

L^AT_EX – a complete setup for Windows

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<http://www.latexbuch.de/install-latex-windows/>

To use L^AT_EX is one thing, and very good introductions exist for learning. But what do you need for installing a L^AT_EX system on Windows? What do I do with T_EX Live, why do I need Ghostscript, what's TeX-maker, and why many people favor Emacs, and above all, how does everything fit together?

This tutorial shall save the search and show step by step what you need and how to setup the individual components.

I am always happy about suggestions and notes on possible errors. When reporting by mail, please always include the file date: July 2, 2018

Many thanks to a number of readers for suggestions and corrections.

The correct addresses for this document are:

- <http://www.latexbuch.de/files/latexsystem-en.pdf> for the PDF version and
- <http://www.latexbuch.de/install-latex-windows/> for the HTML-page.

The German version is available via <http://www.latexbuch.de/latex-windows-installieren/>

The old version with the installation of MiKTeX is available at <http://www.latexbuch.de/install-miktex-windows-7/>.

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1 Everyone can set up L^AT_EX

L^AT_EX is not just a program but a language and a methodology of describing documents and gets used via a L^AT_EX system. With that not only scientific papers can be prepared, but also excellent letters, presentation and much more.

For all that have not worked with free software so far it may be strange in the beginning to have to integrate different components to a system on their own, and some will not easily have the heart to do so. For this I present my own environment that I use to generate from L^AT_EX PostScript and PDF as well as HTML.

This is *not* a introduction to L^AT_EX, there are some excellent documents available in the net as well as my German book[15]. For beginners the best will be the “Not so short introduction to L^AT_EX 2_ε”, delivered with approximately every L^AT_EX distribution in `<texmf>/doc/guides/lshort/`, or to be downloaded from CTAN.org¹. Essential also is the UK T_EX FAQ, to be obtained from the UK TeX Archive[2]. Then we should mention *l2tabu*, which lists obsolete commands and packages and their alternatives.

If you have severe problems with installation although using this tutorial, or have another question related to L^AT_EX, should *not* write to me personally but search in the Internet and the FAQ. In case of continuous confusion you can post in the newsgroup Most questions can be answered there, and also concerning Windows installation this is preferable, because answers are for everyone’s benefits and numerous competent users and developers read along.

This guide was tested under Windows 10, but should work as well with Windows 7, 8 and XP. It is *not* a substitute for the original documentations of the particular programs and building blocks². In case of errors or warnings, consult the documentation of the particular program. This tutorial exclusively cares for

¹CTAN is the abbreviation for *Comprehensive TeX Archive Network*, the complete collection of T_EX related software.

²See my post in `de.comp.text.tex` (in German)

2 What do you need at all?

the mentioned programs. More recent versions of programs usually work well (no guarantee).

2 What do you need at all?

In order to be able to work efficiently, besides the main $\text{T}_\text{E}\text{X}$ distribution more components are needed.

\LaTeX Distribution: $\text{T}_\text{E}\text{X}$ Live The \LaTeX distribution is the core of the system. It contains the most important programs needed for generation of PDF and PostScript, and all additional packages for e. g. standard layouts for different organizations, layout specialties, fonts, and many more.

The distribution is only responsible to transform an input to an output. The input itself is created with the editor of your choice. I use $\text{T}_\text{E}\text{X}$ Live. In my opinion this distribution is easy to install, works quite good and is updated regularly.

Editor: TeXworks For keeping the beginning with \LaTeX as simple as possible, I recommend TeXworks or Texmaker as Editor, differing from my personal setup.

I will skip instructions for the also popular TeXlipse, the Eclipse plugin. Everyone using Eclipse will manage to get that additional package.

For pure mouse oriented users TeXworks is quite comfortable. TeXworks is well updated and convenient to use, because besides graphical menus for most mathematical symbols and all relevant commands it shows so called tool tips during typing of commands. Especially for a newbie in \LaTeX TeXworks is recommendable. Later you can switch to Emacs.

Nevertheless it has to be stressed that TeXworks misses some features that I like in Emacs, e. g. a numerated table of contents view or a powerful handling of labels and cites. The integrated spell-checker does not yet show the quality as Aspell does for Emacs.

Editor: Emacs + RefTeX + AUCTeX + Aspell Please do skip Emacs installation if you are new to \LaTeX .

