LaTeX for Logicians

Using **`beamer.cls`**, Mostly for Transparencies

An Intentionally Incomplete Guide

Contents

Guide version 0.6 August 2004: corrections/suggestions to `ps218@cam.ac.uk`

LaTeX for Logicians is at `http://www.phil.cam.ac.uk/teaching_staff/Smith/LaTeX/`

1 Introduction

Till Tantau's document class `beamer.cls` offers macros for producing presentations. The package is powerful and enables you to do complex things – the document `beameruserguide.pdf` gives 127 pages of detailed instructions covering scores of commands. This guide cheerfully ignores nearly all the power and complexity, and so can be *very* much shorter.

`beamer.cls` is primarily designed for *slides* to be shown using a projector linked to your laptop; and so the class macros are designed to make use of colour, animation effects, and so on. But I'm going to concentrate here on using the macros for making black-and-white *transparencies* to be printed out and shown using a steam-age overhead projector. I think I'm in good company in being sceptical about the benefits of using all-singing, all-dancing slide presentations: and I know I'm not the only one to have been seduced into playing with PowerPoint, or the even prettier Keynote, only to have reverted to using good old-fashioned transparencies. So this guide is mainly for those who want to do the old-fashioned thing, very simply and elegantly, using LaTeX.

2 Keeping it simple

By all means skip this section. But before starting the real guide, here are some prejudiced reasons *against* bothering with fancy presentations, and *for* making your transparencies using `beamer.cls`.

So first, five reasons against using lap-top driven presentations with all the bells and whistles.

1. You'll waste time. Far too much time. You'll start fiddling around choosing colours and backgrounds and shadings and fonts and setting up animations and stuff. And that *always* takes much longer than you ever intended. Life is too short.

2. You have to walk/cycle across town/campus toting your lap-top and maybe the department's portable projector too. One lecture you'll forget the vital adaptor, or forget the power cable when your battery is low, or ...

3. Even when all you need is to hand, you too often have a scrambled ninety seconds at the beginning of the lecture to try to get the projector up and running and talking to the lap-top. (Of course, the previous occupant of the lecture-theatre has managed to over-run his time again.)

4. Sometime during the lecture course, the inevitable will happen and the lap-top temporarily dies on you.

5. And despite your best efforts, even when all goes wonderfully smoothly, your students and colleagues still won't be that impressed and will probably think you are trying too hard. (The philosopher Stephanie Lewis, in a stage whisper during a conference talk: 'Power corrupts: PowerPoint corrupts absolutely.')

So don't bother. Use transparencies. But why use `beamer.cls` to produce them? Five reasons:

1. Well, you don't want to use Word, do you? You want to use LaTeX because you *really* like its fundamental concept that you should keep the business of specifying the logical structure and content of your documents sharply distinct from the business of specifying layout.

2. You may well want to be using some logical or mathematical formulae, and we all know you can't beat LaTeX for that.

3. You are using LaTeX in a modern installation on a personal computer so are pretty likely to be using pdfTeX – e.g. via TeXShop – to produce PDF output, and `beamer.cls` works with pdfTeX (unlike e.g. `prosper.cls`).

4. `beamer.cls` is state-of-the-art, in excellent shape but still under development, with a lot of features and good support from the author. It is destined to become the 'best-in-class'.

5. You want to future-proof your work. Despite my words of wisdom, next year or the year after you and I are going to be seduced into using a 'beamer' in a slide-presentation – maybe they install fixed computer systems into the lecture theatres so we can just take along a CD with our PDF presentations. It will be easy to convert files written for black-and-white transparencies into something fancier using colorized 'themes' or style-files. (This future-proofing is guaranteed because `beamer.cls` doesn't allow you to produce 'portrait' mode transparencies that aren't slide-shaped.)

3 Installing `beamer.cls`

Go to `sourceforge.net/projects/latex-beamer` and download each of the zipped folders

```
latex-beamer
pgf
xcolor
```

Install these folders into your place for adding LaTeX packages. For example, if you are using Mac OSX, go to your home directory, and install them into folders named `beamer` etc. in the directory

```
Library/texmf/tex/latex
```

Then go to the LaTeX for Logicians site and (from the LaTeX in Classroom section) download the simple black-and-white theme file

```
logictheme.sty
```

and put this into your newly created folder

```
Library/texmf/tex/latex/beamer/themes
```

Do whatever else is necessary, depending on your installation, to get LaTeX for recognize the presence of new files; and you are done.

