

# iWorx Physiology Teaching Solutions

## Everything You Need for College-Level Teaching Labs

iWorx offers more than 100 professionally authored experiments, 275 lab exercises and all of the components, software and courseware you need to conduct comprehensive college level lab experiments in:

- Human Physiology
- Exercise Physiology
- Animal Physiology
- General Biology
- Neurobiology
- Psychological Physiology

iWorx offers a unique choice of complete physiology teaching solutions:

**LabsByDesign™** - you choose only the lab experiments you want to teach and iWorx will configure the hardware and courseware you need for the specific experiments that meet your lab requirements.

**Preconfigured Lab Kits** - include all of the components and courseware tailored to teach the full range of experiments and exercises in our human physiology, combination human/animal physiology, exercise physiology, neurobiology or psychological physiology labs.



## LabsByDesign: Choose the Physiology Lab Curriculum that Fits Your Needs Perfectly

LabsByDesign is the easiest and most cost effective way for you to design the physiology lab curriculum that perfectly fits your needs. LabsByDesign lets you stretch your budget and afford more of the things you do need.

### Here's How LabsByDesign Works

You choose from more than 275 iWorx professionally authored lab exercises in cardiovascular, respiratory and neuromuscular physiology. An easy-to-use web-based selection guide lets you simply check-off those labs you want to teach. The automated LabsByDesign configurator then gets to work tailoring the necessary components from our complete line of data recording modules, sensors, electrodes, stimulators and other supporting accessories along with the

courseware necessary to support the experiments you selected. One of our LabsByDesign technical consultants will then contact you to ensure the solution fits your requirements precisely.

The end result is a complete lab package that does exactly what you want - no more, no less.

Design your own physiology labs online at [www.iworx.com/labsbydesign.htm](http://www.iworx.com/labsbydesign.htm).

# iWorx Professionally Developed Courseware

## Web-ready iWorx Courseware

The iWorx solution starts with dynamic, interactive human physiology, animal physiology, exercise physiology, and psychological physiology courseware, developed over several years by university teaching professionals. The course materials include more than 100 lab experiments and 275 learning exercises. They're 100% web-ready. You can easily put them on your own course home page, and customize the content to suit your own teaching requirements. Course materials are provided as .pdf and HTML files.

The courseware works seamlessly with the LabScribe2™ software. Selecting the group of experiments that come with the standard iWorx physiology lab manual adds them to the Settings menu; choosing any of the experiments automatically loads the display time, sampling rate, and analysis functions that are needed to complete the lab. Complete documentation for the selected lab is automatically called up and displayed in a separate window.

A unique "settings manager" lets instructors attach external resources, such as Web links, .pdf files, movies or illustrations to the experimental settings file and makes them readily available to assist students in the completion of the experiment. Instructors can use the "settings manager" to customize their curricula as well.

All documentation features professionally rendered, full-color graphics illustrating physiological principals. All of the web materials can be used locally, or placed on the course/department server for general viewing.

### Experiment HH-1: The Electrocardiogram and Peripheral Circulation

#### Background

The cardiac cycle involves the sequential contractions of the atria and the ventricles which are triggered by action potentials in the myocardial cells. The combined electrical activity of the myocardial cells produces electrical currents that spread through the body fluids. These currents are large and detectable by recording through electrodes placed on the skin. The regular pattern of signals produced by the heart is called the electrocardiogram or ECG (Figure HH-1-1 on page HH-1-1).

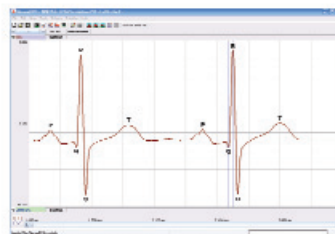


Figure HH-1-1. ECG recording displayed in the Main window with labels showing the P, QRS, and T waves.

The components of the ECG (Figure HH-1-1 on page HH-1-1) are correlated to electrical activity in the atria and ventricles such that:

#### Equipment Required

- PC Computer
- IWX/214 data acquisition unit
- USB cable
- IWX/214 power supply
- C-AAMI-504 FCG cable and electrode lead wires
- PT-104 Pulse plethysmograph
- Stethoscope
- Alcohol swabs
- Disposable ECG electrodes
- Ice, cold and hot water, plastic bags

#### IWX/214 Setup

- 1 Place the IWX/214 on the bench, close to the computer.
- 2 Check Figure T-1-1 in the Tutorial Chapter for the location of the USB port and the power socket on the IWX/214.
- 3 Check Figure T-1-2 in the Tutorial Chapter for a picture of the IWX/214 power supply.
- 4 Use the USB cable to connect the computer to the USB port on the rear panel of the IWX/214.
- 5 Plug the power supply for the IWX/214 into the electrical outlet. Insert the plug on the end of the power supply cable into the labeled socket on the rear of the IWX/214. Use the power switch to turn on the unit. Confirm that the red power light is on.