If you already have worked with \LaTeX under Unix, you might have used Emacs, one of the most powerful GNU programs.

I decided to switch to Emacs due to the add-ons AUCTeX and RefTeX. AUCTeX offers keyboard shortcuts for all important \LaTeX constructs, speeding up work significantly. AUCTeX additionally shows in-editor preview of graphics, tables and formulas. This merges the best from both worlds WYSIWYG and offline editing[9]. On insertion of cross references, RefTeX lets the user select one out of a list of all existing labels, and does help with generation of these labels. Also insertion of bibliographic cites is efficient and fast with RefTeX.

Read the introductions or tutorials for Emacs and AUCTeX and get the *Emacs reference card*. The initial learning effort pays out, it is overcompensated by fast and efficient working.

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Moreover you have a spell checker called Aspell in Emacs. It contains dictionaries for English, German and many others.

Graphics in PostScript with Ghostscript In the Unix world, PostScript is *the* exchange format for vector graphics. Following this paradigm, it is best to include graphics as (Encapsulated) PostScript (PS/EPS) in \LaTeX .

From all Windows applications with their file formats, e.g. existing Word- or PowerPoint drawings, Bitmaps or vector files like Visio, PostScript can be generated even if the application does not support this directly. A PostScript printer driver, redirected to file output, makes this possible. For viewing existing PostScript files and to make small changes you need Ghostscript with its graphical front-end GSview.

HTML translation: TeX4ht TeX4ht has the advantage that it is contained as package in the \TeX Live distribution. For usage see documentation in `<texmf>/doc/generic/tex4ht`. TeX4ht, requires the program ImageMagick for graphics conversion.

Summary and licensing The included package sizes mean the download sizes, not the space needed for installation.

Program	Size MB
<i>TeX Live</i>	3000 MB
<i>Ghostscript for Windows (64-bit Download)</i>	10 MB
<i>GSview</i>	3 MB
<i>Texmaker</i>	6 MB
<i>GNU Emacs for Windows (Download)</i>	45 MB
auctex-w32	2 MB
<i>GNU Aspell (Win32 version)</i>	8 MB
<i>LibPNG</i>	1 MB
<i>Emacs Config File</i>	
<i>Emacs \TeX Registry File</i>	
<i>TeX4ht</i>	1,5 MB
<i>ImageMagick Windows Binaries</i>	10 MB
Σ	ca. $2 \cdot 10^3$ MB

All of the programs mentioned in this tutorial are at least free of charge, in most cases even free software³. All licenses state that the distribution is allowed. Most of them allow furthermore to change the source code, whereas some of them prohibit commercial sale.

³Which as is generally known is a difference to *free of charge*: "Free as free speech, not free beer." See the pages of the *Free Software Foundation* at <http://www.fsf.org>.

3 Installation and Configuration

You are invited to reward the individual projects financially. Each projects' web page tells you how.

3 Installation and Configuration

My system runs on Windows 10. Some access paths to certain configurations may deviate on your system from the described. Access paths denominate entries in the start menu, buttons and menu entries with their particular captions.

The step sequence is to be followed tightly due to program dependencies. If you use another directory for a program, please to take care about this in subsequent steps.

3.1 Download and install T_EX Live

Start by downloading the T_EX Live installer from <http://www.tug.org/texlive/> for Windows. If you only have a thin internet connection, use the same page to order the T_EX Collection DVD.

Unpack the Zip file and from the created folder call the program `install-tl.bat`. Accept all defaults and leave your computer alone for the next couple of hours – depending on your internet connection.

After finishing the installation, all programs can then be started directly from command line.

3.1.1 Install Additional Fonts

The T_EX Live installer contains only fonts whose license allow distribution on DVD. So some are missing where this is not allowed, but which may be used free of cost. Now we install these.

Therefore we download the script `getnonfreefonts` from tug.org/fonts/getnonfreefonts/install-getnonfreefonts. Open a command line and change to your download folder. Enter the following two commands:

```
texlua install-getnonfreefonts
getnonfreefonts --sys --all
```

This first installs `getnonfreefonts`, then downloads and installs all available free fonts for all local T_EX users. If you do not have administrator privileges on your computer, substitute the second line with this one:

```
getnonfreefonts --user --all
```

3.2 Graphics Preparation and Conversion

Configure the PostScript printer driver by Start | Devices and Printers | Add Printer. First you select *local printer* and as adapter the FILE port, the right printer driver is the *MS Publisher Color Printer* (from Windows 7 on, "Generic"

3 Installation and Configuration

in the vendor list), resp. *Apple Color LaserWriter 12/600* (up to Windows Vista). The printer name is best set to “PostScript File”.

