis. Students can listen to the muscle activity through headphones and note the increase in sound intensity as grip strength is increased through motor unit recruitment.

**Nerve Conduction**

Combine the human-safe stimulating electrode with the stimulator to record nerve conduction experiments. Stimulate the ulnar nerve at three different points and record nerve conduction time. Measure the distance between the stimulation and recording points and then calculate velocity.

**Neurophysiology**

Study EEG under a variety of conditions to explore relaxation and brain rhythms—software will filter and display each rhythm separately: Alpha, Beta, Delta, and Theta. Select from a variety of lessons to study Alpha rhythms in the occipital lobe, reaction times, and hemispheric asymmetry. Add the EOG (occipital signal) to study eye movement, saccades, tracking, angular displacement, or ocular fixations. Use the Stimulator to study evoked response—auditory, visual, or somatosensory. The new high-speed MP36 hardware allows for the recording of spontaneous nerve activity, continuously, at speeds of 100,000 samples a second. Add the SuperLab stimulus presentation package to perform psychophysiology stimulus/response protocols examining high-level brain activity. Conduct microelectrode recordings and study action potentials.

**Autonomic Nervous System**

Record a wide variety of ANS-related signals such as EDA/GSR, temperature, ECG, pulse, respiration, airflow, nerve conduction, continuous blood pressure, and continuous non-invasive cardiac output (using bioimpedance technique) to demonstrate changes in the parasympathetic and sympathetic nervous system activity. Use the Polygraph lesson for simultaneous heart rate, electrodermal activity (GSR), and respiration rate. See Psychophysiology & Neurophysiology on page 18 for more details.

**Exercise Physiology & Biomechanics**

Combine a wide range of respiratory system and pulmonary function signals with biomechanical data. Use the new Gas Analysis Module for online analysis of expired O$_2$ and CO$_2$ levels. Options are available for continuous blood pressure and cardiac output, and the system easily interfaces with force plates and other instrumentation (more than 18 ready-made connectors available). There are more than 27 specialized lessons—see page 16 for details.

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**Perform 25 or more lessons with this core package:**

- **Muscular**
  - BSL1 Standard & Integrated EMG
  - BSL2 Motor Unit Recruitment & Fatigue
  - H07 EMG Contractions - Active Learning
  - H27 Facial EMG
  - H34 EGG Electrogastrogram
  - H36 Muscular Biofeedback
- **Cardiovascular**
  - BSL5 Components of the ECG (Lead II)
  - BSL6 Leads I, II, III & Einthoven's Law
  - BSL16 Blood Pressure & Korotkoff Sounds
  - BSL17 Heart Sounds & Cardiac Events
  - H08 Dive Reflex - Active Learning
  - H23 Signal Averaged ECG
  - H32 Heart Rate Variability
- **Pulmonary Function**
  - BSL12 Pulmonary Function: Vol. & Capacities
  - BSL13 Pulmonary Flow Rates: FEV and MVV
- **Neurophysiology**
  - BSL3 EEG Relaxation & Brain Rhythms
  - BSL4 Alpha Rhythms in the Occipital Lobe
  - BSL10 Eye Movement, Saccades & Fixation
  - H10 EEG & Hemispheric Asymmetry
  - H12 EOG Saccades & Displacement
  - H13 EOG Visual Tracking vs. Imagination
  - H14 Ocular Fixation while reading
  - H15 Ocular Fixation while viewing an image
- **Biomedical Engineering**
  - H20 BME Filtering
  - H33 FFT Fast Fourier Transform

**See page 43-45 for a description of all available lessons.**

**Increase your lab options with…**

- Stimulator
- Stim. Electrode for humans
- Finger Twitch Transducer
- O$_2$ & CO$_2$ Analysis Module
- Dissolved O$_2$ Probe
- pH Probe
- Reflex Hammer Transducer
- Multi-Lead ECG Cable
- Cardiac Output Sensor
- Goniometer
- Respiratory Effort Trans.
- Temperature Trans.
- Headphones
- EDA (GSR) Lead
- SuperLab System
- Transducer Accessory Pack

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