4 Frames: the core concept

A presentation file is written by putting together

1. an initial invocation of the `beamer` class, followed by

2. a preamble (selecting the 'theme' to use, and fixing e.g. the overall title of the presentation, etc.), followed by

3. the body of the presentation which essentially defines the content of the transparencies using *frames* interspersed with some (optional) structuring commands to divide the presentation into sections.

The new concept to explain here is that of a *frame*. A frame *can* generate one or more slides or transparencies (e.g. by successively disclosing more bullet points). But in fact we'll begin with simple usages, where a frame correlates to a single transparency.

A single transparency typically has a *header* and *footer* whose content is automatically generated. For example, if you use the `logictheme.sty` style file, the header will contain the current section title (this header is printed large enough for your audience to read); and the footer will contain the author name, title of the whole presentation, and the transparency number (this is printed much smaller, as the info is mainly for your benefit). Other 'themes' or style files arrange things differently.

Now the crucial thing: *the content between the header and the footer – the frame content, as we'll call it – is generated by the command*

`\frame{`*framecontent*`}`

where *framecontent* is, of course, more or less whatever text or other content you choose. Just four points for the moment about frame contents:

1. You won't want to put large slabs of unbroken text into frames. So `beamer` slightly redefines the familiar LaTeX list environments such as `itemize` and `enumerate` to make them suitable use inside frames.

2. `beamer` also defines/re-defines several environments for displaying material in a suitable form: these are `theorem`, `corollary`, `definition`, `definitions`, `fact`, `example`, and `examples`.

3. There are in addition a number of special commands for putting content into frames: the most important of these is

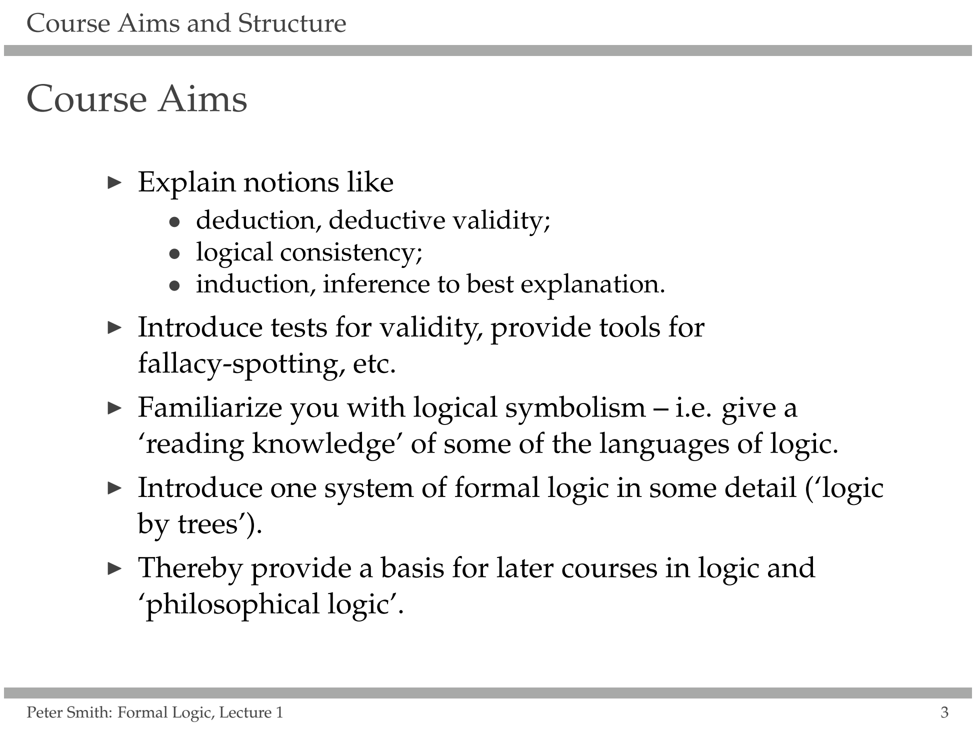
   `\frametitle{`*frametitle*`}`

   which inserts *frametitle* at the top of the frame content.