After installation do the following settings under Start | Devices and Printers | PostScript File | Printer | Printing Preferences | Advanced | Document Options | PostScript Options: Set *PostScript-Output* to “Optimize Portability” and *True-Type Download* to “Contour”. The *ICM Color Matching* should be deactivated for avoidance of color adulterations.

From now on every Windows application can produce PostScript files by using the new printer. The generated file—which should be given the file extension `.ps` instead of the default `.prn`—can be viewed in GSview and converted to EPS. It exceedingly useful to add Ghostscript to the search path. So again, in Start | Control Panel | System and Security | System | Advanced | Environment Variables add to the variable *PATH* the respective folder `C:\texlive\2013\tlpkg\tlgs\bin\`, separated by a semicolon. Attention: No spaces before or after entries of the *PATH* variable!

In order to simplify work in the long run I recommend to setup an “EPS Printer”, for this I have a short tutorial, too: [14]. Only in German, sorry, but Google Translate will do a fair job.

3.3 Configure Emacs

One defect of Windows has to be fixed first: the absence of the environment variable `HOME`. Environment variables allow to set paths or generally strings independent of particular applications, and use them with all applications. For this create a new entry in Start | Settings | Control Panel | System | Advanced | Environment Variables⁴, named `HOME` and assign some path in which you like to have saved all individual settings. The directory name should *not contain spaces*. Then create exactly that folder.

For all environment variables it is to be reckoned that if you want to set an environment variable just for the current user, you create it in *User Variables*. If they should apply to *all* users, create them in *System Variables*.

You need *GNU Emacs for Windows (Download)*, and **auctex-w32** as package. Unpack the Emacs archive `emacs-2x.x-bin-i386.zip` into the programs directory, resulting in a directory like e.g. `C:\Programme\emacs`.

For easier starting Emacs, in directory `C:\Programme\emacs\bin` run the installer `addpm.exe` and accept the settings. This creates a shortcut in the Windows start menu.

You install AUCT_EX from within Emacs. So start Emacs using the recently created start menu entry. With the integrated Emacs package manager we get what we want:

Press `Alt-X`, then type `list-packages` and confirm with Return. Choose the package `auctex` with key `i` and press `x` to start the installation.

⁴To be accessed much faster by keyboard shortcut Windows key+Break, by the way.

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With this, Emacs is ready to run. To have easier access to the following configurations, you may download my Emacs configuration file. Rename this file to `.emacs` and move it to your HOME directory.

Listing 1: Contents of the file `.emacs`

```
(server-start)
(add-hook 'LaTeX-mode-hook 'turn-on-reftex)
(setq reftex-plug-into-AUCTeX t)
(setq-default ispell-program-name "aspell")
```

AUCTeX + RefTeX If you do not want to use my `.emacs` configuration file, you need to implement the following three paragraphs.

The integration of AUCTeX with RefTeX has to be activated separately. For this, start Emacs and use it to create the configuration file `.emacs` within your HOME directory (UNIX shortcut name `~`) with `C-x C-f ~/.emacs RET` (The shortcut `C-x` stands for the keyboard combination `Ctrl-x`, other keys equivalent. So translates to: `Ctrl-x`, `Ctrl-f`, type `"~/.emacs"`, press `Enter`. The `"~/` means the file to be located within your HOME directory.). Here you add the following lines:

```
(add-hook 'LaTeX-mode-hook 'turn-on-reftex)
(setq reftex-plug-into-AUCTeX t)
```

Ensure that you use the straight apostrophe in the expression, not some accent or typographic single quote.

Then save the file by `C-x C-s`, close Emacs with `C-x C-c`, and the setup is completed. The installation was successful, if when opening a `.tex` file in the menu bar new entries "Preview", "LaTeX" and "Ref" appear.

If you want faster and smaller preview images, you have to get the additional graphics library LibPNG from *LibPNG*. From the Website, download "libpng" and "zlib". From the Binary archive extract the two DLLs `libpng14-14.dll` and copy them to your directory `C:\Programme(x86)\emacs\bin`. Do the same with the dependencies archive's content `bin\zlib1.dll`, and place it in the `bin` directory of Emacs as well.

