

Introduction to Scientific Typesetting

Lesson 7: Graphics and Floats

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Vector Graphics drawn using geometrical objects, like lines, polygons, circles; image information stored mathematically; easy to scale and rotate without loss of quality; generally device-independent

Bitmaps without lossy compression image information stored as pixels; scaling and rotating leads to slight loss in quality; printing to the wrong device can give problems

Bitmaps with lossy compression some detail is lost in compression, but usually the human eye cannot detect it; works well for gradual color changes, like in pictures; not good for graphics with sharp borders; most common is JPEG

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For **drawings**, use vector graphics. You get maximum freedom for image manipulation once you include into your document. Use EPS usually.

If you must use **bitmaps**, use PNG.

For **photographs**, JPEG is usually best.

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As usual, we will produce `.pdf` files. There are two options.

1. Profile LaTeX \Rightarrow PDF
2. Profile LaTeX \Rightarrow PS \Rightarrow PDF

How do you choose?

Graphics format	Profile
EPS	LaTeX \Rightarrow PS \Rightarrow PDF
PDF	LaTeX \Rightarrow PDF
PNG	LaTeX \Rightarrow PDF
JPEG/JPG	LaTeX \Rightarrow PDF

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If you're typing a document which will require the inclusion of multiple types of image files, you might need to convert some of them.

There are some free downloads online to accomplish this. (GraphicsMagick is one that looks nice.)

There are also web sites that will do it for you.

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You'll need `\usepackage{graphicx}` in your preamble.

The basic command is

```
\includegraphics [options] {file}
```

Open the first example file (`.tex`).

Make sure that `wjlogo.jpg` (also posted) is in the same folder.

Use the Build Profile `LaTeX => PDF`. View the output.

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scaling With the option `scale=0.5`, your picture will be scaled down to half its normal size. With the option `scale=1.25`, it will appear as 125% of its normal size.

rotation With the option `angle=45`, your picture will appear rotated counter-clockwise by 45 degrees. With the option `angle=-30`, your picture will appear rotated clockwise by 30 degrees.

height and width With the option `height=1in`, your picture will be scaled proportionally so that it has a height of 1-inch. With the option `width=2in`, your picture will have a width of 2-inches. If you use both, your proportions might get messed up. To prevent this, use the `keepaspectratio` option. \LaTeX will scale proportionally so that the the dimensions you specify are maximum.

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Open the second example file (`.tex`). Make sure that `233box.eps` (also posted) is in the same folder.

Build it with `LaTeX` \Rightarrow `PS` \Rightarrow `PDF`. Look at the source and the output to see what's going on.

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Let's practice!

Open the third example file (`.pdf`) and reproduce it.

You'll need `obama.jpg` as well.

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The `wrapfig` package provides a way to wrap text around a picture/figure. You'll need to use the `wrapfigure` environment where you want the top of the figure to be—even if it is in the middle of the paragraph.

Here's the syntax of the command:

```
\begin{wrapfigure} [lineheight] {alignment}{width}  
  figure here  
\end{wrapfigure}
```

Open the fourth example file (`.tex`), and make sure that `obama.jpg` is in the same folder.

Build and view.

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Tables and figures cannot be broken across pages. For this reason, they are called *floats* in \LaTeX . This is because sometimes \LaTeX “floats” them to the top or bottom of the current page (or even the next one) when it is calculating the best spot for them.

Tables go inside the `table` environment.

Figures go inside the `figure` environment.

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The setup:

```
\begin{table}
  \begin{center}
    \begin{tabular}{...}
      ...
    \end{tabular}
    \caption{text} \label{Ta:name}
  \end{center}
\end{table}
```

The `\caption` command is optional, as is the `\label` command. However, if you have both of them, `\label` must come between `\caption` and `\end{table}`.

Centering the table isn't mandatory, but it does make things look nicer, I think.

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The `figure` environment is virtually identical to the `table` environment.

```
\begin{figure}
  \begin{center}
    \includegraphics{...}
    \caption{text} \label{Fi:name}
  \end{center}
\end{figure}
```

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The `table` and `figure` environments have an optional argument which can influence where \LaTeX places the table or figure. The optional argument consists of one to four of the following letters:

- `b`, the bottom of the page
- `h`, here (where the environment is typed)
- `t`, the top of the page
- `p`, a separate page.

So `\begin{table} [hb]` requests that the table be placed here or at the bottom of the page. The order of the letters doesn't matter; if `h` is present, it takes precedence. The default is `[tbp]`.

Open the fifth example file (`.tex`), and make sure that `class-logo.jpg` is in the same folder.

Build (twice) and view.

Both the table and the figure should float to the top of the page.

Now type `[h]` after `\begin{table}` and after `\begin{figure}` and re-build.

Don't you like this version better?