4. There is a special issue about using `\verb` or `\verbatim` contexts in frames: see Section 8.1.

Here then is a real-life example illustrating these commands: within a `beamer` document with the `logictheme` style file in play (and with e.g. the author name defined in the preamble), the sequence of commands

```
\frame
{
\frametitle{Course Aims}
\begin{itemize}
\item  Explain notions like
        \begin{itemize}
        \item deduction, deductive validity;
        \item logical consistency;
        \item induction, inference to best explanation.
        \end{itemize}
\item  Introduce tests for validity, provide tools for
       fallacy-spotting, etc.
\item  Familiarize you with logical symbolism -- i.e. give a
       ‘reading knowledge’ of some of the languages of logic.
```


Course Aims and Structure

Course Aims

- Explain notions like
  - deduction, deductive validity;
  - logical consistency;
  - induction, inference to best explanation.
- Introduce tests for validity, provide tools for fallacy-spotting, etc.
- Familiarize you with logical symbolism – i.e. give a 'reading knowledge' of some of the languages of logic.
- Introduce one system of formal logic in some detail ('logic by trees').
- Thereby provide a basis for later courses in logic and 'philosophical logic'.

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Figure 1: A transparency using `logictheme.sty`

```
\item  ...
\item  ...
\end{itemize}
}
```

produces the single transparency in Figure 1.

It really is as simple as that!

5 Invoking the `beamer` class

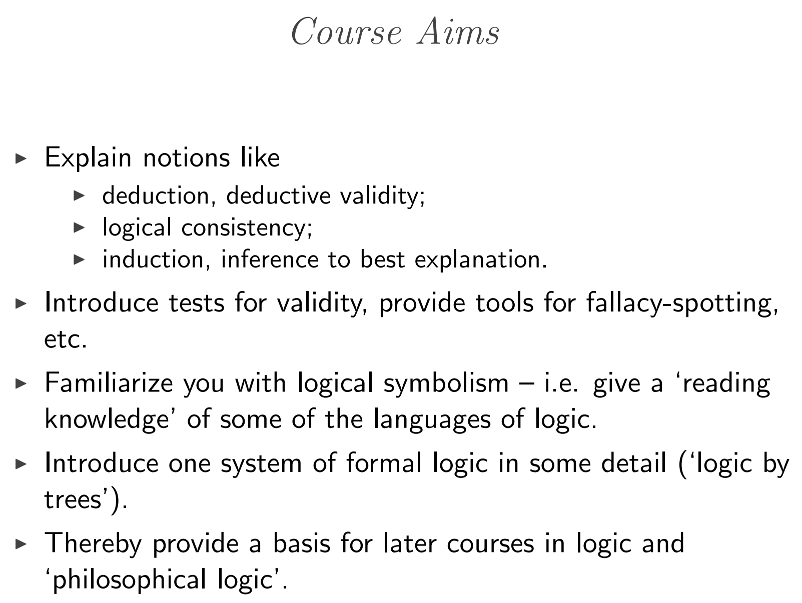
To invoke the class to make transparencies in black and white, we need to set the colour-option to gray-scale. So use

`\documentclass[gray,` *some_more_options*`]{beamer}`

(If you omit `gray`, then you'll get a modestly colourized presentation if you use `logictheme`.) The main options are:

Font type: by default, presentations use sans serif font. If you want to use some serif font, then specify the option `serif`.

Font size: by default, presentations use 11pt font as the base font size. If you want to set the type somewhat smaller or larger, then you can use the options `10pt` and `12pt`.



Course Aims

- Explain notions like
  - deduction, deductive validity;
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- Introduce tests for validity, provide tools for fallacy-spotting, etc.
- Familiarize you with logical symbolism – i.e. give a 'reading knowledge' of some of the languages of logic.
- Introduce one system of formal logic in some detail ('logic by trees').
- Thereby provide a basis for later courses in logic and 'philosophical logic'.

Figure 2: A transparency using `beamerthemeplain.sty`

Two comments:

1. In my view, neither the Computer Modern serif font nor Times is very suitable for transparencies. Of the serif fonts standardly available in LaTeX, Palatino – used in the example in Figure 1 – works much better; that will, of course, need to be specified in the preamble in the usual way.