In PDF-Mode with (`C-c C-t C-p`) you now can call `Preview-LATEX` with `C-c C-p C-d`.

Aspell Aspell servers as spell checker. After downloading the program ("Full Installer") and the dictionary ("`aspell-en-0.50-2-3.exe`") from *GNU Aspell (Win32 version)*, first run the program installer, accepting all defaults, then your dictionary installer.

So once again, in `Start | Settings | Control Panel | System | Advanced | Environment Variables` add to the variable `PATH` the respective directory, e.g. `C:\ProgramFiles(x86)\Aspell\bin\`; separated by a colon.

3 Installation and Configuration

Finally you let Emacs know to use Aspell for spell checking in future by adding the following line to your `.emacs` configuration file:

```
(setq-default ispell-program-name "aspell")
```

3.4 File Types Setup

Only as a further simplification you create a new file type. First, add to your configuration file `.emacs` as first line:

```
(server-start)
```

Then download my Emacs-T_EX registry file and edit it—so do not simply double click but right click and select edit. In line 6, containing the first `@=`, replace both occurrences of the directory name `C:\Programme(x86)\emacs` with the name of the directory you installed Emacs in. Take care that you really use two backslashes `\\` path separators. Save the file and use the double click to add it to the registry. Confirm that you want it when Windows asks for.

Listing 2: Contents of the file `texfile.reg`

```
Windows Registry Editor Version 5.00
[HKEY_CURRENT_USER\Software\Classes\texfile]
[HKEY_CURRENT_USER\Software\Classes\texfile\Shell]
[HKEY_CURRENT_USER\Software\Classes\texfile\Shell\Open]
[HKEY_CURRENT_USER\Software\Classes\texfile\Shell\Open\Command]
@="C:\Program Files (x86)\emacs-26.1\bin\emacsclientw.exe -n -a \"C:\Program Files (x86)\emacs-26.1\bin\runemacs.exe\" %1 %*"
[HKEY_CURRENT_USER\Software\Classes\.tex]
@="texfile"
[HKEY_CURRENT_USER\Software\Classes\.bib]
@="texfile"
[HKEY_CURRENT_USER\Software\Classes\.lco]
@="texfile"
[HKEY_CURRENT_USER\Software\Classes\.sty]
@="texfile"
[HKEY_CURRENT_USER\Software\Classes\.cls]
@="texfile"
```

You can do the same for further file name extensions like `.bib`, `.sty`, `.cls` and `.lco`. From then on double clicking a `.tex` file leads to execution of Emacs. Now Emacs is completely configured.

Now you have full system for generation of printer and camera ready documents in PDF or PostScript. If you do not want to generate HTML, you are done at this point.

3.5 Remedy if you have Admin Rights

Now start Emacs via the start menu. If your Windows user account has admin rights, you may get an error message about a rights problem of folder `.emacs.d/server/`.

```
error: The directory `~/.emacs.d/server' is unsafe
```

Fix it by changing the owner: Close Emacs. Click on Start and enter `cmd` into the search field. This opens a command window. Change into the Emacs"=folder below HOME by typing

```
cd %HOME%\ .emacs.d
```

There you enter the following command:

```
takeown /f server
```

You only need to execute the command if you have administrative rights, and only then you are able to execute it.

3.6 Install ImageMagick

TeX4ht is included in TeX Live and, if you selected the total installation, already on your hard disk for usage.

The precondition for TeX4ht on the one hand is Ghostscript that you installed in a previous section, and on the other hand ImageMagick, which gets configured as follows: Get the *ImageMagick Windows Binaries* from the ImageMagick web site and install it. Simply acknowledge the defaults, which automatically adds the converter program to your search path.

If you want to employ the LibreOffice export of TeX4ht, a Zip packer has to be available in the system. I apply *Info-Zip* for this, but only copy the file `zip.exe` to a directory already covered by the search path. After first use of `oolatex.bat`, if you discover that the generated file is corrupt, you can remedy by editing the file `c:\texlive\2013\texmf-dist\tex4ht\base\win32\tex4ht.env` and replace the tags `<oo-alt>` and `</oo-alt>` by `<oo>` bzw. `</oo>` and vice versa, for activating an alternative processing.

4 And now? Begin typing...

Congratulation! TeX4ht is now installed and the TeX system can generate all important outputs.

