

LabTutor Teaching Suite

Best Practice Guide



This document was, as far as possible, accurate at the time of release. However, changes may have been made to the software and hardware it describes since then. ADInstruments Pty Ltd reserves the right to alter specifications as required. Late-breaking information may be supplied separately.

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This document describes the recommended supported work-flows for the LabTutor Teaching Suite and addresses frequent issues and questions, including:

- System and infrastructure requirements and recommendations
- Networking setup and connection troubleshooting
- Data backup and disaster recovery
- Course administration
- Common student issues
- LabTutor Online setup and configuration
- Frequently asked questions (FAQ)

Using This Document

This document should be consulted by any users installing, configuring or administering the LabTutor Teaching Suite. Although this document makes good reference material at any time, it is designed to be of best use when considering what IT infrastructure is required to run LabTutor Suite, how the course will be run using LabTutor Suite, and how it will be administered on an ongoing basis.

The aim of this document is to maximize the likelihood of a LabTutor course running smoothly and help provide a better user experience.

What is LabTutor Suite?

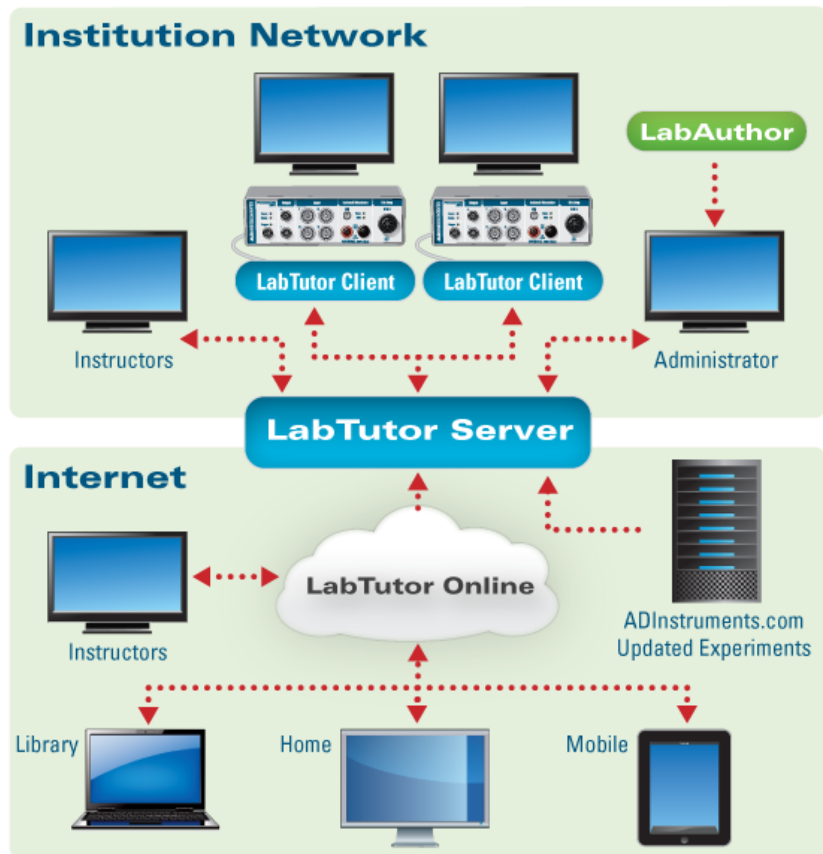
LabTutor Suite is a set of software products developed by ADInstruments that provides a complete solution for a 'paperless' and efficient means of running tertiary life-science laboratory sessions.

LabTutor Suite consists of the following products:

1. **LabTutor Server** - Provides a centralized way to access experiments and administer courses. The web-based administration interface for the LabTutor Suite allows you to easily manage multiple courses and student

information from any computer within your local network. All student experiment data is stored on LabTutor Server for easy access.

2. **LabTutor Online** - An internet-based service that provides the ability for students to view their experimental data and to complete and submit experiment reports. This can be done from any device that has an internet connection and a web browser that supports Flash or HTML5. LabTutor Online also allows administrators to review students' experiments over the Internet.
3. **LabTutor Client** - Displays the LabTutor Experiments from the LabTutor Server. LabTutor Client silently handles communication with LabTutor Server and the PowerLab, and should be installed on each computer in the student laboratory. LabTutor experiments contain all instructions needed by students, as well as interactive components that sample and display real data from a PowerLab.
4. **LabAuthor** - A tool for customizing or creating LabTutor experiments for your courses. LabAuthor can be used on a stand-alone computer that need not be connected to LabTutor Server or the network. Once you are finished creating or editing an experiment it can be exported from LabAuthor as an experiment installer, and installed to LabTutor Server.



The focus of the LabTutor Teaching Suite is split into two areas:

- Classroom - Experiments are performed through a web browser on a computer running the LabTutor Client software. Experimental data is saved to LabTutor Server via the local network.
- Outside Institution Network - Experiments from the LabTutor Server are transferred via the Internet to LabTutor Online. With LabTutor Online students can log on from anywhere with an internet connection to view experiments, analyze data, view media content and complete reports.

Upgrading from LabTutor 3

In contrast to LabTutor 3, LabTutor 4 has adopted a client-server model that facilitates centralized management of student data (LabTutor Server). LabTutor Online is a component that allows students to remotely access their experiments over the Internet.

In LabTutor 3, experiments were required to be installed on each computer individually, and student data removed at the end of each lab session. In LabTutor 4, experiments are installed to the LabTutor Server and accessed from client computers over a network using Microsoft Internet Explorer. LabTutor Server provides a centralized place to administer laboratory courses. Each Student has their own login and can work independently of other students or in a group.

How to upgrade

Before upgrading to LabTutor 4, all LabTutor version 3 experiments should be backed-up onto an external drive or media, and all associated LabTutor 3 software uninstalled. LabTutor 3 and 4 **cannot** operate concurrently.

How to convert your LabTutor 3 experiments to LabTutor 4

All ADInstruments LabTutor 3 experiments are available in LabTutor 4 format and can be installed from **Install Media** or **ADInstruments Website** using the LabTutor Server administration pages.

Server

Experiments

ADInstruments Experiments

Custom Experiments

Upload an Experiment

Instructors Material

Delete

Courses

Students

Student Data

Archives

Install and Update ADInstruments Experiments

English

Install experiments from Install Media ADInstruments Website

Collection	Release	Status	
Animal Physiology	Feb 24, 2010	Not installed	
Exercise Physiology	Jan 29, 2010	Not installed	
General Biology	Feb 16, 2010	Not installed	
Guided Problem Based Laboratories	Mar 1, 2010	Not installed	
Human Physiology	Dec 22, 2009	Some experiments not installed	
Medical Laboratories	Dec 22, 2010	Not installed	
Nursing	Feb 1, 2010	Not installed	
Nursing (with Dissection)	Feb 2, 2010	Not installed	
Nursing Advanced	Feb 16, 2010	Not installed	
Pharmacology	Mar 5, 2010	Not installed	
Psychophysiology	Feb 4, 2010	Some experiments not installed	

Custom Experiments created in earlier versions of LabAuthor may still be used with your upgraded LabTutor Server, however a few important things to take into consideration:

- For your experiment installer to be able to be installed and give rise to a functional experiment on LabTutor Server, it must be saved in the same version of LabAuthor as LabTutor Server. i.e. It is best practice to upgrade LabAuthor at the same time as upgrading LabTutor Server, with the same version.
- To re-save an experiment installer created in an earlier version of LabAuthor:
 1. Double-click on the out-dated experiment installer and install the contained experiment files locally.
 2. Open the experiment (.adiexp) file with the upgraded version of LabAuthor
 3. Re-save the experiment **File > Save Experiment As...**
 4. Re-save the experiment installer **File > Save Experiment Installer...**
 5. The experiment installer may now be uploaded and installed to LabTutor Server

System Configuration

While LabTutor Server can be installed on just about any modern computer, it is important to make sure that the computer you select to install LabTutor Server is sufficiently equipped to run your LabTutor Teaching Lab. It is recommended that you run the [LabTutor Installation Advisor \(adstruments.com/LabTutor-Server-Advisor\)](http://adstruments.com/LabTutor-Server-Advisor) on the prospective LabTutor Server computer before you install and configure the software. In general your LabTutor Server computer needs to meet the system requirements. In addition, you should consider installing an uninterruptible power supply (UPS) on the server to protect data from power outages, implementing a reliable backup scheme and physically locating the server in a secure location. The LabTutor Server should be kept running at all times, where possible.

The best practice for LabTutor Server is to install it on a dedicated server. There are a number of reasons why this is the recommended option:

- Having a dedicated server avoids software conflicts with other web server applications.
- Performance of the LabTutor Server will be better as it does not have to share resources with other services, providing the best overall user experience.
- It is easier to backup and recover in the event of a disaster.

LabTutor Server needs to be installed on a computer that allows for a web-based application to operate. LabTutor Server cannot be installed on a computer that is currently providing services on port 80 and/or 443 (e.g. it has Internet Information Services (IIS) or Apache installed). It is also recommended that the LabTutor Server computer be assigned a static IP address, and not a dynamic one, and should ideally have a Domain Name System (DNS) for it (e.g. labtutor.university.com).

It is important to note that when using LabTutor Online, large amounts of outgoing data will be sent from LabTutor Server to LabTutor Online. Because of this, it is recommended that your LabTutor Server has an Internet connection with a good upload speed to avoid delays in transferring student data from LabTutor Server to LabTutor Online.

Hardware and Software Requirements

Key Information

- Use a dedicated computer for LabTutor Server, if possible
- Run LabTutor Server Installation Advisor to see if your server meets minimum requirements
- Particular care needs to be taken if using a virtual machine for your server - use enterprise solutions such as Hyper-V or ESXi
- Don't install LabAuthor in the same machine as LabTutor Server

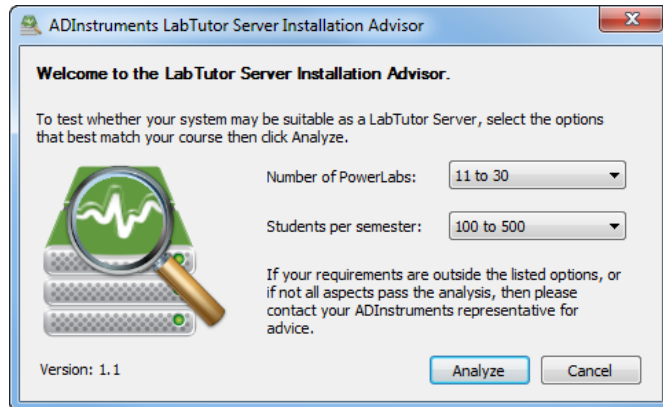
To provide your users with the best LabTutor experience it is important to make sure that LabTutor and LabTutor Client machines are adequately equipped to run your teaching course. Failing to have adequate hardware for either the client or server machines could result in a poor user experience, so getting it right from the start is critical.

LabTutor Server is at the heart of the LabTutor Suite and it is therefore pertinent that the right choices be made regarding the server's hardware, configuration and location. While LabTutor Server can be installed on just about any modern computer, it is important to make sure that the computer you select to install LabTutor Server is adequately equipped to run your LabTutor Teaching Lab. The system requirements for LabTutor Server can vary greatly depending on the number of PowerLabs being used and the number of students that will be using LabTutor per semester. ADInstruments provides a small utility called the LabTutor Server Installation Advisor, which can be run on a prospective server computer to determine if it meets the recommended system requirements for running LabTutor Server in a particular environment. The LabTutor Server Installation Advisor can be downloaded from adinstruments.com/LabTutor-Server-Advisor.

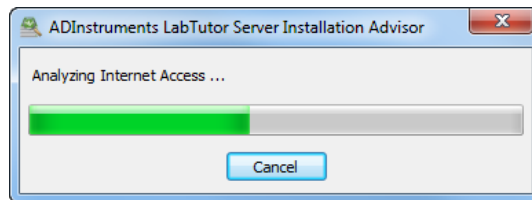
LabTutor Server Installation Advisor

The LabTutor Server Installation Advisor is a stand-alone application that checks hardware, software and network requirements. The utility will function on any supported Microsoft Windows operating system and will test the chosen system in order to determine if it is suitable to be used as a LabTutor Server.

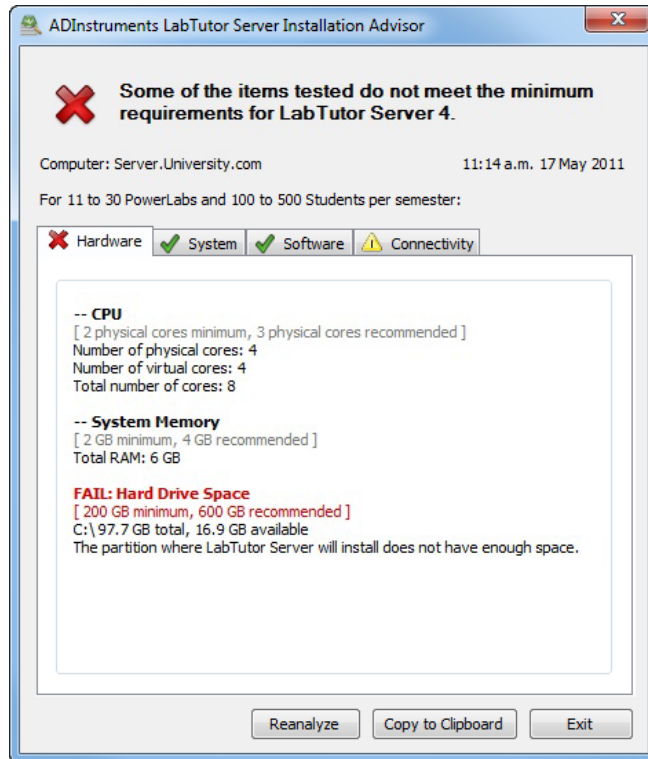
The installation advisor's main screen allows you to select the number of PowerLabs that will be used, and the number of students that will use LabTutor per semester.