2. You may be initially surprised by the small size of the fonts being used. But in fact the notional size of a slide is set to be 12.8cm by 9.6cm; and *you print out transparencies at double size* (in landscape mode, of course). So in fact our three standard font-size options correspond to 20pt, 22pt, and 24pt type on the transparency itself, which about covers the range of optimal sizes if you want highly legible presentations.

6 The preamble to a presentation

In the preamble to a `beamer` presentation you need to do three things:

1. Select a theme.

2. Define the *author*, *title*, etc.

3. Invoke other package files you need (e.g. to select fonts).

1. *Selecting a theme* `beamer` themes are standard `.sty` package files. So you simply apply a theme by issuing the command

```
\usepackage{theme_name}
```

Themes can be found in the folder `beamer/themes` inside your folder for downloaded LaTeX packages. However, the exceptions of `beamerthemeplain.sty` (see Figure 2) and `beamerthemeboxes.sty`, the themes that come with the standard distribution are not really very suitable for black-and-white transparencies. You might well therefore want to use my `logictheme.sty` style file instead.

If you do use (or adapt) one of the standard themes, you'll want to also give the command

```
\beamertemplatenavigationsymbolsempty
```

to remove the small navigation icons that are appropriate to a PDF slide-show, but are unwanted on transparencies.

2. *Adding definitions* Now add to the preamble the following:

```
\title{title_for_presentation}
\subtitle{subtitle_for_presentation}
\author{author}
\institute{institutional_affiliation}
\date{date}
```

If you are using `logictheme.sty`, the *only* function of `\institute` is to set the over-title on the title page of the presentation as in Figure 3. You can cheerfully omit it, or use it to print some other info.

3. *Invoking further packages* It just remains to add any further packages you need for setting the content of your transparencies. An obvious candidate if you want to use a serif font is

```
\usepackage{mathpazo}
```

And you way well want to invoke e.g. `amssymb` to give you access to the $\mathcal{AMS}$ symbols.

7 The body of a presentation

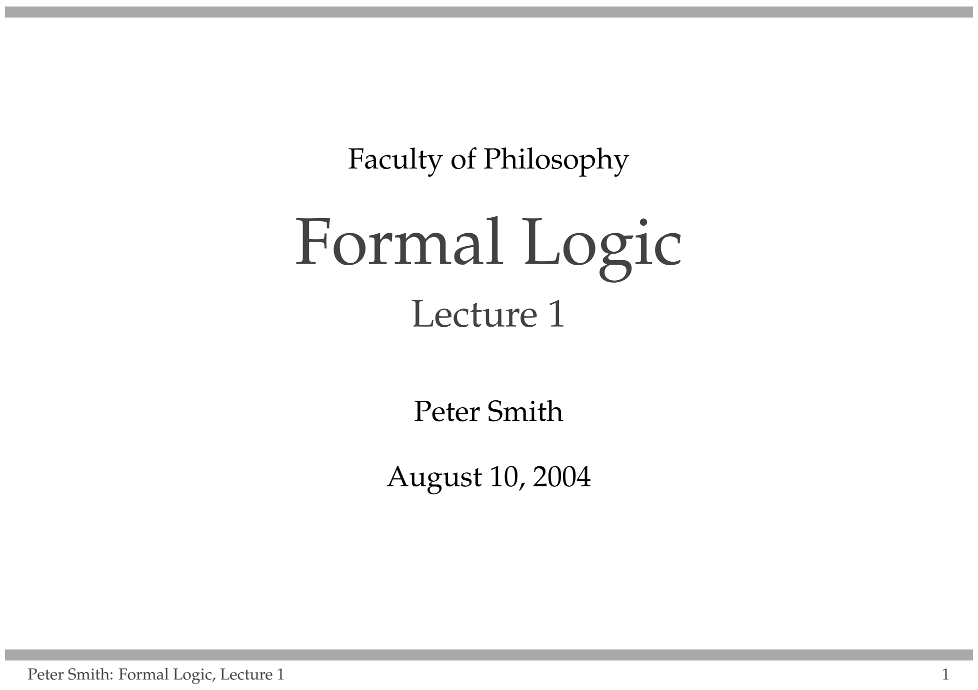
The basic form of the body of a presentation is simply as follows:

```
\begin{document}
\maketitle
\frame{...}
\frame{...}
\frame{...}
...
\frame{...}
\end{document}
```

where `\maketitle` produces a title page.