#### Start the Software

- 1 Click on the LabScribe shortcut on the computer's desktop to open the program. If a shortcut is not available, click on the Windows Start menu, move the cursor to All Programs

## A Full Complement of Lab Experiments and Exercises

### Human Physiology Experiments

These exercises are primarily for use in Physiology courses for majors or upper level students.

- Human Circulation
- Human Exercise
- Human Heart
- Human Muscle
- Human Nerve
- Human Psychophysiology
- Human Spirometry

### General Biology Experiments

- Ecological Balance
- Acid Rain
- Biological Buffers
- Membrane Permeability
- Water Quality

### Exercise Physiology Experiments

- Resting, Active, and Exercising Metabolic Rates
- Respiratory Exchange Ratio (RER)
- Resting metabolic Rate (RMR)
- Exercise, Blood Pressure, and Oxygen Saturation Levels
- Recovery from Exercise
- Metabolic and Thermal Response to Exercise

### Animal Physiology Experiments

- Animal Fluid Balance
- Animal Muscle
- Animal Nerve

### Neurobiology Experiments

- LabScribe2 Tutorial - Neurobiology
- Compound Action Potential
- Neuromuscular Studies
- Membrane Potentials
- Nerve Action Potentials and Synaptic Potentials
- Physiological Identification of Neurons
- Morphological Identification of Neurons
- Crustacean Stretch Receptors

### Foundations of Human Physiology Experiments

These exercises are designed for use in non-majors Human Biology or Anatomy & Physiology courses. Lab exercises have been designed for completion within a shorter time period.

### Marieb Lab Activities

These exercises are designed for courses using Elaine Marieb's Human Anatomy & Physiology Laboratory Manual.

# iWorx Preconfigured Physiology Teaching Kits

iWorx teaching kits contain the appropriate hardware and components, LabScribe2 software, and expertly written courseware necessary to teach all of the experiments available in human, exercise, animal physiology, neurobiology, and psychophysiology.

## Complete Package— Everything Included

iWorx Physiology Teaching Kits are shipped with all necessary transducers, cables and lab documentation—everything designed to work together. The transducers are extremely robust and carry the same three-year warranty as the iWorx 214 Data Recorder.

## Warranty and Upgrades

iWorx Physiology Teaching Kits come with a 3-year warranty\*. Software upgrades are free and can be easily downloaded from the iWorx users area. LabScribe software and courseware may be freely distributed to students.

\*one year on gas analyzers.

## Want to Learn More?

Just call (800) 234-1757 or contact us by email at [info@iworx.com](mailto:info@iworx.com).



HEK-300



## HK-214 Advanced Human Physiology

- iWorx 214 Four Channel Computer Interface with Built-In Two Channel Isolated Bioamplifier and LabScribe2 Recording Software
- Non-Invasive Blood Pressure Transducer and Stethoscope
- Spirometer with 300 Liter Flow Head
- Hand Dynamometer
- Event Marker
- 12VDC GND. Power Supply
- Cables
- 150 Pre-Gelled Ag/AgCl Electrodes
- Pulse Plethysmograph
- Temperature Sensor
- HTML and PDF Lab Manual

## AHK-214 Advanced Animal/Human Physiology Kit

- iWorx 214 Four Channel Computer Interface with Built-In Two Channel Isolated Bioamplifier and LabScribe Recording Software
- Nerve Bath Chamber with Stimulating/Recording Electrodes
- Oxygen Electrode with Current-to-Voltage Adapter
- Non-Invasive Blood Pressure Transducer and Stethoscope
- Spirometer with 300 Liter Flow Head
- Pulse Plethysmograph
- Temperature Sensor
- Displacement Transducer
- 150 Pre-Gelled Ag/AgCl Electrodes
- Cables
- HTML and PDF Lab Manual
- Hand Dynamometer
- Event Marker
- Force Transducer
- Intracellular Probe
- 12VDC GND/Power Supply
- Student Dissection Kit

