BME 3402- MEDICAL INSTRUMENTATION

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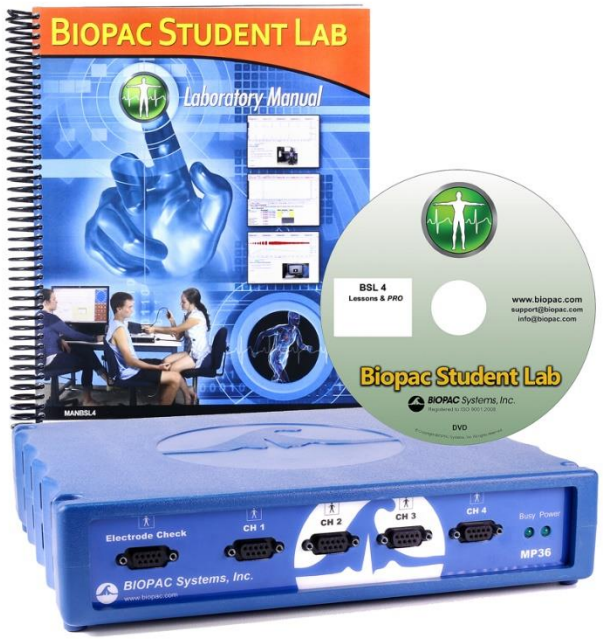
Biomedical Instrumentation

- Biopotentials
- Biosignal Measurements
- Sensors and Electrodes
- Bioamplification and Filtering
- Data Collection and Analysis



Weekly Subjects and Related Preparation Studies

Week	Subjects	Related Preparation
1	Basic Concepts of Biomedical Devices	
2	Origin of Biopotentials	Lab1_Introduction to Biopac Data Collection and Analysis System
3	Electrocardiogram, Electromyogram	Lab2_Electromyogram (EMG)
4	Electroencephalography Electroneurogram, Electroretinogram, Electrooculogram	Lab3_Electrocardiogram (ECG) I
5	Amplifiers and Signal Processing	Lab4_Electrocardiogram (ECG) II
6	Biosignal Amplifiers	Lab5_ECG &Pulse
7	Bioelectrodes	Lab6_Electroencephalography (EEG)
8	Midterm 1 / Practice or Review	
9	Sensory Systems	Lab7_Electrooculogram (EOG)
10	Blood Pressure and Heart Sounds	Lab8_Electrodermal Activity &Polygraph
11	Measurement of Blood Flow and Blood Volume	Lab9_Blood Pressure
12	Measurement of Respiratory System	Lab10_Heart Sounds
13	Clinical Laboratory Instrumentation, Medical imaging systems	Lab11_Respiratory Test
14	Therapeutic and Prosthetic Devices	Lab12_Make Up
15	Final	

Evaluation System

Activities	Number	Percentage of Grade
Attendance/Participation		
Laboratory	10	30
Application		
Field Work		
Special Course Internship (Work Placement)		
Quizzes/Studio Critics		
Homework Assignments		
Presentations/Jury		
Project		
Seminar/Workshop		
Mid-Terms	1	30
Final	1	40
	Percentage of In-Term Studies	60
	Percentage of Final Examination	40
	TOTAL	100

MEDICAL INSTRUMENTATION LAB REPORT FORMAT Softcopy

The experiment reports should include the following sections:

(Font: Times New Roman – Font size: 12)

TITLE PAGE

Author name, student ID, experiment name, experiment date and section.

1- OBJECTIVE (5 point)

The objective section of your report should be a few sentences that describe the purpose of your experiment. Do not copy the instructions.

2- THEORY (10 point)

Provides a brief summary of the background and theory related to the experiment. This part should consist of one paragraph. Do not copy the instructions.

3- DATA AND CALCULATIONS (25 point)

This part include your data into tables and graphs. Show all the calculations with the equations (if there is any!). Each result should contain unit. Tables and figures must be numbered and titled. Table titles appear at the top, figure titles at the bottom.

4- DISCUSSION (30 point)

Restate the purpose and findings of the experiment. This section is the explanation of the results section. Include explanations of unpredicted or inconsistent results and explain. Compare results with existing knowledge. Explain why you think the results mean.

5- QUESTIONS (25 point)

Answer all questions that are given in the lab manuals.