What about exporting to Word? In principle there is no reason to export \LaTeX to Word, but there are programs that convert \LaTeX to the Rich Text Format (`.rtf`), which you can open in Word then. I sense the best way is via HTML or LibreOffice. This means: convert \LaTeX with TeX4ht to HTML or LibreOffice, and then open the output in Word resp. LibreOffice.

The generation of outputs is normally directed by the editor programs, there are buttons and/or keyboard shortcuts for this. For the usage of the Emacs

4 And now? Begin typing...

add-ons I refer to their documentation. The access may be bitter, it is really worthwhile.

TeX4ht usage TeX4ht is a flexible tool for converting \LaTeX to HTML, but with the loads of options one easily loses overview at the beginning. With a little practice, nevertheless, you can accomplish everything you imagine.

The TeX4ht documentation delivered is not so luxuriant. A comprehensive list of options, written to the log file, you get by calling

```
htlatex.bat myfile.tex "info"
```

at the command line for an arbitrary \LaTeX file. Be sure to call `htlatex.bat`, not just `htlatex`, as this starts a \TeX Live program instead.

Because I want XHTML as clear and as small files as possible, I tend to invoke by

```
htlatex.bat myfile.tex "xhtml,2,fn-in,NoFonts,fonts,graphics-,sections  
+,next"
```

for the conversion. This generates XHTML, separate files for two levels of sections, no special font information but basic logical formatting, non-scaled graphics and helpful hyperlinks. If you like to have a more precise reproduction of the fonts, skip the option `NoFonts`, which of course leads to bigger files. For a monolithic file specify a 0 instead of 2.

Graphics conversion For drawing, use vector oriented programs, like e.g. CorelDraw, LibreOffice Draw, Visio or related. Generally it is strongly advisable to create diagrams or graphics as bitmaps, with Photoshop, GIMP or similar programs. Applications like Excel or PowerPoint also process their graphics vector oriented, and are able to generate nice PostScript files via our PostScript printer driver. These PostScript files then get converted to EPS [14]. MATLAB directly can produce PS/EPS.

The generated file with the extension `.eps` can be loaded into GSview in order to e.g. control whether the bounding box has to be corrected. The bounding box can be showed by selecting the menu entry `Options | Show Bounding Box`.

In case the bounding box does not fit, the command `File | PS to EPS` allows to set the bounding box automatically or manually and save the output to a new file. *Automatic* can be selected if the whole graphic should be used. *Manual* selection of the bounding box is useful if unwanted head or foot lines should be cropped.

Attention: For generating PostScript or DVI graphic files have to be present in (Encapsulated) PostScript (EPS), whereas with pdf \LaTeX only graphics in PDF, JPEG oder PNG can be processed. It is well possible to convince the one and the other to accept all file types, but has to use special options which may make the source document unportable to other systems. If both DVI and PDF should be generated, the graphics have to exist in two formats.

5 If something fails

If you want to use pdf \LaTeX to create Portable Document Format from your documents, you have to convert the EPS files to PDF. For this there is the command `epstopdf`, like the following:

```
epstopdf file1.eps
```

Bitmap files like JPEG or PNG can be processed directly by pdf \LaTeX . For usage with the normal \LaTeX they have to be converted to EPS using `bmeps`.

5 If something fails

If anything does not work or behaves apparently wrong, often the reason is a forgotten environment variable. So you first should check whether all environment variables suggested by this tutorial are set appropriately. If one misses or has a wrong value, it is possible that a succeeding installation failed, especially that of Preview- \LaTeX . So do it again. Another popular source of defect are files in wrong places. Go through the tutorial again and check and correct if necessary.

If needed, risk a look to the installation manual of the particular package to find more hints. Of course it cannot be ruled out that my tutorial contains an error. If you find everything in the right place and still not working, ask me and include the version number of the tutorial. Maybe I made some assumption that is not general, or a new version of a package works different.

6 Prospect

With all the possibilities offered by the numerous \LaTeX packages always bear in mind: Choose simple layouts and structure, especially if you plan to publish also in HTML. With help of this article nevertheless it should be possible for a reasonably Windows-experienced user to begin relatively quick with editing and typesetting texts.

If this document helps appeasing the timidity of installing and using such a system and by that lowers the inhibition threshold of the access to \LaTeX , it has fulfilled its purpose.

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