The Installation Advisor will then analyze the system:



The results of the analyses are then displayed, with any issues highlighted by either a red cross for a fail, or a yellow exclamation mark for a warning. Any fail messages should be addressed before installing LabTutor Server.



LabTutor Server

The general software requirements for LabTutor Server are as follows:

- Microsoft Windows 7 or Windows Server 2008/2008 R2 recommended, Windows Vista SP1, or Windows Server 2003/2003 R2 supported
- Microsoft .NET v2.0 Service Pack 2 or v3.5 Service Pack 1 required
- Internet Explorer 9 recommended, IE 7 minimum
- LabTutor Server requires exclusive the use of ports 80, 443 and 8005; other web server products cannot be installed
- Direct Internet access is required for LabTutor Online and for access to ADInstruments.com for software updates and experiment installation
- Adobe Reader 8.0 or later is required to view all language experiment report PDFs. Adobe Reader X or later is required to annotate experiment report PDFs. The latest version of Adobe Reader is recommended.

The actual hardware requirements for LabTutor Server will be somewhat dependent on your needs. ADInstruments always recommends running [LabTutor Server Installation Advisor](#) on the server prior to installing LabTutor Server. If you are looking at buying a new computer to run LabTutor Server on please see the example system recommendations below for an idea of what specifications your server should have.

When buying or building a computer for LabTutor Server you should consider the following:

- A full size computer case with good airflow and a full size ATX motherboard
- A quad core CPU over a dual core CPU if possible
- 8GB (or more) of RAM. RAM is relatively cheap and will help with performance of the system
- Two good-sized hard disks in RAID-1. This will provide some protection from drive failures
- A good quality power supply (PSU)
- Install a 64-bit Operating System
- Have the server on an uninterruptible power supply (UPS)

The following is a list of general considerations for LabTutor Server:

- Where possible have a dedicated LabTutor Server machine. By having a dedicated server you will avoid conflicts with other software, and you will get the best overall performance from the system.
- Locate the server machine in a physically secure location; restrict access.
- Have a reliable backup scheme in place so that your LabTutor Server data is regularly backed up in case of a disaster.
- Leave the LabTutor Server computer running around-the-clock, especially if you are using LabTutor Online.
- If you are using LabTutor Online ensure that your Internet connection has a sufficient upload speed. LabTutor Server can transfer large amount of data to LabTutor Online, and having a good upload speed will help avoid delays in transferring this data.

The following are some examples of recommend hardware configurations:

1 - 10 PowerLabs with 100-500 students per semester:

- Quad Core CPU recommended, Dual Core minimum
- 2GB RAM recommended, 1GB minimum

- 600GB free hard drive space recommended, 200GB minimum
- 1Gbps wired network connection recommended, 100Mbps minimum

11 - 30 PowerLabs with 500-2000 students per semester:

- Quad Core CPU recommended, Dual Core minimum
- 4GB RAM recommended, 2GB minimum
- 1.5TB free hard drive space recommended, 500GB minimum
- 1Gbps wired network connection recommended, 100Mbps minimum

31 - 60 PowerLabs with >2000 students per semester:

- Quad Core CPU recommended
- 6GB RAM recommended, 2GB minimum
- 2TB free hard drive space recommended, 750GB minimum
- 1Gbps wired network connection recommended, 100Mbps minimum

LabTutor Client

The following are the general hardware and software requirements for LabTutor Client:

- Microsoft Windows 7 or later, or Windows Vista SP1 or later supported
Microsoft .NET v2.0 Service Pack 2 or v3.5 Service Pack 1 required
- Internet Explorer 9 recommended, IE 7 minimum
- Dual Core CPU recommended
- 2 GB RAM recommended, 1GB minimum
- 1Gbps network connection to LabTutor Server recommended, 100Mbps minimum
- 10 GB free hard drive space
- Flash Player plug-in for Internet Explorer 9.0.115 or later is required to play video and audio

LabAuthor

The following are the general hardware and software requirements for LabAuthor:

- Microsoft Windows 7 or later, or Windows Vista SP1 or later supported

- Microsoft .NET v2.0 Service Pack 2 or v3.5 Service Pack 1 required
- Internet Explorer 9 recommended, IE 7 minimum
- Dual Core CPU recommended
- 2 GB RAM recommended, minimum
- 50 GB free hard drive space
- Flash Player plug-in for Internet Explorer 9.0.115 or later is required to play video and audio

Please note that installing LabAuthor on the same computer as LabTutor Server is not a supported configuration. LabAuthor and LabTutor Server share common components and having both installed on the same machine could lead to confusing and unpredictable behavior.

Virtual Machines

LabTutor Server and Virtual Machines

LabTutor Server can work very well in enterprise-class virtual environments and there are no known compatibility issues with running LabTutor Server in a virtual machine. However, ADInstruments recommends using native installs where possible to maximize performance.

Due to the rich and engaging content provided, LabTutor Server can be resource demanding - it may stream high-quality videos to many clients and has to do CPU-intensive file conversions when uploading student data to LabTutor Online. With a whole lab of students recording or viewing data, disk space access and network access must be reliable.

If you wish to install LabTutor Server on a virtual machine it is advised not to use 'desktop' virtualization software such as VMware Fusion or Workstation, Sun's Virtual Box, or Parallels Desktop. Server-orientated virtualization platforms such as VMware's ESXi, Citrix's XenServer or Microsoft's Hyper-V are more suitable. Ideally the LabTutor Server virtual machine should be given its own large dedicated physical disk or RAID array, have high-priority access to CPU resources, enough dedicated RAM (as recommended by the LabTutor Installation Advisor) and a dedicated network to the storage host (important if virtual machine data is stored on a storage area network, SAN).

LabTutor Server can be installed on an Intel-based Macintosh computer running Boot Camp provided it meets the minimum system requirements.

LabTutor Client and Virtual Machines

LabTutor Client and LabAuthor require Microsoft Windows and Internet Explorer to operate. If your teaching labs are equipped with Intel-based Macintosh computers, you can use the LabTutor Teaching Suite by using Internet Explorer on Microsoft Windows in Boot Camp.

Virtual machine software such as Parallel's Desktop for Mac or VMware Fusion may be used, however for best performance and reliability, ADInstruments recommend and support LabTutor use with Boot Camp only. Virtual machines should only be used if you require access to Macintosh applications and need the ability to switch between Mac and Windows operating systems during the class. While using LabTutor Client in a virtual machine should work, it is important to note that it is not currently a supported configuration.

LabTutor Client and thin-client Workstations

LabTutor Client may work on thin-client setups, however this depends very much on your particular setup and there is no easy one-size-fits-all answer as to how it will perform. Thin-clients are great for running applications like Microsoft Word, checking email, browsing the Internet etc, but are not ideal for things that involve heavy disk usage (due to contention - all the clients will likely be accessing the same storage array), or heavy network usage.

For example, if the students watch a video in a LabTutor Experiment then that video probably has to be streamed from LabTutor Server to each of the virtual desktops running under the virtual host, and from there, to each of the client machines. Depending on the setup, this could be a problematic bottleneck, although some thin-client solutions have been getting much better at handling this. Another potential confounder is the high-rate sampling used in some experiments.

In these sorts of situations ADInstruments recommends that you do a small trial of running LabTutor in this setup, which should give some indication of what your system can cope with, and what it can't. For example, having a few of the classroom machines access the videos in one of the experiments would likely give a very good indication of how things will run.

It's recommended that you get in contact with your ADInstruments representative with some information about your setup so further advice can be given.

Network

Key Information

- Use 1Gbps network where possible
- Avoid wireless networks
- LabTutor Server needs direct Internet access - no proxy servers
- LabTutor Server requires use of ports 80, 443 & 8005 on the server
- [Run Net Checker](#) utility to help diagnose connection issues

LabTutor 4 has been designed to work in a networked environment where there is a central server that has LabTutor Server installed, clients in a laboratory that have LabTutor Client installed and content able to be accessed outside of the campus through LabTutor Online.

The LabTutor 4 Suite requires that all computers (clients and server) be connected together via a Local Area Network (LAN). Before installing LabTutor Server and LabTutor Client you should verify that clients can connect to the server computer over the network. Depending on how your network is managed, you may be required to consult with your IT department before deploying the LabTutor 4 Suite.

The [LabTutor Server Installation Advisor utility](#) assists in making sure that the server's network connection is suitable. ADInstruments recommends the use of a 1Gbps wired network for LabTutor Suite as this will provide users with the best overall experience and performance. For optimal performance, clients should have the same network connectivity speed as the server. i.e. if [LabTutor Installation Advisor](#) recommends a 1Gbps network speed for the server, then if possible, the clients should all have a 1Gbps connection back to the server.

Having an inadequate network setup could result in a poor user experience, so attaining recommended specifications is critical for reliably running a successful LabTutor 4 course.

LabTutor Client machines do not require access to the Internet, however LabTutor Server requires a direct connection to the Internet to obtain software updates and experiments installers, as well as to connect to LabTutor Online.

Wireless Networks

For performance and reliability reasons ADInstruments does not recommend or support the use of wireless networks with LabTutor Suite. There are a number of

reasons for this:

- Wireless performance can have negative effects on how LabTutor performs. Since LabTutor Client stores all data on LabTutor Server there is the potential for large amounts of data needing to be transferred over the network. In a busy LabTutor environment with many client machines and students, wireless can struggle to deliver data in sufficient speed.
- The reliability of wireless networks is often not as good as a wired network.
- The type of wireless technology being used can have a dramatic effect on how a wireless network performs.
- The number of clients that use the same wireless access point has a dramatic effect on how a wireless network will perform.

Where possible you should use a wired network as this will provide users with the best overall LabTutor experience. There are too many variables that can have negative effects on wireless performance and reliability.

Internet Access and Proxy Servers

LabTutor Client machines do not require access to the Internet, however LabTutor Server requires a direct connection to the Internet to obtain software updates and experiment installers, as well as to connect to LabTutor Online.

For technical reasons LabTutor Server does not support the use of proxy servers (either authenticated or unauthenticated). A direct connection to the Internet is required for accessing LabTutor Online and the ADInstruments website. If your network uses a proxy server for access to the Internet, an exception will need to be added so that LabTutor Server can directly access the Internet on port 80 and 443. LabTutor Server will fail to connect to LabTutor Online and fail to download updates and experiment installers if a direct connection to the Internet is unavailable.

[Net Checker](#) can be run on the LabTutor Server machine to ensure that a direct connection to the internet is available (see below)

If machines running LabTutor Client are setup to access the Internet though a proxy server then an exception should be added so that they directly access content on LabTutor Server. On a local network there is usually no reason to for clients to access local content though a proxy server.

Net Checker

[Net Checker](#) is a small utility that can be run on a LabTutor Server, providing clear feedback regarding your current network configuration. It checks that LabTutor Server is able to communicate with LabTutor Online and the [ADInstruments](#) web page. If Net

Checker returns a failed result, you will likely have to consult with your IT department and rectify your network settings.

Net Checker is installed with LabTutor Server and is available from the ADInstruments program group in the Start menu. [It is also available to download from ADInstruments.com.](http://ADInstruments.com)

Checking Network Connection

Before installing LabTutor Server and LabTutor Client you should verify that the client computers can communicate with the server computer over the network. Depending on how your institution's network is setup you may be required to consult with your IT department before deploying LabTutor 4 Suite.

If you are having issues with clients communicating with the LabTutor Server there are a few things that you can do to troubleshoot the issue. These include:

- Pinging the server
- Checking the network cable and connections from the client computer to the server computer.
- Ensuring that the correct IP addresses are assigned to the client and server machines, and that they are on the same subnet mask.

Cables and IP Addresses

If you are having problems with one particular client machine connecting to the LabTutor Server, the issue is likely to be a physical network connection issue or an IP Address configuration issue on the client in question. You should:

- Check that the network cable is correctly connected.
- Verify that the wall plug is patched into the network.
- Check the network cable for physical damage.
- Verify that the client has a valid IP address for your network - you may need consult your IT department for further help with this.

Required Ports

LabTutor Server requires exclusive use of ports 80, 443 and 8005 on the server where it is installed. Ports 80 and 443 are used by clients and administrators to connect to the LabTutor Server and access experiments and administration pages. Port 8005 is used internally by the Apache Tomcat process to communicate with itself. The ports used by LabTutor Server cannot be changed or configured. If you have other software causing a port conflict, that software must be altered or removed for LabTutor Server to

function correctly.