However, if you have more than a few transparencies, you will probably want to divide your presentation into sections, and every so often show transparencies indicating which section you've reached in the presentation.

You organize this in two stages. First, to mark the beginning of a section, insert between frames the command



Faculty of Philosophy

Formal Logic

Lecture 1

Peter Smith

August 10, 2004

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Figure 3: A title page using `logictheme.sty`

```
\section{section_title}
```

Note, this command does *not* generate a new transparency: but the section title will feature in the header of subsequent transparencies, and will appear in tables of contents. This command also has a starred version `section*` which produces a section-title – e.g. 'Table of contents' – that may appear in the header of a frame, but which won't be listed in tables of contents.

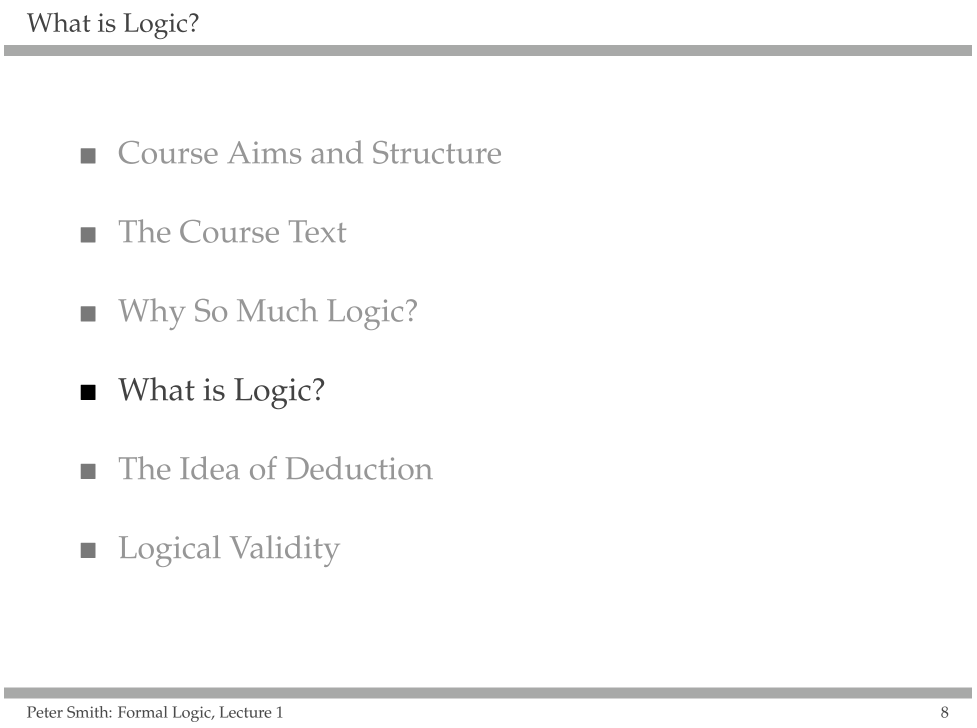
Second, when you want to show the table of contents as a transparency, you use

```
\frame{\tableofcontents[current]}
```

Here, the modifier `[current]` is optional. Without it, you get a frame listing all the sections of the presentation. With the modifier, you still get a frame listing all the sections of the presentation, but with all but the current section-title greyed out, as in Figure 4.

So putting all that together, here's a characteristic structure for a whole presentation, starting with a outline summary of section headings and finishing with a reminder of that summary:

```
\documentclass[grey, more_options]{beamer}
% start preamble
\usepackage{logictheme.sty}
\title{title_for_whole_presentation}
\subtitle{subtitle}
\author{author}
\institute{institutional_affiliation}
```


What is Logic?

- Course Aims and Structure
- The Course Text
- Why So Much Logic?
- What is Logic?
- The Idea of Deduction
- Logical Validity

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Figure 4: A table of contents page, using the `[current]` option

```
\date{date}
\usepackage{some_other_packages}
% end preamble
\begin{document}
     \maketitle
\section*{Outline}
     \frame{\tableofcontents}
\section{title_for_first_section}
     \frame{some_content}
     \frame{some_content}
\section{title_for_next_section}
     \frame{\tableofcontents[current]}
     \frame{some_content}
     \frame{some_content}
\section{title_for_next_section}
     \frame{\tableofcontents[current]}
     \frame{some_content}
     ...
\section*{Outline}
     \frame{\tableofcontents}
\end{document}
```

And that – in nine pages flat! – is basically all you need to know to produce extremely acceptable transparencies using `beamer.sty`.