REFERENCES (5 point)

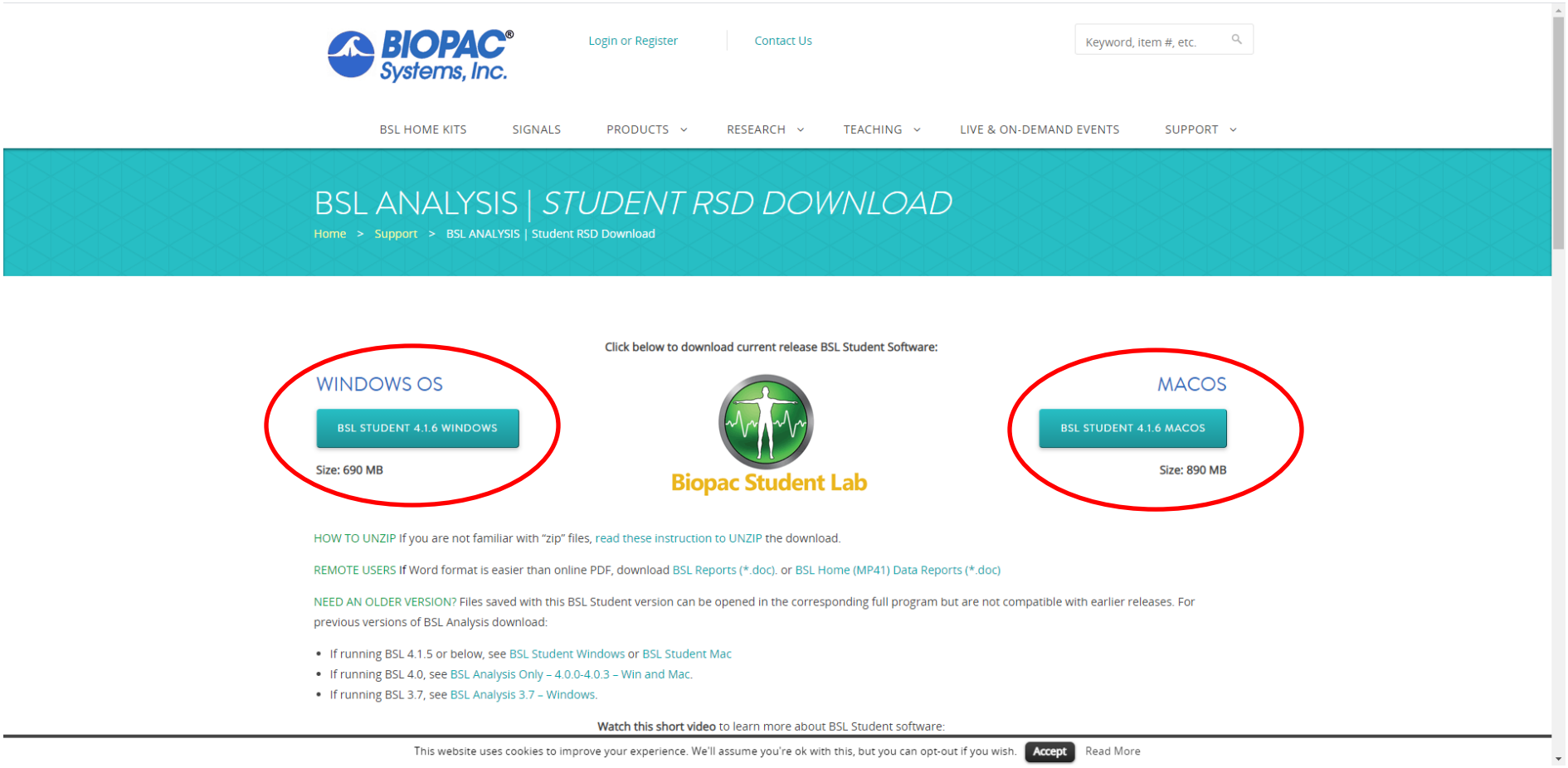
List the sources you used to compose the lab report. As laboratory research relies on previous work, written reports must include references. All information or interpretations given in the introduction and discussion part should be supported by references. Inadequate or inappropriate referencing should be avoided. Include references to any journal articles, books, etc. used to complete your lab reports both as parenthetical references (in the correct location of the text) and in the bibliography.

List references in proper scientific format. For this course, use the IEEE style of referencing.