The LabTutor Server installer program will warn you if it detects that there is another application utilizing port 80, 443 or 8005 before installing the software. This is however just a warning and LabTutor Server can still be installed. However, LabTutor Server will not function until the required ports become available. Typically if this is a departmental server the most likely reason port 80 and 443 are in use is because this computer has a web server installed on it, such as IIS or Apache. In this case you either need to uninstall the conflicting product from the server, or install LabTutor Server on a different machine. The [LabTutor Installation Advisor](#) can also be used on existing servers to detect this.

Firewalls

When LabTutor Server is installed, the installer automatically adds the required rules to the **Windows Firewall** to allow LabTutor Server to communicate with clients on ports 80 and 443. If clients are having issues connecting to the server check that firewall exceptions are still in place in the **Windows Firewall** control panel item. If the LabTutor Server exception is missing, and there are no other exceptions to allow ports 80 and 443 through the firewall, then you will need to manually add this exception to the firewall. If your server is running a firewall other than the **Windows Firewall** you may need to manually add exceptions for LabTutor Server on ports 80 and 443.

Remember that LabTutor Server needs a direct connection to the Internet to communicate with LabTutor Online and [ADInstruments.com](#). [Net Checker](#) can be run on the LabTutor Server machine to ensure that a direct connection to the Internet is available (see the '[Net Checker](#)' section for more information).

Antivirus Products

Many antivirus products can interfere with the normal operation and performance of LabTutor Server and LabTutor Client. This is because many antivirus products perform realtime scanning of web page content. Because LabTutor content is all served over HTTP this realtime scanning can add significant overhead to page load times, and in some cases, prevent LabTutor from functioning. If you experience performance issues with LabTutor it is recommended that you disable any realtime antivirus software scanning for HTTP, and that any antivirus Internet Explorer add-ons are disabled.

Incompatible Software

If you have Skype installed on the same machine as LabTutor Server, this can result in ports 80 and 443 being used by Skype, and therefore not being available for LabTutor

Server. You can get around this by disabling Skype from using ports 80 and 443 for incoming connections. Go into Skype and click **Tools > Options > Advanced > Connection** and uncheck the box that says **Use port 80 and 443 as alternatives for incoming connections**. VMware Server also has the same issues, and should not be installed on the same machine as LabTutor Server.

Multiple Sites

If you have multiple locations which need to access LabTutor Server, the ideal solution is to have a LabTutor Server hosted at each location, however, there may be situations where this is not practical or possible. If you must have one centrally-hosted LabTutor Server then you need to ensure that the networks connecting the remote locations to this central location are adequate - have a fast and reliable connection. Ideally this connection should be 1Gbps, however this may not be attainable.

If you require your LabTutor Server to be accessed from multiple locations, you will need to get specific details of the network connection (such as link speed, latency, contention levels and if there are link backups in case of primary link failure) from your IT department and contact your ADInstruments representative for further advice.

Backups and Disaster Recovery

Key Information

- Backups are your responsibility
- Setup database snapshots to run before backups occur
- Keep multiple copies of backups in case a backup becomes corrupt
- Have on-site and off-site backups
- Have a written disaster recovery plan in a sensible place
- All LabTutor Server data is stored in the LabTutor Server data folder

It is extremely important that you backup LabTutor Server data so that in the event of a disaster LabTutor Server can be restored with minimal loss of data – remember all of your user's data is stored on the LabTutor Server machine. ADInstruments does not provide a solution for backing up LabTutor Server Data; it is the responsibility of the customer to maintain backups for their server. Failure to maintain correct backups could result in the loss of data in the event of a disaster.

In order to have a full backup of your LabTutor Server data you need to ensure that you have made a recent snapshot of your LabTutor Server database, and that you have

a full copy of the LabTutor Server data directory. The combination of both backups and snapshots will provide you with an easy way to restore server or move LabTutor Server data.

Snapshots ensure that all necessary parts of the database are correctly stored for a backup to occur, but are not a full backup themselves. Both snapshots and backups are required for restoring a database and should therefore be performed daily.

Snapshots

What is a Database Snapshot?

LabTutor Server uses a private (internal) database to store all information about students and experiments. This internal database cannot be reliably backed up while LabTutor Server is running. To provide copies of your database which can be backed up, LabTutor Server makes daily snapshots containing everything in its database and saves these in the LabTutor Server data folder. These snapshots can then be included as part of your regular backup. Snapshots are generated automatically by LabTutor Server. Once you have set up a time for snapshots to be created in the administration pages, they will occur at the set time every day.

Database Snapshots are configured in the **Server > Configuration** Tab of the LabTutor Server administration pages. You can also perform a snapshot manually by choosing the **Snapshot Now** option within the **Configuration** tab of the LabTutor Server administration pages.

Backups

What needs to be backed up?

LabTutor Server stores its data in a folder in the ADInstruments area of the (hidden) Program Data or Application Data folder. This folder contains all data stored by LabTutor Server. The entire data folder must be included as part of your backup procedure. Database snapshots alone do not provide a backup of LabTutor Server data. To backup LabTutor Server, a recent database snapshot is required as well as a full backup of the LabTutor Server data folder.

The path to the data folder depends on the version of Windows you are running:

- Server 2003: **C:\Documents and Settings\All Users\Application Data\ADInstruments\LabTutor Server**
- Windows Vista and later: **C:\ProgramData\ADInstruments\LabTutor Server**

How often should I create a backup?

All LabTutor Server data should be backed up daily. It is strongly recommended that you configure your backup software to keep at least one weeks worth of previous backups available in case more than a single day of changes need to be rolled back.

You should implement a backup strategy to ensure that a frequent copy of the LabTutor Server data is placed into secure locations; ideally this should be done on a daily basis. This strategy should include the data being stored in an easily accessible location on-site, so it can quickly be restored if the need arises.

- You should also ensure an off-site backup is also taken at frequent intervals. Again, this should be fairly easily accessible in the event you need to restore from this backup.
- Ideally more than one previous version should be available both on and off-site; you don't want to risk overwriting a good backup with a corrupt one.
- Do not store backups on the computer running LabTutor Server because your backups may be lost if the computer fails.

ADInstruments does not provide or recommend any backup solutions for LabTutor Server. It is your responsibility to configure, maintain and verify that your backups are working as intended.

When to perform Database Snapshots and Data Backups?

Daily backups and snapshots should be scheduled to run overnight when LabTutor Server is not in use, to avoid affecting students. The performance of LabTutor Server will be reduced while these operations are in progress. The backup should be configured to run two hours after the daily database snapshot. The exact time required to create a snapshot depends on the size of the database and speed of the computer, however, in most cases the actual time required will be less than five minutes. A two hour delay should still be used to ensure the snapshot completes before the daily backup.

Does LabTutor Server support Volume Shadow Copy?

LabTutor Server does not support the use of Volume Shadow Copy (VSS). You need to use the Database Snapshot feature to ensure the database is backed up reliably.

Using Snapshots and Backups

With backups and snapshots, restoring or relocating LabTutor Server is easy.

Restoring a Backup

If you need to restore the LabTutor Server data to an older version, you must firstly [stop the LabTutor Server service](#) using the Service Controller in the ADInstruments folder in the Start Menu. Then replace the LabTutor Server folder with the backup copy before [restarting the service](#).

It is important to ensure that the version of LabTutor Server that is currently installed matches the version that was installed when the backup was taken. The LabTutor Server service may take up to five minutes to start due to the restoration process.

For the location of the LabTutor Server data folder see the '[Backups](#)' section.

How do I move LabTutor Server to another computer?

Moving LabTutor Server data to a new computer follows much the same process as restoring a backup. Once LabTutor Server is installed on the replacement computer, [stop the LabTutor Server service](#), replace the LabTutor Server data folder with the backed up one and [restart the service](#).

It is important to ensure that the version of LabTutor Server that is currently installed on the replacement computer matches the version that was installed when the backup was taken.

Once the LabTutor service has started and you can access the administration pages you should take a database snapshot. It will also be important to update DNS records so that they point to the server's new IP Address (if it has changed).

For the location of the LabTutor Server data folder see the '[Backups](#)' section.

Disaster Recovery

In the unfortunate event that a computer running LabTutor Server fails in some way and is not immediately recoverable, it is a priority to ensure that students can continue to use LabTutor with minimal disruption.

Ensure that you have a written plan for a disaster recovery scenario that has been discussed with other staff and stakeholders. An A3 PDF template is installed with LabTutor Server and available from the Start menu: **ADInstruments > LabTutor Server > Backup and Recovery**. Digital and printed versions of this should be filled out with information specific to your LabTutor set-up, and kept in an easily accessible location.

In the event of a disaster (e.g. a complete failure of the LabTutor Server computer) the best option is to have a standby computer that is ready to take on the workload of the failed LabTutor Server computer.

Obtain a similar computer to act as a substitute for your primary

LabTutor Server

- Ideally this would be a physical computer, however as a short-term solution, a Virtual Machine may be used.
- The hardware and software specifications should be as close to the primary LabTutor Server as possible. However, it is understandable that this machine may be of a lower specification, so use the LabTutor Server Installation Advisor to check how it matches the recommended requirements for a LabTutor Server computer.
- If the computer is of lower specification, you should evaluate the effect this will have on your laboratory and make any necessary preparations. This might mean having a plan for laboratory sessions taking longer or having extra staff being able to help in the laboratory (this will obviously depend on your environment and setup). Remember that this is a temporary solution, so a lower specification machine may be acceptable for the short-term, and most modern entry-level computers will function sufficiently as a LabTutor Server for a definitive period until your primary LabTutor Server has been restored.
- Do not install this spare computer with LabTutor Server. Doing so may cause conflicts, especially if both servers are configured to connect to LabTutor Online. Instead, have the installer handy and make sure it is the same as the installed version on the primary LabTutor Server.
- Ideally this spare computer will not be in active use, but if this isn't possible, ensure that it can be easily acquired i.e. you won't have to wait for another user to finish work, or have to copy data off before you can use it.
- This spare computer should, if possible, be installed with a clean Operating System that is the same version as your primary LabTutor Server. As with your primary server, it should not be installed with any software that could conflict with LabTutor Server or the ports that are required for LabTutor access.
- Pre-configure any network/domain access, and anything else that will make it quicker to get this computer functioning as a LabTutor Server with short notice.
- The computer name for your substitute computer must be unique on the network, i.e. not the same as your primary LabTutor Server.
- It is advisable to have a full disk image of your primary LabTutor Server, both as a clean computer with only the OS installed, and with LabTutor Server in a working state. In the event of a disk failure to your primary server,

this image will help you get the primary machine running sooner. There are many third party software packages that can do this, such as Acronis or BootIT NG.

Ensure that you have a written plan for a disaster recovery scenario that has been discussed with other staff and stakeholders. This should be in an easily accessible location in both digital and printed form.

In the event of a disaster (e.g. a complete failure of the LabTutor Server computer) the best option is to have a standby computer that is ready to take on the workload of the failed LabTutor Server computer.

Backup the Primary Server

- Implement a backup strategy to ensure that a frequent copy of the LabTutor Server data is placed into secure locations. This strategy should include the data being stored in an easily accessible location on-site, so it can quickly be restored to your substitute server. You may wish to back this up to the actual substitute machine. Ideally more than one previous version should be available, as you don't want to risk overwriting a good backup with a corrupt one.
- Ensure an off-site backup is also taken at frequent intervals. Again, this should be fairly easily accessible in the event you need to restore from this backup.
- Consult the backup guide for more information.

Take a Disk Image

- It is advisable to have a full disk image of your primary LabTutor Server, both as a clean computer with only the OS installed, and with LabTutor Server in a working state. In the event of a disk failure to your primary server, this image will help you get the primary machine running sooner. There are many third party software packages that can do this, such as Acronis or BootIt.

Start of Semester

At the start of a course there are several things that you should do:

1. Install experiments

- Install all of the experiments needed for the semester.

2. Create a course

- Give the course a name that students will be able to recognize (e.g. BIOL101).

3. Add experiments

- Add experiments to the course.

4. Update student lists

- You can import lists of students from tabs separated (.txt), comma separated (.csv), or Microsoft Excel 97-2003 format (.xls) documents.

5. Ensure your administrator and instructor details are up-to-date.

- Ensure that your administrators and instructors have LabTutor Server usernames and passwords.
- An administrator has full access to all LabTutor Server functions, while the instructor's role is restricted to tasks related to teaching a course (such as locking and reviewing experiments).
- Assign Instructors to restricted courses

6. Check LabTutor Online is connected and that a licensing protocol has been established

- The LabTutor Online administration pages allow you to check that LabTutor

Online is syncing with LabTutor Server correctly.

- You should decide on either Bulk or Individual Student licensing, set this appropriately in the **Accounts and Licensing** tab of the administration pages and obtain licenses where necessary

Throughout the Semester

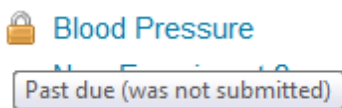
While a course is running there are several things to keep in mind.

1. Add experiments

- Experiments you add to a course are immediately available to students, but you don't have to add all of the experiments to the course at the very start of the semester. If you don't want students to access experiments too far in advance, you can add experiments to the course throughout the semester.