In the rest of this Guide, I add just a little more useful information: but you can get by perfectly well using no more than you've met already.

8 Extras

It would rather defeat the object of this Guide if I now replicated all the further information that can be found in `beameruserguide.pdf`. What follows is a small selection of additional information that might be particularly useful to those producing transparencies.

8.1 More on frames

1. *Plain frames* Sometimes, while using a theme like `logictheme` which has headers and footers, you'll want to insert a transparency that puts material on a completely plain background (e.g. you want to insert a graphic that occupies more of less a whole transparency, or give a proof that takes all of a slide). Use the option `plain` thus:

```
\frame[plain]{...}
```

2. *Verbatim frames* Sometimes you'll want to insert verbatim material in a frame, using `\verb` or `\verbatim`. You need in this case to declare the option `containsverbatim` thus:

```
\frame[containsverbatim]{...}
```

And this is not compatible with using overlays (to be explained) with this frame. The document `beameruserguide.pdf`, §4.2.4 explains some more complex procedures for use if you *must* insert verbatim material while using overlays.

8.2 Introducing overlays

If you are producing a slide presentation then, yes, you may want bullet points to appear sequentially in successive slides to build up a composite slide. If you are using transparencies then you'll probably used the old-technology equivalent of laying a piece of paper over the transparency and then revealing more of the transparency in stages. That being so, techniques for producing the sequential appearance/disappearance of parts of a slide are not so relevant to the use of transparencies.

However, there are occasions when it could be useful to have some material on one transparency, and more material on another transparency to be placed over the first one. So in this sub-section, I do introduce some of the overlay commands available in `beamer`.

1. *Overlay specifications* The basic idea is that we can numerically qualify various commands used in building frame-contents with *overlay specifications* like `<1>`, `<2>`, `<3>`. *These will have the effect of generating a number of different transparencies from the same frame*, with text in the scope of *command*`<1>{...}` only appearing on the first transparency; text in the scope of *command*`<2>{...}` appears on the second transparency; and so on.

More complex markers are also available: thus text marked `<2->` will appear from transparency 2 onwards in the collection generated by the frame, and text marked `<-2>` will appear up to transparency 2, and text marked `<2-4>` will appear on transparencies 2 to 4.

2. *Overlay modifications* A number of ordinary commands are modifiable using overlay specifications. In particular note the following example.

```
\frame
{
This frame produces three slides/transparencies
\begin{itemize}
     \item<1-> This appears from the first slide.
     \item<2>  This appears only on the second slide.
     \item<2-> This appears from the second slide.
     \item<3>  This appears on the third and last slide from this frame.
\end{itemize}
}
```

As well as items in list environments, commands like `\textbf` can take overlay specifications (so certain text can be marked as bold on some but not all transparencies generated by a frame).

3. *Special commands* There are also a number of special commands used in producing overlay effects. In particular note

```
\onslide<o_spec>
\only<o_spec>{...}
\visible<o_spec>{...}
\invisible<o_spec>{...}
```

To explain: material preceded by `\onslide<`*o_spec*`>` will only appear on the slide(s) specified by *o_spec*; the command stays in force through the frame until followed by another `\onslide<`*o_spec*`>`, or is cancelled by plain `\onslide`.

Material in the context `\only<`*o_spec*`>{...}` only appears in the slide(s) specified by *o_spec*, and otherwise is suppressed (not leaving a space).

Material in the context `\visible<`*o_spec*`>{...}` only appears in the slide(s) specified by *o_spec*, but is invisibly there on other slides. And the other way about, of course, for the command `\invisible`.

8.3 Subsections

We've already explained how to use `\section` to divide up a presentation into sections that can then be listed using in a table of contents.