Example:

[1] W. Brown, "Electrical Design Considerations," in *Advanced Electronic Packaging: With Emphasis on Multichip Modules*: Wiley-IEEE Press, 2013, pp. 51-74.

https://www.biopac.com/support/bsl-analysis-student-rsd-download/



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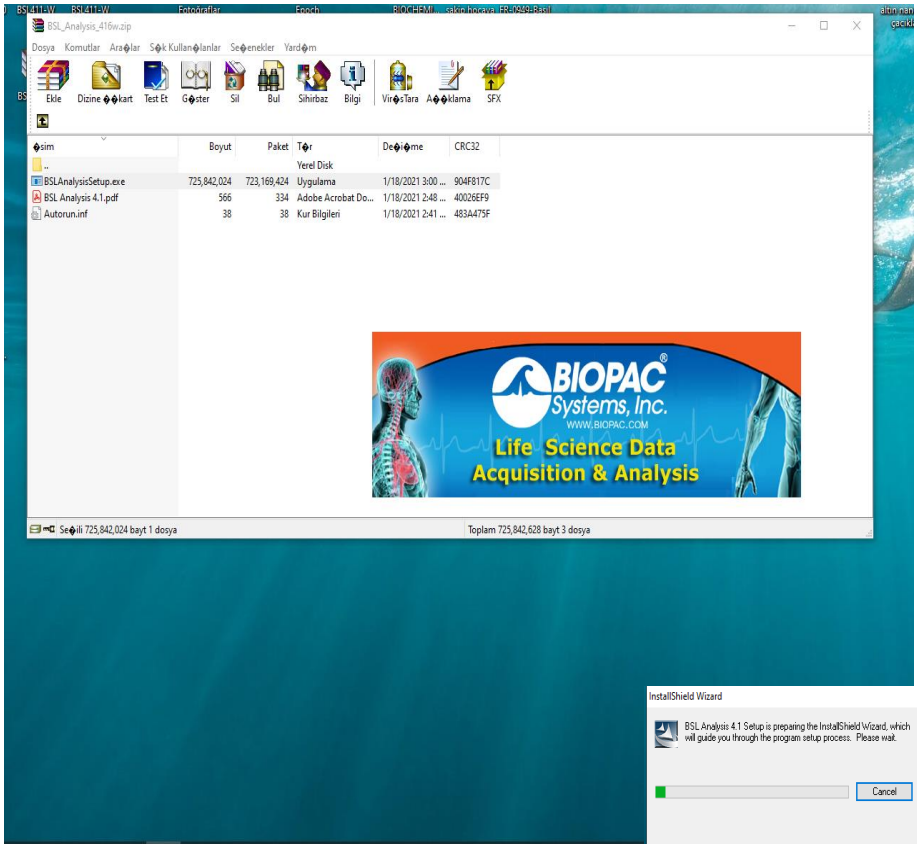