2. Lock experiments past their due date

- This means that students will no longer be able to edit their experiments. Any non submitted experiments that students have started will be moved to **Completed** but marked as **Past due (was not submitted)**. You can also unlock an experiment for individual students or for all students.



3. Avoid updating experiments part-way through a course

- Updating Experiment: Adding a new experiment with the same name as an existing experiment.
- Updating an experiment will **not** replace the old version (unless checked; see below). This means that students who have started the experiment will see the new version and the old version of the experiment when they log in.



- It is best practice not to update experiments mid-way through a semester. You should only update experiments mid-way through a course if major issues are found that you want to fix for later students. It is advisable that you name the updated experiment appropriately so that students know which one they should use (e.g. "Experiment 4 - EEG (New)"). If you check 'Replace existing versions in Course lists' upon uploading, the new version will not be available to students who have already started editing the former version.

End of Semester

At the end of a course there are several things that you should do to tidy up LabTutor Server and prepare for the next course.

1. Archiving student data

- When you archive student course data, the report pages for all **submitted** and **in progress** student experiments are archived as PDF files. All other student experimental data for that course will be deleted. Archiving reduces clutter and disk usage. If you use LabTutor Online, a mechanism is provided for you to save archived data to a local machine. Archiving provides a convenient method for starting a new semester with a clean slate, while keeping a record of previous students.

2. Deleting student data

- If you don't want to retain an archive of the report page, you can just delete all of the student data.

3. Deactivate students

- Deactivated students cannot start, preview, edit or submit any experiments, but they can still view experiments they have started. Deactivated students are not allocated with new LabTutor Online licenses. You can also delete students to completely revoke their access to LabTutor.
- If you do not deactivate students at the end of the semester and you are in Bulk licensing mode, they will be automatically issued a new LabTutor Online license when they next log in to LabTutor, once the current license expires.

4. Updating your courses

- In anticipation of a new semester, old experiments should be removed or updated.

- Removing/Adding Courses - When students log on to LabTutor they see all of the courses added to LabTutor Server. Remove any old unused courses and only add courses you need to keep clutter to a minimum.

What about students retaking a course?

You can protect changes being made to student credentials in the **Student Details** section of the LabTutor Server administration pages.

Edit Student

User name:	<input type="text" value="Gregory"/>	User ID:	<input type="text" value="goygr264"/>
Given name:	<input type="text" value="Gregory"/>	Family name:	<input type="text" value="Goyle"/>
Email:	<input type="text"/>		
Protected:	<input checked="" type="checkbox"/> Prevent changes when importing student lists		
Active:	<input type="checkbox"/> Student can start experiments and edit or submit these once started		
Password:	<input checked="" type="checkbox"/> Student has supplied password		

Students

LabTutor Server includes tools to help you manage your student list. The import function allows entire student lists to be imported and set up with a login credentials.

How can I alter class lists?

Importing a class list with the required changes automatically updates the current student list. Changes can also be made manually to individual students from the administration pages.

Active vs Inactive students

In Bulk licensing mode, active students will pick up LabTutor Online licenses when they log in. Deactivating a student means that they do not pick up licenses, and can not start new experiments or preview experiments using LabTutor Online. Inactive students can be easily reactivated in the administration pages

Deleting students

Students must be deactivated before they can be deleted. This makes it harder to accidentally remove a student and lose their data.

Is there a limit on class sizes?

There is no limit on the number of students in a class list.

Passwords

If you don't give students passwords they are prompted to create one the first time they log into LabTutor. If they forget or lose their password, these can be reset in the administration pages.

Group Login

Students can form a group to work on an experiment by logging in together on the same computer.

What is the largest group size?

There can be up to 8 students logged in as a single group.

Are groups permanent?

No. Students can work in different groups each session if they are accessing a different experiment each time.

What if a student is absent?

Absent students are able to be added into a group that is currently in progress by an Administrator or Instructor. This allows them access to all of the student data in that experiment. They can then complete the experiment with the group or on their own.

Do groups who start an experiment together have to submit it as a group?

If a group of students work together on an experiment in the lab, they then have the option of re-forming the same group to continue working on their experiment later, or finishing the experiment individually or in smaller groups. A group can be divided into smaller groups, or individual students, by simply logging into LabTutor separately (or as a smaller group). The branching of their original work will be done automatically by LabTutor Server.

If a group changes, what happens to the data completed in other groups?

If students log in as different groups, previous work from earlier groups will not be

available to the new group. When the students log back into the original group, the data will be available again. Logging in individually will allow the student access to all of the experiments they have been working on.

Session Expiry

Students will be logged out after 30 minutes or more of inactivity. This will occur when they next try to navigate on the page, or sample data from the PowerLab. All student data will be retained.

The same user is only allowed to be logged into one machine at a time. If you are logged into a machine as 'USER1' and then log into a different machine with the same user, the first session will expire. This happens within 30 seconds of the user logging in somewhere else, but usually you will see it within 5 seconds. If the first session is inactive (i.e. page idle) it may display for longer, but any attempt to sample data or answer questions will force LabTutor to check the session is permitted.

Completing Experiments

What can students do with completed experiments?

Depending on course options set in the administration pages, reports are able to be printed, submitted or emailed.

Printed reports

The report page can be printed if the print option has been activated by the administrator in the course list. This does not submit the report, but brings up the print dialog and prints a correctly-formatted report. Using the browser's print function will print the report page, however page breaks and formatting may be incorrect.

Submitted reports

Clicking the **Submit** button will tag the experiment as completed and the student will no longer be able to make changes, but will still be able to view the experiment. When students submit their experiment, administrators can configure themselves to be emailed a PDF of the report page. The administration pages can also be used to allow a student to resubmit an experiment.

Emailed reports

There are two separate ways that reports can be emailed. If the **Email** button is

available, students can email a PDF or .docx file of the report page to themselves or to any other valid email address. This does not submit the report. If the option to email a submission report has been selected, then when the student submits, the report page will automatically be sent to the configured email address.

Differences between LabTutor Online and PowerLabs Required modes

- Printing - no difference
- Submitting - If the server is in [LabTutor Online mode](#), all submitted experiments are converted to LabTutor Online. If students wish to view submitted experiments in the classroom, they will automatically be redirected to LabTutor Online.
- Email - In [PowerLabs Required mode](#), reports can be sent as either PDF or .docx documents. In LabTutor Online mode, only PDF reports may be sent.

Reviewing

LabTutor provides a review feature to allow Instructors and Administrators to view student reports and experiments. Experiments can be reviewed multiple times regardless of whether they have been submitted or remain in progress. The way in which experiments are accessed for reviewing depends on which LabTutor licensing mode is being used.

Instructors and Administrators are able to view students' experiments at any time using the Student Data Review feature. Reviewing allows you to:

- View a student's experiment in its entirety.
- Access information about when the experiment was started and when it was last accessed, the time spent doing the experiment and whether the experiment has been submitted, locked or is in progress.

Experiments are sorted by date started, with those accessed first at the top of the list. Reviewing a student experiment does not change its status or store a record of that experiment as having been reviewed. No changes, annotations or comments can be made when reviewing experiments

Reviewing in PowerLabs Required mode

If LabTutor is in [PowerLabs Required mode](#), experiments can be reviewed through the LabTutor Server administration pages. To review student experiments you need to have LabTutor Client installed on the computer you are using and use Microsoft Internet Explorer 7 or later.

Reviewing in LabTutor Online mode

If LabTutor Online has been activated, experiments may be reviewed anywhere an Internet connection is available. Any common web browser may be used, but Flash is required to view the data panels in the report. You do not need to have LabTutor Client installed to review experiments when using LabTutor Online.

Marking

The marking and assessment of experiments is not an inherent feature of LabTutor and no changes, annotations or comments can be made when reviewing experiments. Adobe Reader X now allow you to add comments to PDFs, which would allow you to annotate the student report pages that LabTutor emails to you. For this, the latest version of Adobe Reader is recommended.

Experiment Data

What is Student Data?

Student data is any recorded data, answers to questions, or information entered into tables that is generated or added by a student. The data for each experiment is associated with the student who generated it and is stored within the LabTutor Server file system.

If the student was logged in as part of a group when the data was generated, each student in the group has the data associated with their login details. This ensures that if the members of the group want to submit individual reports or split into smaller groups, that their original data is not lost.

Student data is managed through the LabTutor Server database. The LabTutor Server database maintains the integrity of the associations between each student and their experimental data. The database tags the student data as being in one of four states: In Progress, Past Due, On LabTutor Online, or Submitted. Once students have started an experiment, the state of that experiment session becomes 'In Progress'. Students can access an experiment by previewing it, but it will not be In Progress and no student data will be stored.

Transferring Student Data to LabTutor Online

When student data is transferred to LabTutor Online it can no longer be accessed again in LabTutor Client by the student.

- Once experiments are edited in LabTutor Online they can no longer be

accessed again in LabTutor Client without an administrator rolling the experiments back to its pre-LabTutor Online state. Doing so means any changes made in LabTutor Online will be lost. If students attempt to access these experiments in LabTutor Client, they will be redirected to LabTutor Online.

- Submitted experiments are always transferred to LabTutor Online once submitted.
- Reviewing an experiment that has not been transferred to LabTutor Online will not result in that experiment becoming inaccessible to the student in LabTutor Client - a temporary upload is made of that experiment for review purposes only.

Experiment Cache

Versions of LabTutor prior to LabTutor 4 Suite used an experiment files cache which had to be cleared before each student session, when all students used the same login.

Because LabTutor 4 Suite saves all student data directly to the LabTutor Server database, there is no experiment files cache and it is not necessary to clear files between student sessions. Each student will see their experiments in the same state they left them the last time they logged out. The only exception to this is if a student is a member of a group and the branches of the group experiment data have been collapsed by an administrator or instructor.

Archiving Student Data

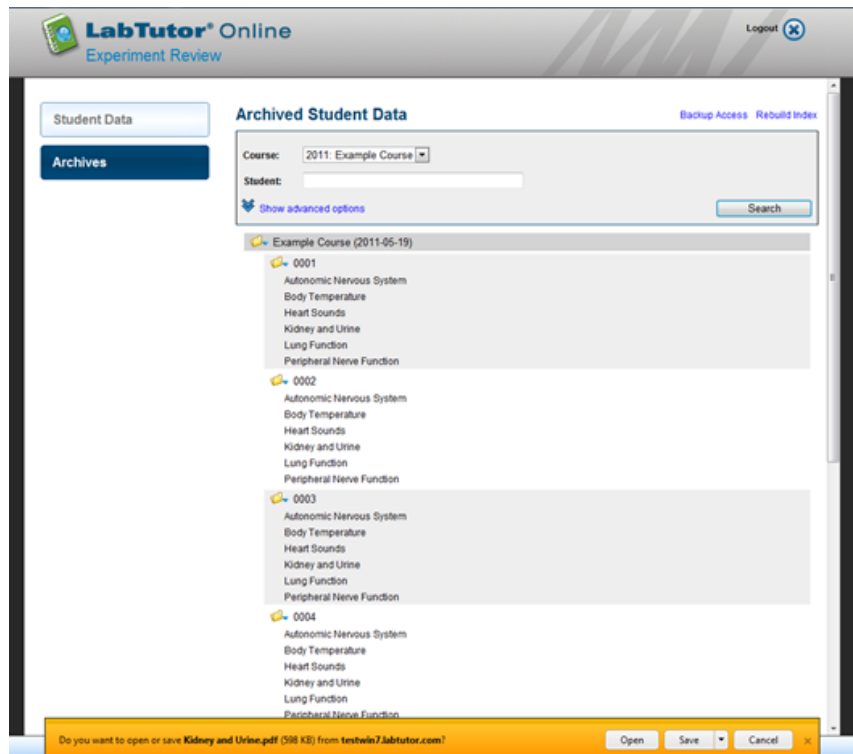
After the end of a course or semester, student data is able to be archived and stored. This allows for students to be deactivated or deleted, whilst retaining an archive of their data.

How do I archive data?

Each course page has a button for archiving data. When it is clicked, all of the report pages from each student run are stored as PDFs.

How do I access the archived data?

Archived data can be accessed via the administration pages. If you are operating in [PowerLabs Required mode](#), the reports can be accessed via the administration pages or the Archived Student [Data folder](#) (C:\Program Data\ADInstruments\LabTutor Server\Archived Student Data). If you are in [LabTutor Online mode](#), then the archived data can be accessed via LabTutor Online. You can search through archived data and, when it is found, simply click on the experiment to open the saved report as a PDF.



Are there other ways of backing up archived data?

In LabTutor Online [licensing mode](#) only, archived data is also able to be accessed securely via SFTP (Secure File Transfer Protocol). To utilize this feature, an SFTP client will need to be installed on the computer being used for access. Clients such as Cyberduck and Filezilla are free applications available online, and compatible with most Macintosh and Windows operating systems. In the **Archives** tab, **Back-up Access** is a feature which configures credentials to access archived student data via SFTP. These credentials are only valid for one week, but may be re-validated as often as necessary.

Once the SFTP client has successfully connected with the host, the archived files will be displayed, organized into folders and able to be arranged according to name, date, size etc. From here, individual files or folders are able to be isolated and downloaded to a desired location on your local server.