## HEK-300 Human Exercise Physiology Kit

- iWorx 214 Four Channel Computer Interface with ECG/EMG Amplifier and LabScribe2 Software
- O<sub>2</sub> and CO<sub>2</sub> Gas Analyzer
- Spirometer with 1000L and 300L Flowhead
- Mixing Chamber
- Pulse Plethysmograph
- Temperature Probe
- Event Marker
- Hand Dynamometer
- Blood Pressure Sensor
- Polar<sup>®</sup> Transmitter/Receiver Set
- HTML and PDF Lab Manual

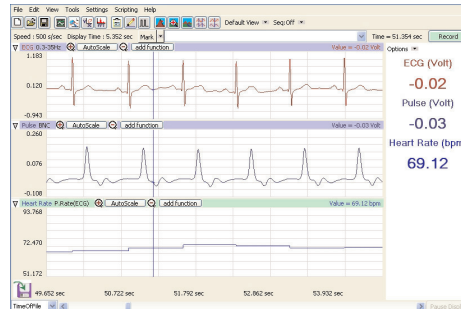
# iWorx Easy-to-Use Software and Classroom-Ready Hardware

## LabScribe2 Software Makes Even Sophisticated Experiments “Click and Play” Easy

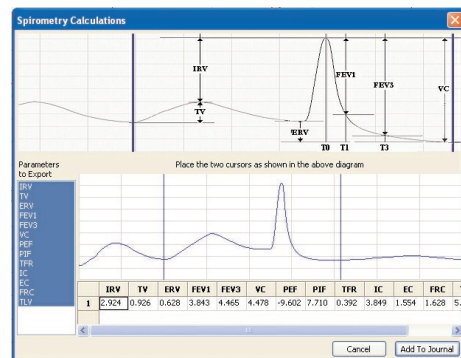
LabScribe2 has been developed from the ground up for classroom teaching, and strikes an ideal balance between flexibility and simplicity. Setup of gains, sampling rates, display times and other criteria is automatic via the “settings” file. No complicated adjustments are needed. Users can easily control the various aspects of recording through dialogue windows and save their preferences for future use. In Manual mode, the user has control of all aspects of the recording.

LabScribe2 includes its own function generator/stimulator for maximum experiment versatility. Easy-to-use tools let the student make measurements from the data with a minimum of manipulation. For example, LabScribe2 can display the Mean, Min, Max, Duration and Amplitude of a selection, or it can display the Rate or Integral of incoming signals in real time. Incoming voltages can be easily converted to real units such as pH or mmHg. And, of course, built-in online help is instantly available.

Recorded data is presented as distance per-unit of time, e.g., cm/sec, exactly as it would be on a traditional paper chart recorder. Using the built-in annotation feature, students can even “write” on the virtual chart recording to quickly locate regions of interest. For convenience, professional-looking LabScribe2 reports can be prepared and edited, all within the program’s own Journal. If desired, the pictures and text in the Journal can be easily exported to other programs.



*LabScribe2 is a comprehensive, data recording and analysis solution developed especially for classroom use. It's easy to use, yet offers a full range of features for human, animal, psychological physiology and neurobiology teaching.*



*LabScribe2's Analysis window lets you zoom in on specific areas of the recording and perform calculations on selected pieces of the data.*

## iWorx 214 Data Recorder

The iWorx 214 recorder is the centerpiece of iWorx teaching solutions. The reliable 4-channel data recorder is constructed of rugged, extruded aluminum, with a minimum of student-accessible controls and adjustments.

For most applications, setup is automatic and transparent to the user. From within the software the unit can be configured for EEG, EMG (EOG) or ECG. The iWorx 214 includes a dual-channel biopotential amplifier approved for use on human subjects. Two additional channels accept practically any sensor you're likely to encounter, as well as voltage output of pH meters, spectrophotometers and other laboratory devices. The iWorx 214 also provides a fully functional built-in stimulator useful for a variety of human and animal labs.

The recorder interfaces to a PC or MAC via a USB connection which provides high speed aggregate sampling (at 100 kHz continuous).

### iWorx 214 Specifications

Analog Inputs:	2 isolated differential biopotential/2 single-ended/differential transducer inputs
Input Range:	±5V
Excitation Voltage:	±5V
Input Impedance:	10 Gohm
Amplifier Response:	0 - 2 kHz
Analog Output:	1 (differential)
Output range:	±5V
Output Current:	5 mA
Output Resolution:	12 Bit
ADC Resolution:	16 Bit
System Noise:	±1 LSB (< 1mV)
Sampling Rate:	100,000 samples/sec aggregate continuous
Trigger:	1 (TTL)
Biopotential Amp:	Safe for use on human subjects
Stimulator Output:	±5V

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