If you wish, sections can be subdivided, using the command

```
\subsection{subsection_title}
```

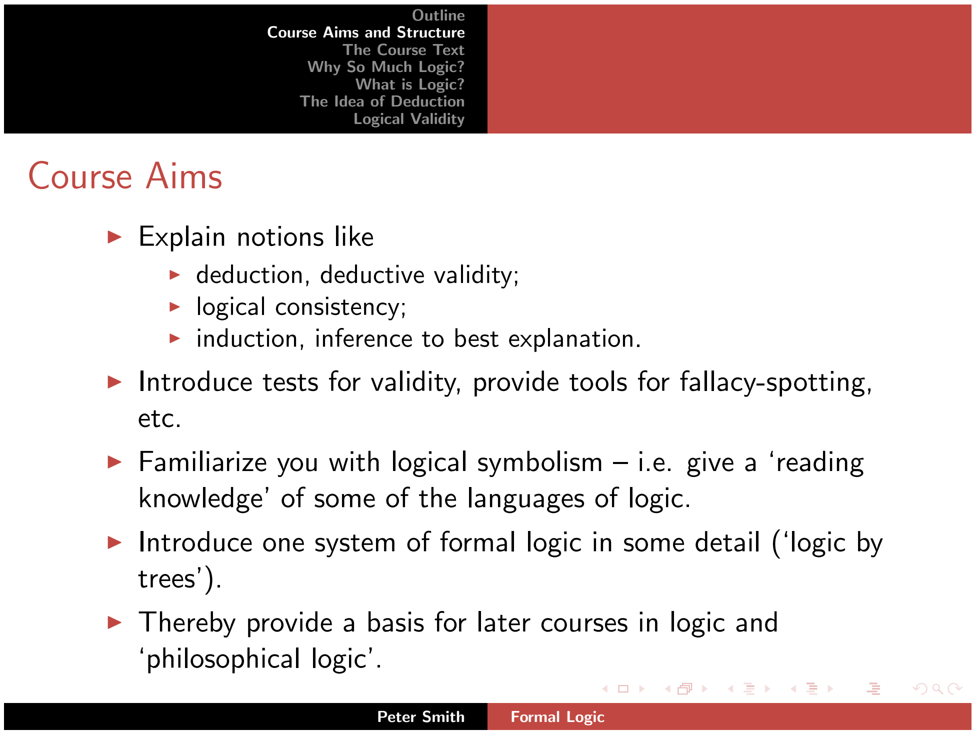
Then you have more options in building a table of contents transparency. For example, you might want a table that shows the section headings for the whole presentation, but the subsection headings only for the current section.

You control this by setting the comma-separated list of options in the command

```
\frame{\tableofcontents[options]}
```

So note the effects of the following options:

1. `current` – all sections except the current one are shown semi-transparently. (Subsections except those in the current section are also shown semi-transparently.)


Outline
Course Aims and Structure
The Course Text
Why So Much Logic?
What is Logic?
The Idea of Deduction
Logical Validity

Course Aims

- Explain notions like
  - deduction, deductive validity;
  - logical consistency;
  - induction, inference to best explanation.
- Introduce tests for validity, provide tools for fallacy-spotting, etc.
- Familiarize you with logical symbolism – i.e. give a 'reading knowledge' of some of the languages of logic.
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Figure 5: A slide using `beamerthemesplit.sty`

2. `currentsubsection` – all subsections except the current subsection in the current section are shown semi-transparently.
3. `hidesubsections` – all subsections are omitted, unless the `current` option is also used, when the subsections of the current section are shown while all the others are omitted.
4. `shadesubsections` – subsections are shown semi-transparently.

8.4 And what else . . . ?

And that, I hope, is at least enough to enable you to produce classy black-and-white overhead transparencies for a lecture course.

But in fact, you'll probably find that it is also more or less enough to enable you to produce colourful PDF slides to be shown using e.g. Acrobat – for though you can produce fancier effects, do you *really* need to? Is it *really* worth the time?

To produce coloured slides, explore the templates provided with the `beamer` package (if you still want to use `logictheme.sty` then you'll need to open up the file and comment out the line that currently kills the on-screen navigation icons for PDF displays). The default colour scheme for themes (if you remove, of course, the `\documentclass` option `gray`!) is bluish. You can also try replacing `gray` by the options `red` or `brown` (e.g. as in Figure 5).

If you want to know more – in particular, want information about how to tinker with the templates used 'under the bonnet' which govern the layout of frames, headers, footers, etc. – then see the extensive documentation `beameruserguide.pdf`.