Exporting Student Answers

The 'Export Answers' feature will export the following information from a LabTutor Experiment as a .csv file:

- For Answer panels, the text entered by the student will be exported.
- For MCQ panels, each possible answer has a numerical value assigned in LabAuthor, starting from "0". The numerical value of the option(s) selected by the student will be displayed.
- For Sub page order and/or select panels, the sub pages are labeled "0, 1, 2, 3..." and so forth, corresponding to their positions within the established 'Available' list. The number(s) selected by the student are exported in the order that they are arranged by the student, with the sub page at the top of the list appearing first.
- Meta-information pertaining to the exported experiment will be prefixed with a '#' symbol, and displayed at the top of the exported file. This meta-information comprises:
 - Course name
 - Experiment name
 - Number of student answer rows exported
 - Average time taken
 - Number of In-Progress, Submitted and Past Due experiments
 - Numbers of answers exported for a row

Answers will be arranged within the .csv file alphanumerically based on the 'LabTutorPageItem' ID assigned to the Answer, MCQ or sub page panel. These page item IDs should therefore be established in LabAuthor with this feature in mind.

Furthermore, educators may have Experiment marking schemes which may be used in conjunction with the Export Answers feature. Formulas may be set-up on a spreadsheet, which output a 'mark' based on the contents of a cell. These outputs may then be used to create a graph.

#Course	BIO541 S1												
#Experiment	Blood Pressure												
#In Progress	4												
#Submitted	4												
#Past Due	0												
#Average Time Taken	58.9												
#Student Rows	4												
#Answer Columns	3												
User ID	User Name	Given Ni	Family Name	Email	Started With	Started	Time Taken	Last Accessed	Status	Online	LabTutorP	LabTutorP	LabTutorPageItem-4
1	1 Bert	Ladwig		bladwig@sirearnhe	0001, 0002, 0003	16/03/2012	58.9	16/03/2012 9:21	Submitted	N	0 1 2		1 Diastolic pressure
2	2 Tory	Dublin		tdublin@curcu.com	0001, 0002, 0003	16/03/2012	58.9	16/03/2012 9:21	Submitted	N	0 1 2		2 systolic
3	3 Adrian	Ratcliff		aratcliff@ing.com	0001, 0002, 0003	16/03/2012	58.9	16/03/2012 9:21	Submitted	N	2 1 0		2 Diastolic pressure
4	4 Eric	Wilmes		ewilmes@aecenky	0001, 0002, 0003	16/03/2012	58.9	16/03/2012 9:21	Submitted	N	1 2 0		2 Diastolic pressure

4

Maintenance & Technical Info

LabTutor Server

Software Updates

When should I update LabTutor Server?

It is recommended that, if possible, you should always use the latest version of LabTutor Server. It is advisable to update LabTutor Server between semesters as there may be discrepancies between the data formats used (for server snapshots etc.). If you do update during the semester, you should update outside of course hours, so that you can be sure that no students are connected via LabTutor Client. If you update LabTutor Server while students are performing an experiment, data loss could occur.

How can I update all of my client computers?

If the server detects that the client computer is running an old version of LabTutor Client, you will be prompted to update to a newer version when you try to log in. The update will be provided directly from LabTutor Server, rather than over the Internet.

Updating LabTutor Online

LabTutor Online is maintained by ADInstruments independently of LabTutor Server and LabTutor Client. Because of this, users will always have the most up-to-date version of LabTutor Online (that is compatible with their version of LabTutor Server).

Uploaded Experiments

You can access experiment installers that have been uploaded to LabTutor Server through the administration pages.

Upload and Install Experiments

[Browse uploaded installers](#)

Upload experiment installer from:

LabTutor Server stores its data in a folder in the ADInstruments area of the (hidden) Program Data or Application Data folder. Under no circumstances should you interfere with these files directly, as this may cause LabTutor Server to stop working.

Server Recovery

Data is saved back to the server at regular intervals upon user interactions and major commits. Sampled data is regularly sent back to LabTutor Server so that in the event of a system failure most data will be retained.

What happens in LabTutor Client when sampling data during an experiment and a snapshot is performed of LabTutor, on the Server?

When a server snapshot is performed while students are in a laboratory using LabTutor, students should not notice anything. Sampling will continue and student sessions do not expire. No loss of data will be experienced.

What happens in LabTutor Client when sampling data during an experiment and the server is restarted?

Student sessions will expire and students will be logged out of LabTutor Client. Any data being sampled while the Server service is restarted, will be lost.

What happens if uploads to LabTutor Online are in progress and the LabTutor Server service is restarted?

Experiments will continue to upload successfully to LabTutor Online after the server service has restarted.

What happens when the PowerLab is disconnected during sampling?

If the PowerLab power cord is pulled out, the PowerLab is switched off, or if the PowerLab USB cord is disconnected while sampling, the recording will stop but any data already recorded will be saved.

What happens if the client computer loses power while sampling?

Sampled data will be lost when computer power is lost while sampling data. Also, the

PowerLab may crash and will need to be reset (switched on and off).

Restarting LabTutor Server

If you need to restart LabTutor Server you can do this in one of three ways:

1. Restart the server computer.
2. Restart the ADInstruments LabTutor service via the Services control panel (**Control Panel > Administrative Tools > Services**).
3. By using the LabTutor Service Controller that is installed in the ADInstruments Start menu group (**Start > All Programs > ADInstruments > LabTutor Server > Service Controller**).

Remote Access

LabTutor Server requires outgoing access to the Internet to contact and synchronize with LabTutor Online, and to download experiments and updates. However, under no circumstances should it allow incoming connections over the Internet. Allowing computers to connect to LabTutor Server over the Internet is a security risk and not a recommended or supported configuration. LabTutor Server has been designed and optimized to run over a Local Area Network (LAN), and not over the Internet. If students log directly into LabTutor Server from the Internet, this will result in extremely compromised performance and functionality. These students would also need to have LabTutor Client installed on their computer, which is not compatible with Macintosh or Linux operating systems. If students require remote access to their data, LabTutor Online is the only supported solution. LabTutor Online removes all of the complications of performance, security and operating system dependence for accessing student data over the Internet.

Security Certificate

The default security certificate that is generated for LabTutor is a self-signed SSL certificate. This means that you have to install the root certificate for the LabTutor Server on all computers that access the administration pages, if you wish to remove the security warnings from browsers. It is possible to supply your own SSL certificate for use with LabTutor Server that is generated by a trusted Certificate Authority (CA) such as [VeriSign](#) or [Go Daddy](#), or one generated by your own Certificate Authority, such as [Active Directory Certificate Services \(AD CS\)](#).

LabTutor Server requires the SSL certificate to be in Tomcat format (pkcs12). Many CAs will allow you to download the certificate in Tomcat format directly. Alternatively

OpenSSL can be used to convert most certificate formats into the pkcs12 format. The certificate must be generated with the standard Tomcat password of "changeit".

Once you have the certificate in pkcs12 format you can install it by backing up the existing "server.p12" file, replacing it with the new certificate, and restarting LabTutor Server. You can inspect the certificate in your browser to verify it matches the certificate you expected. The "server.p12" can be found in the following locations:

- Windows Vista, Windows 7 and Server 2008: C:\ProgramData\ADInstruments\LabTutor Server\ssl
- Windows Server 2003: C:\Documents and Settings\All Users\Application Data\ADInstruments\LabTutor Server\ssl

LabTutor Client

LabTutor Client is installed on each computer in the student laboratory. LabTutor Client works in the background and silently handles communication with LabTutor Server and the PowerLab. Once LabTutor Client is installed, you access can LabTutor through your Internet Explorer web browser.

The easiest way for students to access LabTutor is to provide a desktop shortcut or browser bookmark to the student login page. The student login page can also be manually entered into your web browser:

- <http://<LabTutor Server computer name>> e.g. <http://labtutor-server/>
- <http://<LabTutor Server IP Address>> e.g. <http://192.168.1.58/>

Updates

LabTutor Client must always be the same version as the LabTutor Server. There are three recommended ways for updating LabTutor Client computers:

Method 1: Via the LabTutor Login Page

If the server detects that the client computer is running an old version of LabTutor Client, you will be prompted to update to a newer version when you try to log in. The update will be provided directly from the LabTutor Server, rather than over the Internet.

Method 2: Using the LabTutor Suite DVD

You can install LabTutor Client from the supplied LabTutor Suite DVD.

Method 2: Administrative Deployment (recommended for many computers)

The LabTutor Client MSI installer supports administrator deployment from the command line for silent, first-time or updated installs.

LabTutor Online

Once a student has edited their experiment in LabTutor Online, the student will no longer be able to record data in the laboratory using LabTutor Client.



Students must complete data acquisition and analysis (tables, graphs etc.) before editing their experiment via LabTutor Online.

LabTutor Server and LabTutor Online Interaction

Communication between LabTutor Server and LabTutor Online is one-way, meaning that once you've clicked the **Edit** button in LabTutor Online, the experiment can no longer be edited back in the classroom using LabTutor Client. This means that additional data cannot be sampled from a PowerLab or added as example data, tables can no longer be completed and graphs unable to be populated. Once in LabTutor Online, students can still analyze data, tables and graphs and can type text into the answer panels.

Conversion of Student Data

LabTutor Online requires a different data format to that used by LabTutor Server. When a student first edits their experiment online, their data is converted to the LabTutor Online format. Experiments with high amounts of data will take longer to convert than experiments with low amounts of data. Students can still preview labs or view their current progress in LabTutor Online without changing its format, but once the students click the **Edit** button the experiment data is converted to the LabTutor Online format.

Queuing

LabTutor can only convert one experiment to the LabTutor Online format at a time. If multiple students access LabTutor Online and simultaneously need an experiment converted, they will be queued. Queuing for conversion is on a first-come basis.

Why are some experiments grayed out on LabTutor Online?

LabTutor Server may still be in the process of uploading the experiments to LabTutor Online. The amount of time this takes depends on:

- The network connection

-
- The size of the experiment
 - The number of experiments being uploaded
 - If experiment conversion is taking place

If the experiments remain disabled after a significant amount of time, you may need to [restart the LabTutor Server](#).

Changing Server Hardware

Authentication of LabTutor Server with LabTutor Online is based on both the Media Access Control (MAC) address and hostname of the LabTutor Server computer. Changing network cards or the computer name of the server computer will break this connection.

- If the computer name or network card is changed, an administrator will need to go to the administration pages of LabTutor Server and re-authorize the machine for LabTutor Online.
- No LabTutor Online information will be lost because the database has not changed.

Activating LabTutor Online

Activation of LabTutor Online requires a LabTutor Online Activation Certificate from ADInstruments. This will be emailed to the original purchaser of LabTutor Online for your LabTutor Server. The certificate should be saved to a safe location that can be accessed by LabTutor Server.

You should decide on either Bulk or Individual Student licensing, set this appropriately in the **Accounts and Licensing** tab of the administration pages and obtain licenses where necessary. Individual Student licenses (scratch cards) may be obtained from authorized resellers or education providers whereas Bulk licenses can be purchased from myLabTutor.com, or by clicking on the myLabTutor.com link on the header of the admin pages. You can also send an email to: support.lto@adstruments.com for assistance, or contact your sales representative directly.

Diagnosing Connectivity Issues

LabTutor Server requires a direct connection to the Internet on ports 80 and 443 for syncing with LabTutor Online and downloading software updates and experiment installers. The most common connectivity issue is caused by a proxy server on the network or a firewall that blocks direct access to the Internet. If your network uses a proxy server for Internet access you will have to get an exception put in place that

allows LabTutor Server to directly access LabTutor Online and ADInstruments.com. If your network uses a proxy server please talk with your IT department before deploying LabTutor Server.

If you are experiencing connectivity issues with LabTutor Server and LabTutor Online that do not appear proxy server-related, please contact your ADInstruments representative.

Licensing

There are two modes of operation for LabTutor Client, depending on the licensing model that is purchased:

- 1. PowerLabs Required** - A student can log in and start an experiment if the computer on which LabTutor Client is installed has a PowerLab connected. LabTutor Client must also be able to connect to LabTutor Server. Students are able to edit experiments on computers that have LabTutor Client installed and that can connect to LabTutor Server.

- 2. LabTutor Online is activated** - Where LabTutor Online is activated, a student can log in and start or edit an experiment on any computer on which LabTutor Client is installed, as long as LabTutor Client can connect to LabTutor Server. LabTutor Client can be installed on any number of computers. No PowerLab need be connected to the computer running LabTutor Client. In this case, licensing may be on a per-student (Student Access Card - Compulsory or Optional) or pool (Bulk Licensing) basis.

Administrators may empower students to create their own accounts on LabTutor. This

may be relevant where no consolidated student registry information is available to import to LabTutor to create accounts en mass, thus saving time and money over manually entering a student database.

Furthermore, in the instance of LabTutor Online, where the onus may be on the student to purchase their individual license, a scratch card may be obtained by a student from an authorized reseller or from their Education Provider and entered upon account creation. Bulk licensing also exists in LabTutor Online mode, whereby a license is effectively grabbed from a pool of available licenses by an active unlicensed student upon logging in.

If enabled by an administrator, individual LabTutor Online and PowerLabs Required accounts can be created by a student from the appropriate LabTutor login page.