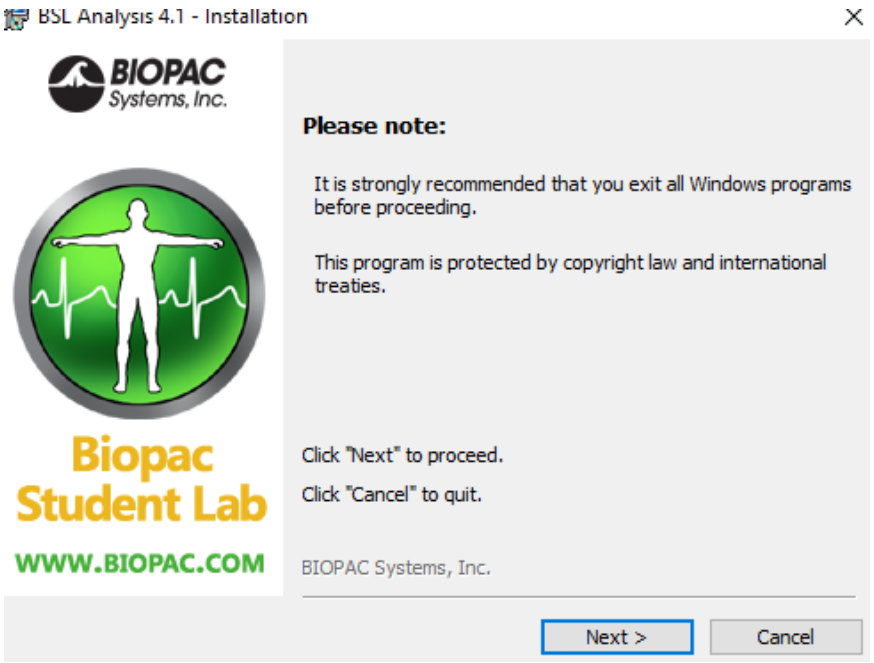
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Click "Cancel" to quit.
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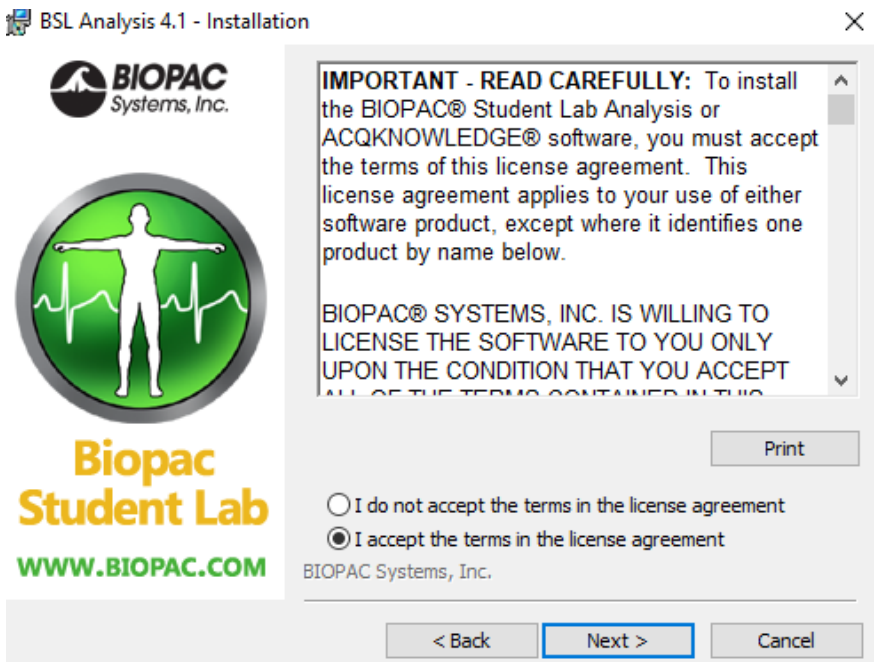
BSL Analysis 4.1 - Installation
BIOPAC Systems, Inc.
IMPORTANT - READ CAREFULLY: To install the BIOPAC® Student Lab Analysis or ACQKNOWLEDGE® software, you must accept the terms of this license agreement. This license agreement applies to your use of either software product, except where it identifies one product by name below.