Adding new Bulk Licenses

1. In LabTutor Online mode, log in to the LabTutor Server Admin pages as an administrator and navigate to **Server > Accounts and Licensing** (ensure Licensing mode is set to Bulk Licenses)
2. Click **Add**
3. When prompted, type you license and click **Save**
4. Your licensing status will be updated on the previous page, reflecting your changes.

NB: To purchase more bulk licenses, click the blue hyperlink Buy Licenses on myLabTutor.com to be redirected there. From myLabTutor.com, click Get More Student Licenses, type the number of licenses required into the subsequent License Request page and click Proceed to have your request forwarded to your sales representative.








Bulk licenses remain valid for 6 months from their time of activation. A bulk license becomes activated when a student first logs in to LabTutor Server or Online, provided sufficient licenses are available.


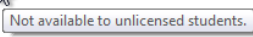
- Bulk licenses must be activated within 12 months of purchase. Exceeding 12 months will deem the license invalid, and these licenses will be removed from LabTutor Server.
- If a student is allocated a license and has his/her account deleted within a week of doing so, the license will become available for another student to use. If a student account is deleted more than a week after being allocated a license, their license will become obsolete.
- Unless a snapshot is taken prior to deactivating LabTutor Online, active bulk licenses will be lost. Any available licenses prior to deactivation will be retained.

- Once all purchased bulk licenses have been activated, subsequent first-time student logins may continue to be allocated licenses, with up to 10% of the original number of licenses being purchased able to be attained in advance. Any additional licenses used will be deducted from future purchases.

Students with invalid bulk licenses will prompt an error upon logging in to LabTutor Client or Online, and be unable to preview or edit any experiments. This will also affect group sessions regardless of whether all other members of the group are licensed. The unlicensed user or users will have their login symbol grayed out in the **Logged in** dialog, whereas licensed users will appear blue.

Mammalian Biology

Introduction to LabTutor 
Airways Resistance 
 Chick Biventer Cervicis 
 Mammalian Atria 
Mammalian Blood Pressure - Drug Effects 

  Not available to unlicensed students.

Your department here

Your organization here

Logged in

 Dublin , Tory (0002)
 Ladwig , Bert (0001)
 Ratcliff , Adrian (0003)
 Wilmes , Eric (0004)
 Woodcock , Carolyn (0005)

Experiments to be edited in LabAuthor are separate from the experiments installed to the LabTutor Server.



You cannot and should not attempt to edit experiments installed to LabTutor Server directly.

Best Practice

- Have LabAuthor and LabTutor Server on separate computers.
- Install Experiments in a local folder in your User directory and execute the **experiment.adiexp** file to open the experiment in LabAuthor.
- Install your own custom experiments in a separate location to the supplied ADInstruments experiments to avoid confusion.

Install experiments to a local folder.

- Double-click on a LabTutor Experiment .ltxp file. This will open the LabTutor Experiment Installer.
- Install ADInstruments experiments from the LabTutor Suite DVD.
- Install ADInstruments experiments using the Check for Updates tool or the Install LabTutor Experiments tool
 - **Start > All Programs > ADInstruments > LabTutor > Check for Updates**
 - **Start > All Programs > ADInstruments > LabTutor > Install Experiments**

Experiment Flow

ADInstruments-authored LabTutor experiments conform to a high standard. Each experiment is structured in a similar way and includes background information, detailed experimental setup and exercises as well as easy-to-follow data acquisition, analysis and reporting protocols.

Experiment Flow

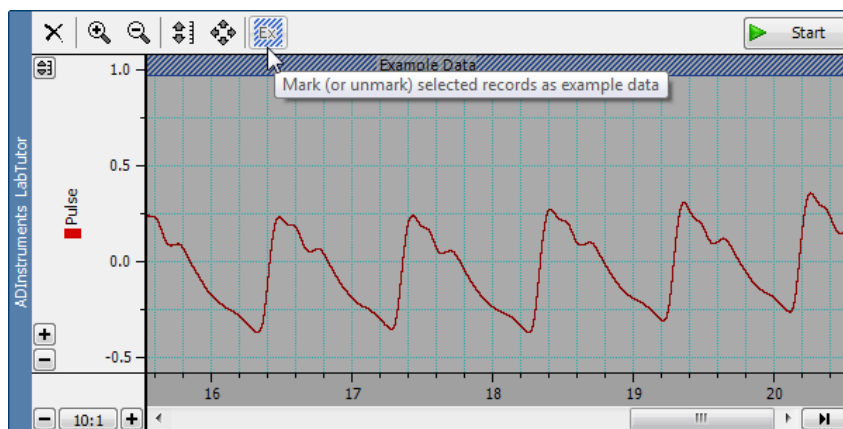
ADInstruments experiments follow a linear flow so that students don't need to navigate backwards and forwards throughout the lab.

General flow used by ADInstruments:

1. Introduction and background information
2. Equipment Setup
3. Experimental Exercise
4. Analysis of Results
5. Report

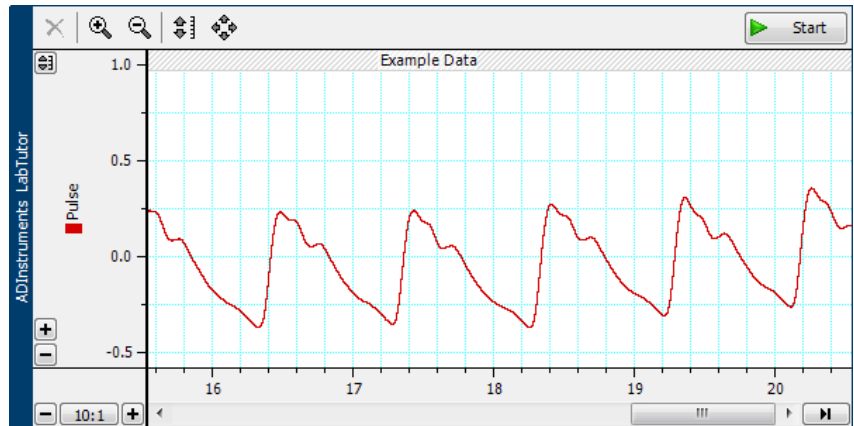
Example Data

Using LabAuthor you can record and embed example data into a LabTutor data panel which demonstrates what the student should typically see when the experiment is carried out. Recording example data is identical to recording data normally using the LabTutor panel. It simply needs to be "marked" as example data.



Adding example data using LabAuthor

The students performing the experiment will be able to access the example data by right-clicking on the Start/Stop button and choosing **Add Example Data...**



Example data shown in a LabTutor student experiment

Audio and Video vs Other Media

Audio and Video Playback

LabTutor has built-in codec support for .h264 mp4 video files and mp3 audio files using Flow Player.

Advantages of using .h264 mp4 video files with Flow Player:

- Built-in cross-platform video player
- Full-screen video playback
- Subtitle support – as multiple subtitle tracks in the video file
- Provide a low resolution video for LabTutor Online (for fast internet viewing), and a high resolution version for in the laboratory (where local network bandwidth is less of an issue).
- Poster Images – Shown as a placeholder image before the video starts playing.
- Play correctly on all major browsers and platforms (Including iPad and iPhone).

Advantages of using mp3 audio files with Flow Player

- Built-in cross-platform audio player
- Play correctly on all major browsers and platforms (Including iPad and iPhone).

Note: when previewing an experiment in LabAuthor with .h264 encoded videos,

users will not be able to watch the video content. When accessed through a LabTutor Server these videos will play as expected.

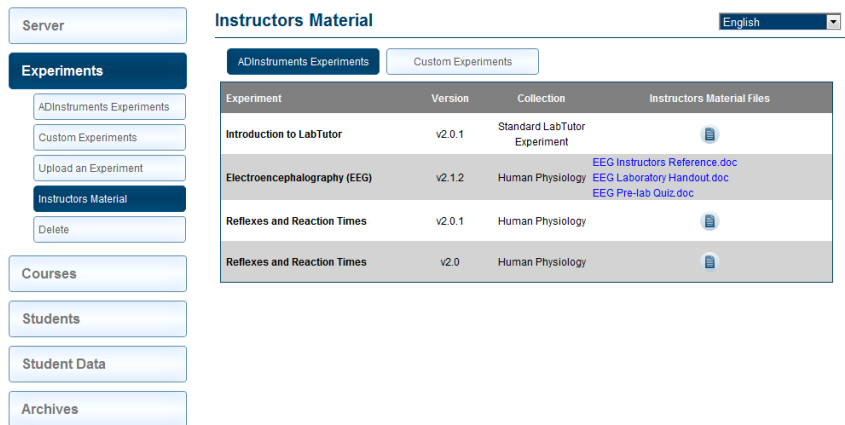
Other Media

LabAuthor can also embed other types of media files such as wav, wma, aac, avi, mov or wmv. For a full list, see the LabAuthor help.




- These file formats rely on external software and will be displayed/played only if the required software is installed and set up correctly (e.g., Adobe Reader, Flash, QuickTime, Windows Media Player etc.). As such, performance can be temperamental. The recommended practice is to use content that is fully supported (.h264 encoded video, and mp3 audio files).

Instructor's Material

Documents can be added to the LabTutor experiment that can be accessed from the LabTutor Server interface.

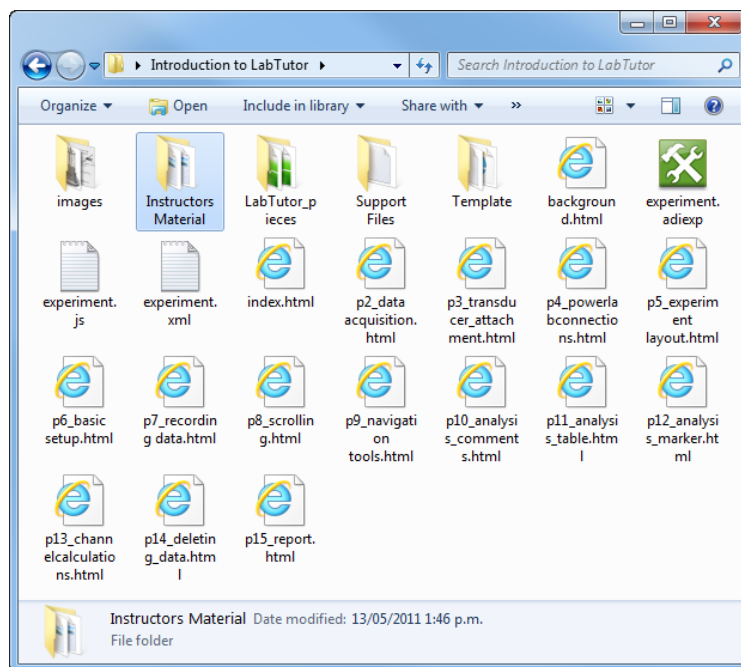


The screenshot shows the LabTutor Server administration interface. On the left is a sidebar with buttons for 'Server', 'Experiments', 'Courses', 'Students', 'Student Data', and 'Archives'. The 'Experiments' section is expanded, showing options like 'ADInstruments Experiments', 'Custom Experiments', 'Upload an Experiment', 'Instructors Material', and 'Delete'. The 'Instructors Material' section is active, displaying a table with columns for 'Experiment', 'Version', 'Collection', and 'Instructors Material Files'. The table lists three experiments: 'Introduction to LabTutor', 'Electroencephalography (EEG)', and 'Reflexes and Reaction Times'. The 'Introduction to LabTutor' experiment (v2.0.1) is associated with 'Standard LabTutor Experiment' and has a file icon. The 'Electroencephalography (EEG)' experiment (v2.1.2) is associated with 'Human Physiology' and has two files: 'EEG Instructors Reference.doc' and 'EEG Laboratory Handout.doc'. The 'Reflexes and Reaction Times' experiment (v2.0.1) is associated with 'Human Physiology' and has a file icon. The 'Reflexes and Reaction Times' experiment (v2.0) is also associated with 'Human Physiology' and has a file icon.

Experiment	Version	Collection	Instructors Material Files
Introduction to LabTutor	v2.0.1	Standard LabTutor Experiment	
Electroencephalography (EEG)	v2.1.2	Human Physiology	EEG Instructors Reference.doc EEG Laboratory Handout.doc EEG Pre-lab Quiz.doc
Reflexes and Reaction Times	v2.0.1	Human Physiology	
Reflexes and Reaction Times	v2.0	Human Physiology	

Location

If there is a folder named **Instructors Material** in the experiment directory when the .ltxp installer is created, then any files in that folder will appear in the Instructors Material section of the LabTutor Server administration pages. The instructors material folder should not contain any sub folders.



The correct location of the Instructors Material folder for a LabTutor experiment.

Optimizing Experiments

It is important to keep the file size of experiments to a minimum to ensure that experiments perform optimally, particularly when using LabTutor Online. Larger file sizes will still work; however students may find themselves in a queue while waiting to download an experiment. Depending on the volume of students and recorded data, queuing time may vary from a few seconds to several hours. This is not an ideal situation and should be avoided by following these best practices.

1. Sampling rate

To reduce file size, choose the lowest suitable sampling rate for the recorded data. For example, a default sampling rate of 1000 samples per second (i.e. 1k/s) is suitable for most human biological recordings (e.g. spirometry, ECG, EOG, finger pulse and blood pressure). Other signals may require a higher sampling rate (e.g. EMG at 4k/s), or a lower rate will do (e.g. pharmacology organ bath experiments at 200–400 samples/s). There are certain special cases for which high sampling rates are required for quality data, such as when recording action potentials.

2. Fixed duration sampling

In LabTutor you can fix the duration of sampling, to say 30 seconds, for a recording of spontaneous nerve activity. For exercises where students have to apply an intervention or enter a comment, it is important to consider whether a brief sweep would allow adequate time for this.

3. Instruct Students to Delete unusable data

If you wish, you may choose to add an instruction to each analysis page to have the students delete unusable data before completing the exercise. Note: it is necessary to do this while they are in the laboratory. For example, the following instruction has been added to version 2.1 of the Cockroach Sensory Nerve experiment on each analysis page:



It is good practice to delete any unusable data, and it will improve the presentation of your Report for this laboratory. Before proceeding to the next exercise, select the unusable data and click on the **Delete Data** button.

4. Reduce number of channels

The number of active channels in the referenced data file can have a large impact in the data file size. You should remove any unused channel calculations and reduce the number of channels. The channel calculations can continue to be run even if the channels are hidden, so ensure that unused channels are turned off.

5. Combine Channels

If you are proficient using LabChart, you may feel confident enough to try to combine two or more Channels using an arithmetic equation. You can have an arithmetic equation running on the channel you are recording into. For example, to differentiate Channel 1, select Arithmetic from the channel drop-down menu and enter: “= **Differentiate(Ch1)**”. This will return the derivative of channel 1 into Channel 1. Refer to the Arithmetic section of the LabChart 7 Help for further information and formulae.

Experiment Properties

When you use LabAuthor to create or edit an experiment it is important to provide good experiment properties. In particular:

- **Experiment Title:** This is the full name of the experiment as seen by the student. In some circumstances you may wish to give an indication as to the

order of the experiments e.g. "PHYS201 - Lab 1 - Blood Pressure". It is recommended that experiment titles be less than 40 characters, including spaces, in length. This is because excessive titles can cause problems to the header of an experiment page, pushing down navigation buttons.

- **Version:** The version number helps you keep track of experiments so you always know which one is the most current version. LabTutor Server checks the version number on installation of experiments so that if there is already an experiment with the same properties, it is able to tell you whether it is older, newer or the same as the currently installed experiment.

Why you should use experiment version numbers

When amendments to experiments are made, you should increase the version number by opening the **Experiment Properties** dialog from the **Edit** menu in LabAuthor. You can increase the version number in point increments (e.g. 2.0 to 2.1) or point-point increments (e.g. 2.0 to 2.0.1). This reduces confusion when uploading an experiment to LabTutor Server when a previous version already exists. LabTutor Client will prompt you when uploading a new version of an experiment as to whether you intend to replace existing versions of that experiment on Course lists.

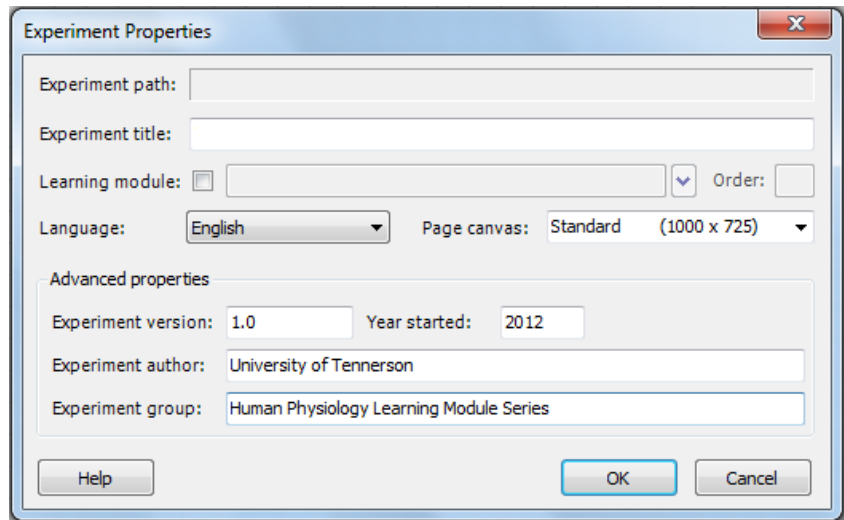
Note: LabTutor Server will not allow you to overwrite an experiment that has identical Experiment Properties.

Learning Modules

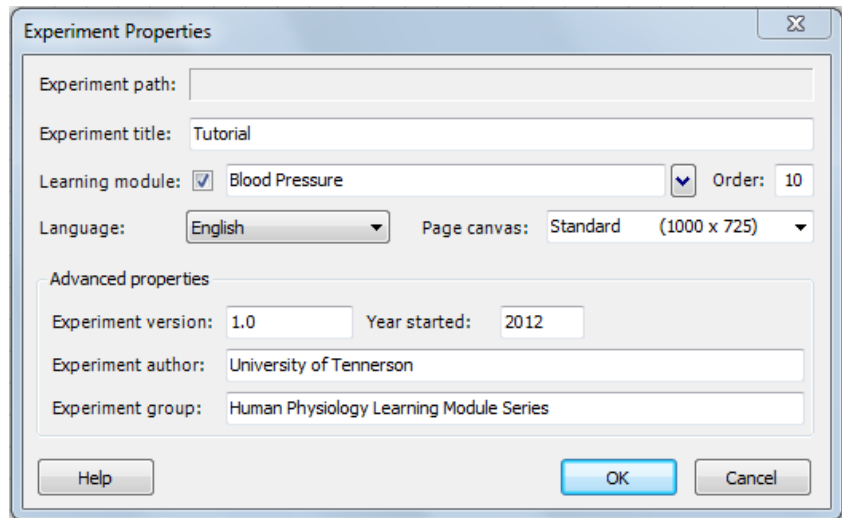
Learning Modules allow related experiments to be grouped together, with different components intended to be accessed in the classroom or laboratory (Client) and outside of the classroom (LabTutor Online). Each component in a learning module is only accessible once the previous component has been submitted. This creates a seamless learning experience, whilst giving educators increased control over the student's work-flow to benefit them maximally through active reinforcement and self-evaluation.

How to create a 'Learning Module' experiment:

1. Open an existing experiment, or create a new one, in LabAuthor
2. Navigate to **Edit > Experiment Properties**



3. Check the box labeled **Learning module:** and define a title for the learning module. All experiments that you want to include in this learning module must be given the same learning module title. N.B: If you have previously authored a learning module, it will be available from the drop-down for this field.
4. Define an **Order:** for this learning module component. In this example, the tutorial is the first learning module component, so the number '10' is assigned as its order. Assigning orders in increments of '10' means that supplementary or alternative components can easily be integrated into an existing learning module, without having to reassign the entire order. i.e. if an educator decides to implement a second tutorial component, they may do so, and assign any number from '11-19' as its order (assuming the next component's order is '20').



5. Click **OK**
6. Repeat steps 2-5 for each component of a given learning module, giving each a relevant title and order number. i.e. For a Blood Pressure Learning Module comprising a tutorial, pre-lab quiz, laboratory session, patient case study and evaluation, the following attributes would be applied in the **Experiment Properties** dialog for each.
 - **Learning module title:** 'Blood Pressure'
 - **Experiment title:** 'Tutorial'; **Order:** '10'
 - **Experiment title:** 'Pre-lab Quiz'; **Order:** '20'
 - **Experiment title:** 'Laboratory Session'; **Order:** '30'
 - **Experiment title:** 'Patient Case Study'; **Order:** '40'
 - **Experiment title:** 'Evaluation'; **Order:** '50'

Other Considerations:

- Ensure the **Experiment author** is identical for every component of the learning module. Experiment properties must be consistent throughout all components of a Learning Module for them to be recognized and grouped correctly by LabTutor. If you edit a component of an ADInstruments' Learning Module, an option 'Keep this experiment part of the ADInstruments' Learning Module' is selected by default. Keep this selected to maintain the edited component as belonging to the original Learning Module. If you are editing *every* component of an ADInstruments' Learning Module, it is recommended that you uncheck this and ensure the

Experiment author: is kept consistent across the module.

Experiment Properties

Experiment path: C:\Users\...\LabTutor Experiments\Autonomic Nervous System - Evaluation

Experiment title: Evaluation

Learning module: Autonomic Nervous System Order: 50

Language: English Page canvas: Standard (1000 x 725)

Advanced properties

Experiment version: 1.0 Year started: 2012

Experiment author: ADI

Experiment group: Pre-Clinical Medicine

Learning module: Keep this experiment part of the ADInstruments learning module

Help OK Cancel

- The experiment installer will save with the following attributes: '<Learning module name> - <Experiment title>.ltexp'
- Learning modules can be distinguished from traditional experiments in the Course pages by light-blue text:

Edit Course

Configuration	Experiment List
Configured Experiments	
English	Introduction to LabTutor (v2.0.1) Standard LabTutor Experiment
English	Autonomic Nervous System (v1.0)
English	Blood Pressure (v1.3) Medical Laboratories

- The **Experiment title:** should be kept brief and only describe that discrete learning module component. Ie. "Tutorial", as opposed to "Autonomic Nervous System - Tutorial". The learning module title is displayed as the 'parent' of the learning module drop-down, and appears in the student pages as below:

Introduction to LabTutor
 Autonomic Nervous System ▾ ← Learning module name
 ✓ Tutorial
 ✓ Pre-Lab Quiz
 Laboratory ← Learning module experiment title
 Patient Case Study
 Evaluation

Logged in
 👤 Dugger, Ahmad (0056)
 Course options
 ➕ Add course

Troubleshooting

If a group login includes a mix of students who have submitted or started different learning module components independently, the following error will be shown:

BIO540

Your department here
Your organization here

Introduction to LabTutor
 Autonomic Nervous System ▾
 Tutorial
 Pre-Lab Quiz
 Laboratory
 Patient Case Study
 Evaluation

Logged in
 👤 Putman, Katina (0600)
 👤 Walburn, Kirby (0601)
 Course options
 ➕ Add course

Not available to the currently logged in group. One or more members of the group have started this experiment independently.

Scenario 1: A group comprises students A, B and C. Students A and B started and submitted the Tutorial component of the learning module, whereas student C started the Tutorial but did not submit it. As a group they are now required to complete the Pre-Lab Quiz.

- **Solution 1:** Student C should log in to LabTutor independently and simply submit the Tutorial. Upon subsequently logging in as a group, with students A and B, the Pre-Lab Quiz will be available.
- **Solution 2:** Log in to LabTutor Server as an administrator. Navigate to **Student Data > Find and Manage** and search for the submitted student data pertaining to the Tutorial for either student A or B. Click **Edit**. Under the heading **Students**, click **Add**. Type student C's user ID or user name into the box and click **Search**. When you have located student C, click **Add**. They will now have submitted student data for the Tutorial, and subsequently logging in as a group, the Pre-Lab Quiz will be available.
- **Solution 3:** Log in to LabTutor Server as an administrator. Navigate to **Student Data > Find and Manage** and search for the in-progress student data pertaining to the Tutorial for student C. Click **Edit**. Under the heading **Status**, click **Lock**. This will classify the Tutorial 'Past Due' for student C, therefore making the Pre-Lab Quiz component available. The Pre-Lab Quiz


will now be available to students A, B and C when they log in as a group.

Scenario 2: A group comprises students A, B and C. Students A and B started and submitted the Tutorial component of the learning module at home the previous evening, whereas student C did not even start the Tutorial. As a group they are now required to complete the Pre-Lab Quiz.

- **Solution 1:** Student C should log in to LabTutor independently and start and then submit the Tutorial. Upon subsequently logging in as a group, the Pre-Lab Quiz will be available.
- **Solution 2:** Log in to LabTutor Server as an administrator. Navigate to **Student Data > Find and Manage** and search for student data pertaining to the Tutorial for either student A or B. Click **Edit**. Under the heading **Students**, click **Add**. Type student C's user ID or user name into the box and click **Search**. When you have located student C, click **Add**. They will now have submitted student data for Tutorial and subsequently logging in as a group, the Pre-Lab Quiz will now be available.

Scenario 3: A group comprises students A, B and C. Students A and B started and submitted the Tutorial component of the learning module. Student C submitted the Tutorial and the Pre-Lab Quiz, as well as starting the Laboratory. As a group they are now required to complete the Pre-Lab Quiz.

- **Solution 1:** Log in to LabTutor Server as an administrator. Navigate to **Student Data > Find and Manage** and search for student data pertaining to the Pre-Lab Quiz and Laboratory for student C. Click **Edit**. On the bottom left-hand corner of the subsequent page, click **Delete**. This will remove student C's data for the submitted Pre-Lab Quiz and Laboratory learning module components. They will now only have submitted the Tutorial, and the Pre-Lab Quiz will be available to students A, B and C when they log in as a group.