BIOPAC® SYSTEMS, INC. IS WILLING TO LICENSE THE SOFTWARE TO YOU ONLY UPON THE CONDITION THAT YOU ACCEPT
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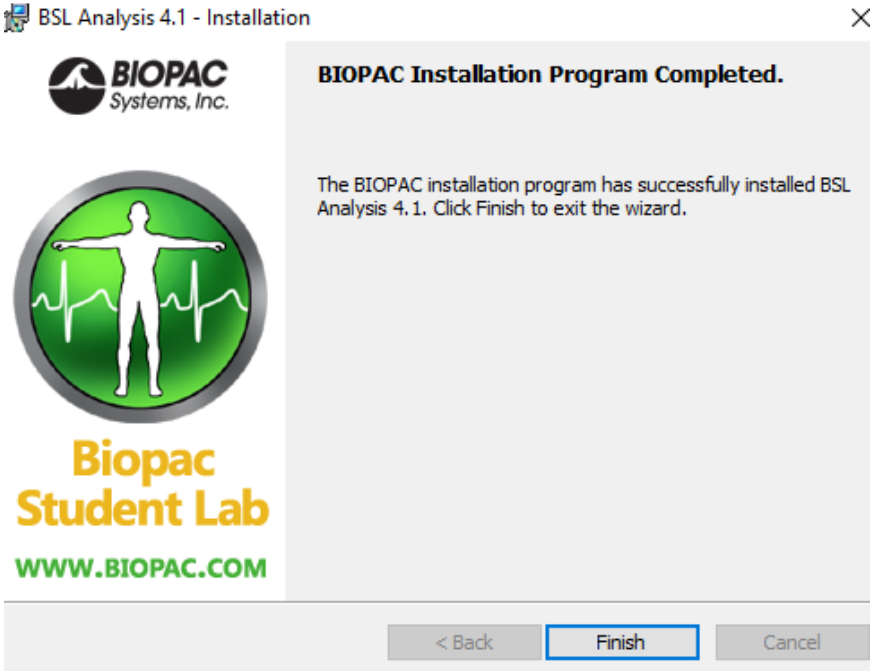
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BIOPAC Systems, Inc.
BIOPAC Installation Program Completed.
The BIOPAC installation program has successfully installed BSL Analysis 4.1. Click Finish to exit the wizard.
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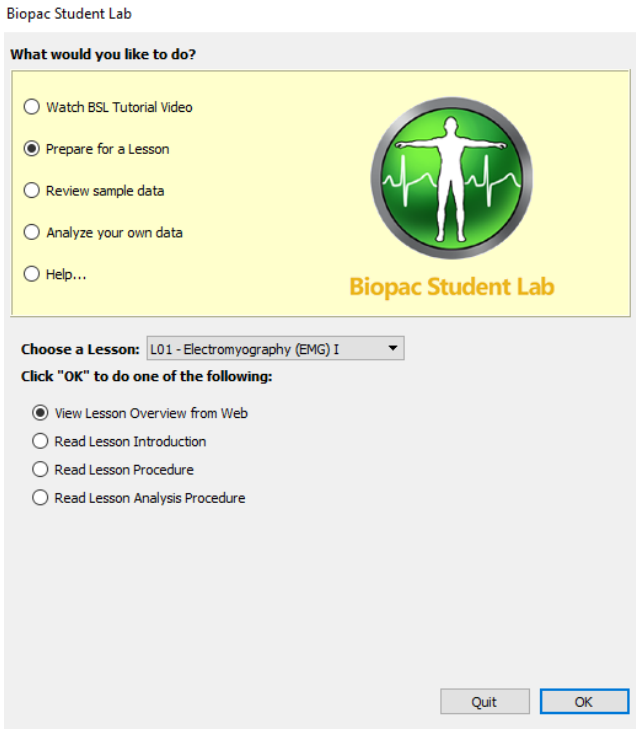
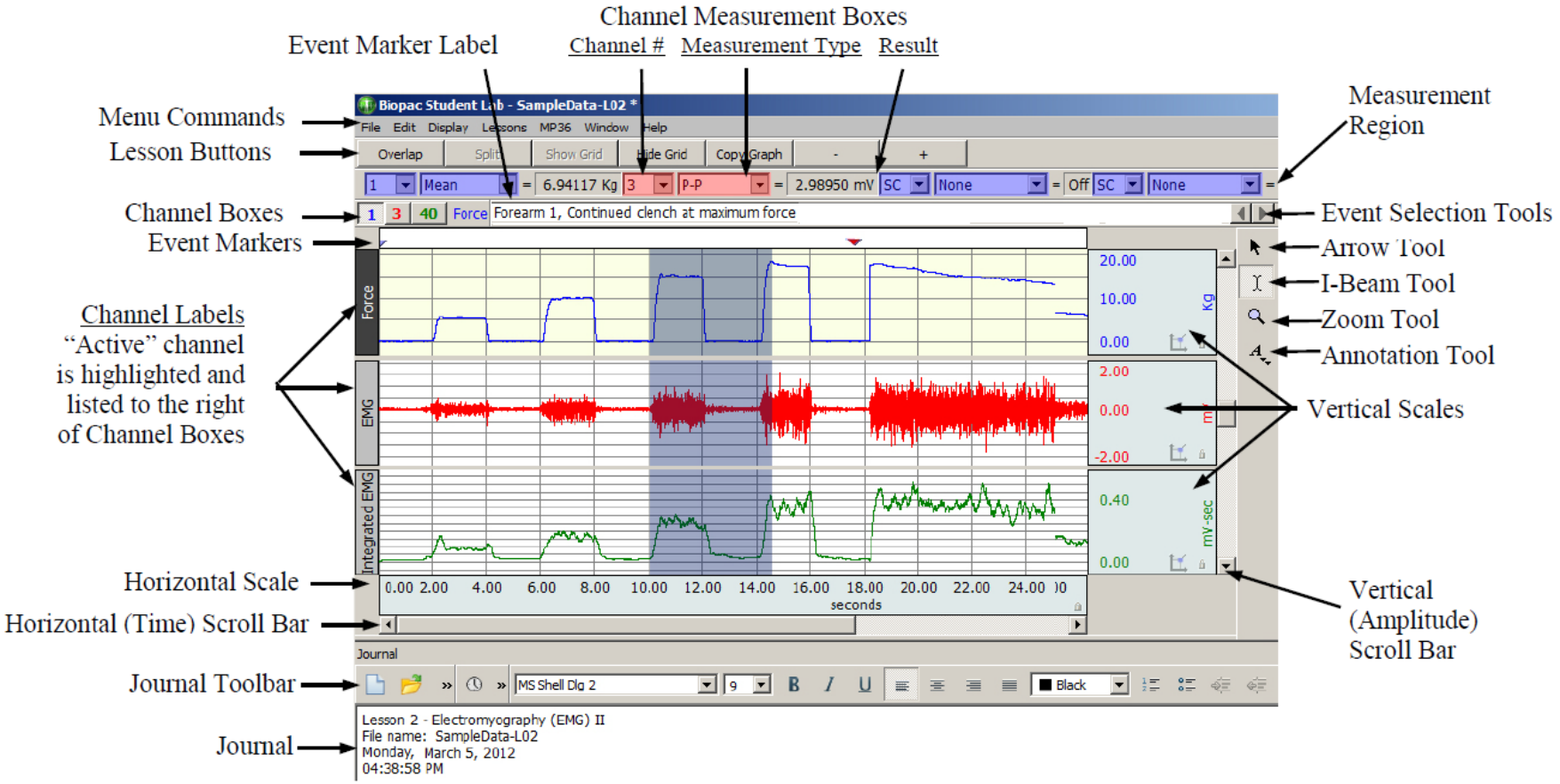