 **Learning Module experiments must contain a Report page (and Submit turned on in Admin pages) so that the *next* Learning Module component can be accessed.**

6

Troubleshooting

This section contains some frequently asked questions and describes actions to take if you encounter problems using the LabTutor Suite. Further information can be found in the LabTutor Server help and via adstruments.com

Technical Support

There is always the potential for problems to arise that will stop LabTutor Server from functioning correctly, if you find yourself in such a situation please contact your ADInstruments representative for further assistance. They will be able to assist you in gathering diagnostic information from your server to help resolve the issue.

Forum

The ADInstruments Software Forum provides an interactive online environment where PowerLab users and ADInstruments product and application specialists can share their knowledge and expertise. It provides a great place to ask questions, make suggestions, share ideas, tips and experiments. You can access the [forum](http://adstruments.com/forum/) at adstruments.com/forum/

FAQ

- ❑ **If the experiment is saved on different computers but not on the server, how can I access this and continue working?**

In LabTutor 4, experiments must be installed to LabTutor Server to function properly. Local experiment installs are for creation and editing using LabAuthor and are not intended for usage in a classroom situation as data sampled and recorded outside of LabAuthor will not be saved.

- ❑ **How many copies of the same experiment can be submitted? What if a student is working on the same experiment by logging on from different computers?**

Each student can only submit an experiment once. The number of computers a student uses to perform an experiment does not matter, as all data is stored on the LabTutor Server. Students cannot have more than one active session. If a student

logs in using another browser or computer, the other session will automatically be logged out upon navigating to a new page or performing an action, such as sampling data.

- ❑ **What happens if a student starts an experiment with one group, then leaves to join another group without the first group logging out and logging back in?**

Students cannot have more than one active session. If a student logs in with another group of users, then the first group will be logged out automatically and they will need to log back in without that student.

- ❑ **What will happen if a student logs in to LabTutor Client and/or Online using two different browsers/browser windows at the same time?**

Students cannot have more than one active session. If a student logs in using another browser or computer, the other session will automatically be logged out.

- ❑ **Is there a way to setup LabTutor to use another port besides 80, 443, or 8005?**

No

- ❑ **How do I find out what programs are using ports 80 and 443?**

The [LabTutor Installation Advisor](#) will detect this situation if it arises. You can also manually check this from the LabTutor Server computer. Open a command prompt window by looking in **All Programs > Accessories** and right click on the command prompt item, then select **'Run as Administrator'**. Once the window opens type **'netstat -oan'**. This will show you a list of all the listening services, the port they are using and the process ID. This information can then be given to your Tech Support provider. The most common scenario is that these ports are already in use by Skype.

- ❑ **How do I stop Skype and VMware Server using ports 80 and 443?**

If you have Skype installed on the same machine as LabTutor Server, this can result in ports 80 and 443 being utilized by Skype, and therefore not being available for LabTutor Server. You can get around this without reducing the standard functionality of Skype or uninstalling it. Go into Skype and click **Tools > Options > Advanced > Connection** and uncheck the box that says **'Use port 80 and 443 as alternatives for incoming connections'**. VMware Server also has the same issues, and shouldn't be installed on the same machine as LabTutor Server.

- ❑ **What is the minimum Hard Drive size for running LabTutor server?**

This depends on a number of factors including the number of students, number of experiments, and the amount of data collected. It is recommended that you use the [Installation Advisor](#).

▣ **I have .NET Framework version 4, do I still need v2.0 Service Pack 2?**

Yes, you will still need .NET v2.0 Service Pack 2 or v3.5 Service Pack 1. The .NET Framework 4 works side-by-side with older Framework versions, but does not replace them.

▣ **How many administrators can you have on one server?**

The number is not restricted, but it is recommended that you do not have more administrators than necessary in order to retain high system security.

▣ **What are the main differences in access for Administrators and Instructors?**

An Instructor can:

- Access Instructor's material for experiments
- Add or update ADInstruments experiments from the install media or ADInstruments website
- Add or update custom experiments
- Add individual students
- Edit students (including deactivating and resetting passwords)
- Delete individual student data
- Edit student experiment data
- Add students to experiment groups
- Allow resubmission of experiment reports
- Reset Checkpoints
- View the status of experiments
- Access archived Student Data
- Configure and manage access to any restricted course they may be assigned

An Administrator can do all that an Instructor can do and, in addition, can:

- Configure the server with the department and organization names
- Set the database backup time
- Download and install a LabTutor Server Admin Certificate
- Activate LabTutor Online
- Configure LabTutor Online display options
- Change LabTutor Online

- Add and delete Administrators
- Add and delete Instructors
- Reset passwords for Administrators and Instructors
- Import student lists
- Export student lists
- Bulk deactivate students
- Bulk delete students
- Delete student data.
- Backup access to archived data via SFTP
- Export student answers
- Archive Student Data
- Assign students to restricted courses
- Assign Instructors to restricted courses

☐ **Can the administration pages be accessed remotely?**

Yes, when working on other computers on your local network, access the administration pages remotely by either:

- Typing `http://<LabTutorServer computer name>.<domain>/admin/`
- Typing `http://<LabTutorServer IP Address>/admin/`

Administrators cannot access the administration pages from a computer that is not on the same network unless the IT department has setup specific remote access software.

☐ **Can marking be done via LabTutor Online?**

LabTutor provides a review feature to allow Instructors and Administrators to view student reports and experiments. The way in which you access the experiments for reviewing depends on which [LabTutor licensing mode](#) is being used. See [Reviewing](#).

☐ **Is it necessary to install the browser security certificate?**

No, it is not required. The certificate verifies that the LabTutor Server administration pages are secure, avoiding browser security warnings. If not installed, you will have to approve these warnings each time you access the administration pages. See [Security Certificate](#).

☐ **How do you upload instructor material for custom experiments?**

You must use LabAuthor to add the Instructors Material to an experiment. These files are then installed along with the experiment, and accessed via the Instructors Material tab in the administration pages.

▣ **What is the required format for importing/exporting student list?**

You can import student details in bulk from a file. The file containing the list of student details should be formatted so that the details for each student are on a separate row, with columns separated either by tabs (.txt) or commas (.csv), or the file should be in Microsoft Excel 97-2003 format (.xls). Note that for Excel documents, only data contained on the first sheet of the document can be imported.

For exporting a student list you can choose which columns of data are exported by checking the boxes beside each one. The Licensed, Active and Protected fields export a value of 1 for yes and 0 for no. The export may be limited to a subset of the whole student list by selecting for only those students who are Licensed, Active or Protected. Data can be exported in comma separated value (.csv), tab delimited (.txt) or Microsoft Excel 97-2003 (.xls) formats.

▣ **Is it possible to get a list of students who have or have not submitted an experiment?**

You can use the Student Data tab within the administration pages to see which experiments have not been submitted, and by whom. You can also print this page out. The Find and Manage option allows you to see the status of all unmarked student data, whilst the Status tab allows you to search for an experiment based on its status.

▣ **Is it possible to annotate and return student experiments?**

No, this functionality is not currently available from LabTutor Server. You can print or export the report pages (PDF or docx), and manually annotate the experiment.

▣ **What is the minimum version of Adobe Acrobat required to view the report PDFs?**

PDFs generated by LabTutor Server are saved as version 1.4 (Acrobat 5 or above), which most common PDF viewers should be able to read. It is recommended that you always use the latest version of Adobe Reader available.

▣ **What is the minimum version of Microsoft Word required create docx files?**

You must have Microsoft Word 2007 or later installed on LabTutor Server in order to be able to create docx reports. There are many software products and

services that students can use to view and edit docx files (Microsoft Office, OpenOffice.org, Google Docs etc.)

☐ **Is it possible for a student to just see a relevant course?**

Yes, there are a couple of ways you can do this with restricted courses.

How to assign an existing student to a restricted course:

1. Log in to LabTutor Server as an Administrator or Instructor (must be assigned to that course)
2. Navigate to **Student > Find and Edit**
3. Search for that student and click **Edit**
4. Unrestricted courses will be listed in Course list for that student and restricted courses in Available courses
5. Double-click a restricted course, or highlight and click **^ Add ^** to have that restricted course added to that student's course list, now able to be accessed from their homepage.

How to assign a new student to a restricted course:

1. Log in to LabTutor Server as an Administrator or Instructor (must be assigned to that course)
2. Go to **Students > Add a Student.**
3. Enter a unique student **User Name.**
4. Enter a unique **User ID.**
5. Enter the student's **Given name** and **Family name.**
6. You can also enter an **Email address** if desired.
7. Click the **Protected** checkbox if necessary.
8. By default, all unrestricted courses are displayed in this student's Course list. All restricted courses will be listed in Available courses and may be added to the Course list by selecting and clicking **^ Add ^**, or double-clicking. Courses in the Course list will be available and displayed on that student's home page.
9. Click **Save.**

The other approach is to navigate to a new or existing course in the Server Admin pages, check the box **Allow students to add this course with access code;** define an course access code and communicate this to relevant student(s). They are then able to add (assign) themselves to this course by logging in, clicking the **+ Add course** button on the student home page and entering the relevant course access code.

In either case, the result will be that the restricted course becomes visible and available on that student's home page.

▣ **How many client machines can access the server at any one time?**

Our tests indicate that over 200 users can simultaneously access LabTutor Server. However, this depends on the specification of the server and client computers, and the experiments that the students are conducting. In general, we advise that a computer with high specifications should be used for the LabTutor Server computer.

▣ **Is it possible to start/review an experiment in Client without a PowerLab connected?**

Yes - when LabTutor Online is activated, a student can log in and start or edit an experiment on any computer on which LabTutor Client is installed, so long as LabTutor Client can connect to LabTutor Server.

LabTutor Client can be installed on any number of computers. No PowerLab need be connected to the computer running LabTutor Client. In this case, licensing is on a per-student basis - either Individual or Bulk Student licenses. Bulk student licenses may purchased along with LabTutor or at anytime from adstruments.com/downloads/student_licenses.php and Individual Student licenses may be purchased from an authorized reseller or education provider. A Bulk license, once added to LabTutor Server, permits access for a certain number of students (e.g. 25, 50, or 100 students). Bulk licenses expire after a certain period. A student can only log into LabTutor Client for the first time provided there is a Bulk or Individual Student license available.

▣ **Is it possible to use LabAuthor and LabTutor Server on the same computer?**

Installing LabAuthor on the same computer as LabTutor Server is not a supported configuration. LabAuthor and LabTutor Server share common components and having both installed on the same machine could lead to confusing and unpredictable behavior.

▣ **Where are the student experiments saved by default on the Server, and can this location be changed?**

It is saved to the 'LabTutor Server' folder on the computer running LabTutor Server, this location cannot be changed. The path to this data folder depends on the version of Windows you are running:

- Server 2003: C:/Documents and Settings/All Users/Application Data/ADInstruments/LabTutor Server
- Windows Vista and later: C:/ProgramData/ADInstruments/LabTutor

Server).

- ❑ **Is it possible to simultaneously open two different experiments in LabAuthor to edit or combine them?**

No, LabAuthor does not allow users to open and edit more than one experiment at once.

- ❑ **LabTutor Online is missing some images when viewing from an iPad. How can I fix this?**

This can be fixed by clearing your web browser's cache. For iOS Safari, navigate to **Settings > Safari > Clear Cookies and Data**.

- ❑ **Can I use LabTutor Server with a wireless network?**

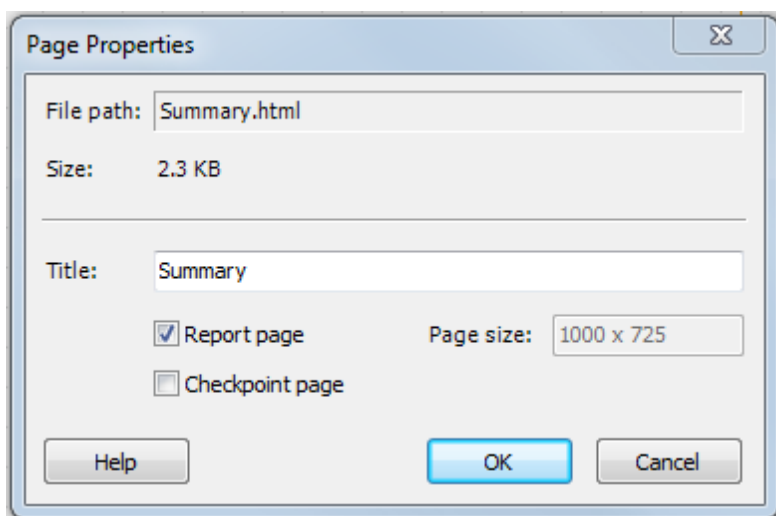
Wireless networks are not supported for a classroom situation because of potential wireless interference and the bandwidth required when sampling data from the PowerLab using multiple client computers. A 1Gbps wired network connection is recommended for optimal performance.

- ❑ **Students have just updated Client in the student pages, why are their PowerLabs now not being recognized?**

If students' PowerLabs are not being recognized by Client after a version update, have them log out, switch their PowerLab off and on, and then log back into Client.

- ❑ **Why does the next Learning Module component appear greyed out and is unable to be accessed in the student's course page?**

Each Learning Module component must be submitted before the subsequent component can be accessed. Therefore, each component of the Learning Module must contain a **report page** (LabAuthor) and have '**Display Submit button**' (Server admin pages) configured for that particular course.



Report Options

- Display Submit button
 - Email reports to:
- Display Email button
- Display Print button