Biopac Student Lab
What would you like to do?
Watch BSL Tutorial Video
Prepare for a Lesson
Review sample data
Analyze your own data
Help...
Biopac Student Lab
Choose a Lesson:
L01 - Electromyography (EMG) I
Click "OK" to do one of the following:
View Lesson Overview from Web
Read Lesson Introduction
Read Lesson Procedure
Read Lesson Analysis Procedure
Quit
OK

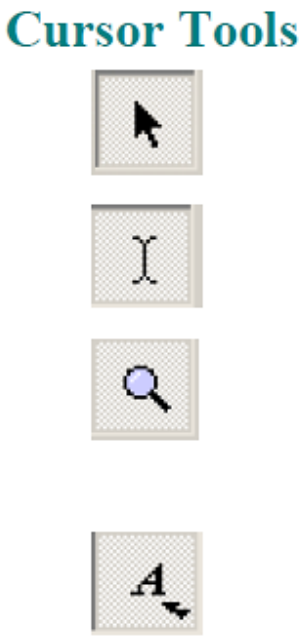
OVERVIEW OF THE BSL DISPLAY

- All Biopac Student Lab lessons have a Data window and a Journal.
- The **Data window** displays the recorded data and is where you perform measurements and analysis.
- The **Journal** is below the Data window and it works like a text editor. The Journal provides instructions to assist with setup, calibration and recording, and is also used for making notes and storing measurements.



Biopac Student Lab Lessons Display in analysis mode

VIEWING DATA



- **Arrow tool**, a general-purpose cursor used for selecting waveforms and scrolling through data. All other cursors default to this mode when the cursor is moved outside the graph area.

- **I-beam tool**, used to select a single point or an area of a waveform(s) for measurement or editing. To select an area of data, hold down the mouse button and drag the mouse left or right.

- **Zoom tool**, used to select and magnify any portion of a wave to see detail. To draw a zoom box, hold down the (left) mouse button and drag to form a "box" encompassing the area you wish to magnify. To undo the Zoom command, choose **Zoom Back** from the **Display** menu, or use the "-" toolbar button.

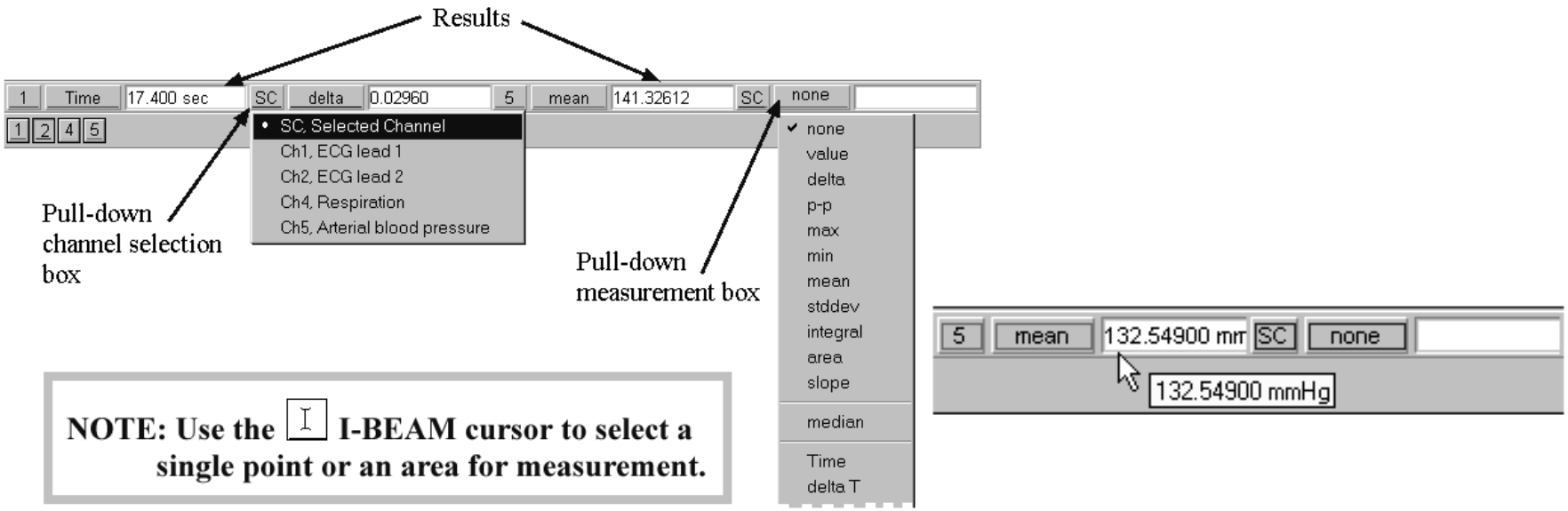
- **Annotation Tool**, used to insert and add text into a graph channel at any desired location.

MEASUREMENTS AND RESULTS

Channel Selection: Use the pull-down channel selection box to indicate the channel you want to take a measurement from. The "**SC**" option will automatically take measurements from the selected channel. The "selected" or "active" channel has its channel label highlighted on the left edge of the display, its channel box is depressed, and its label name is displayed next to the channel boxes.

Measurement: The pull-down menu gives you access to an array of measurements.

Result: The result of the selected measurement appears to the right of the measurement title (i.e., mean = 132.54900 mmHg). A result of "********" means the measurement is invalid because not enough data was selected. If the result is cut off, point the cursor over the result box to generate a tag that displays the full result precision and units.



- **Time :** measurement shows the exact time of the selected waveform at the cursor position. If a range of values is selected then the measurement will indicate the time at the last position of the cursor.

- **Max :** finds the maximum amplitude value within the selected area (including the endpoints).

- **Min :** finds the minimum amplitude value within the selected area (including the endpoints).

- **Mean :** The mean measurement computes the mean amplitude value or average of the data samples between the endpoints of the selected area and displays the average value.

- **Value :** The value measurement displays the amplitude value for the channel at the point selected by the I-beam cursor. If a single point is selected, the value is for that point, if an area is selected, the value is the endpoint of the selected area

- **Delta T :** (delta time) measurement is the difference in time between the end and beginning of the selected area.

- **P-P :** The P-P (Peak-to-Peak) finds the maximum value in the selected area and subtracts the minimum value found in the selected area. P-P shows the difference between the maximum amplitude value in the selected area and the minimum amplitude value in the selected area.

- **BPM** : The beats per minute (BPM) measurement uses the start and end points of the selected area as a measurement for one beat, calculates the difference in time between the first and last selected points, and divides this value into 60 seconds/minute to extrapolate BPM. This would be the result obtained if you took ((1/□T)*60) for a selected area. If more than one beat is selected, it will not calculate the average (mean) BPM in the selected area.

Note: In order to get an accurate BPM value, select an area with the I-Beam cursor that represents one complete beat-to-beat interval. One way to do this is to select an area that goes from the peak of one cycle's R wave to the peak of the next cycle's R wave (R-R interval).