Academic Applications of LaTeX

Session 2 of 5

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Today

1. Tables

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2. Cross-references, footnotes, hyperlinks

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3. Bibliographies

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3. Bibliographies
4. Custom commands
5. Multi-file projects and collaboration

SECTION 1

Tables

Two environments, not one

`tabular`	the grid of cells itself
`table`	the float wrapper: caption, number, and it can move

- You almost always want both, one inside the other.

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- You almost always want both, one inside the other.
- The same pattern returns next session: `\includegraphics` inside a `figure`.

The grid itself

TYPE ALONG

```
\begin{tabular}{lcr}
    Sample & Mass (g) & Yield (\%) \\
    A      & 1.24     & 87 \\
    B      & 0.98     & 91 \\
\end{tabular}
```

- `{lcr}` — one letter per column: **l**eft, **c**entre, **r**ight.

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- & separates columns. \\ ends a row.

A proper table

```
\begin{table}[htbp]
    \centering
    \caption{Yields for the three trial conditions.}
    \label{tab:yields}
    \begin{tabular}{lcr}
        \toprule
        Sample & Mass (g) & Yield (\%) \\
        \midrule
        A & 1.24 & 87 \\
        B & 0.98 & 91 \\
        \bottomrule
    \end{tabular}
\end{table}
```

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`[htbp]` = **h**ere, **t**op, **b**ottom, own **p**age

SECTION 2

Cross-References

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\label and \ref

```
\begin{table}[htbp]
    \centering
    \caption{Yields for the three trial conditions.}
    \label{tab:yields}
    ... the tabular goes here ...
\end{table}

Yields are summarised in Table~\ref{tab:yields}.
```

What LaTeX actually does

1. Reaches `\caption` and adds one to the table counter. This is the first table, so the counter is now **1**.
2. Reaches `\label{tab:yields}` and records: *the name `tab:yields` means 1*. Nothing prints.
3. Later reaches `\ref{tab:yields}`, looks the name up, finds 1, and prints "1".

Three consequences

- **The name never prints.** `tab:yields` appears nowhere in the PDF. It is a private note between you and LaTeX.

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- **The name never prints.** `tab:yields` appears nowhere in the PDF. It is a private note between you and LaTeX.
- **You invent the name.** You don't need to use a command or something specific, you can name it something you can easily remember.
- **Insert a table above and step 1 gives 2 instead.** Steps 2 and 3 follow automatically.

Order matters

`\label` **goes after** `\caption`

The label attaches to whatever was most recently numbered and `\caption` does the numbering. If you reverse the order, LaTeX will give you a wrong number.

Naming labels

`sec:`	sections
`tab:`	tables
`fig:`	figures
`eq:`	equations

- These are used by convention since they're easy to remember and identify. You can change them, though, as they're not rules encoded by LaTeX

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- But every label shares one namespace, so a section called `methods` and a table called `methods` collide.
- Prefixes make collisions impossible and labels searchable.

Two more

```
See Section~\ref{sec:methods} on page~\pageref{sec:methods}.

As proved by Ted Kaczynski.\footnote{Better known for other work.}
```

- `\pageref` returns the page number instead of the item number. Useful when Section 4 is sixty pages away.

Hyperlinks

```
\usepackage[hidelinks]{hyperref}   % load this LAST

Full information is at \href{https://www.overleaf.com/learn}{Overleaf's
    Documentation}.
```

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- `\url` prints the address. `\href` takes destination first, visible text second.
- `hidelinks` removes the coloured boxes that look dreadful in print.

SECTION 3

Bibliographies

The pitch

- Keep your references in one file, once, in a standard format.
- Cite them by a short key.
- LaTeX works out which you actually used, formats them, sorts them, and numbers them.
- Change one word and the whole thing reformats to another style.

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The promise

You will never renumber a reference list by hand again.

The `.bib` file

```
@article{knuth1984,
    author  = {Knuth, Donald E.},
    title   = {Literate Programming},
    journal = {The Computer Journal},
    year    = {1984},
    volume  = {27}
}

@book{lamport1994,
    author    = {Lamport, Leslie},
    title     = {LaTeX: A Document Preparation System},
    publisher = {Addison-Wesley},
    year      = {1994}
}
```

Anatomy of an entry

- **The entry type.** `@article`, `@book`, `@inproceedings`, `@phdthesis`, `@misc`.

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Anatomy of an entry

- **The entry type.** `@article`, `@book`, `@inproceedings`, `@phdthesis`, `@misc`.
- **The citation key.** `knuth1984` — you choose it, and it is how you refer to the entry.

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Anatomy of an entry

- **The entry type.** `@article`, `@book`, `@inproceedings`, `@phdthesis`, `@misc`.
- **The citation key.** `knuth1984` — you choose it, and it is how you refer to the entry.
- **The fields.** `field = {value}` pairs. Different entry types require different fields.

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But check what they give you

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Braces protect capitals

Styles lowercase words in titles. To keep a proper noun, an element symbol, or a species name capitalised, wrap it:

```
title = {Studies of {DNA} in {E. coli}}
```

Wiring it up

```
% preamble
\usepackage[style=numeric, backend=biber, sorting=none]{biblatex}
\addbibresource{references.bib}

% body
Knuth argued for literate programming \cite{knuth1984}.
As \textcite{lamport1994} explains, ...

% at the end
\printbibliography
```

Change one word

`style=numeric`

↓

`authoryear` `alphabetic` `apa` `nature` `chem-acs`

The entire bibliography and every in-text citation reformat.

Citation commands

Command	Produces	Use when
`\cite{key}`	[1]	the reference supports the sentence
`\textcite{key}`	Lamport [2]	the author is the subject
`\parencite{key}`	[Lamport 1994]	parenthetical styles
`\cite{a,b,c}`	[1–3]	several at once

Exercise

Build a bibliography

1. Add `references.bib` with the three references you brought.
2. Cite all three — one of them with `\textcite`.
3. Compile until the bibliography appears.
4. Change the style, and recompile.

SECTION 4

Custom Commands

Define your own

```
% in the preamble
\newcommand{\eg}{e.g.\ }
\newcommand{\ecoli}{\textit{E.~coli}\xspace}
\newcommand{\pdv}[2]{\frac{\partial #1}{\partial #2}}

% in the body
Cultures of \ecoli were grown to mid-log phase.
```

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```

`\newcommand{\name}[arguments]{definition}`, where `#1` and `#2` stand in for what you pass.

Three reasons, in ascending order

1. **Less typing.** Obvious, and the least important.

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1. **Less typing.** Obvious, and the least important.
2. **Consistency.** Every species name written `\ecoli` is italicised identically.
3. **Global change.** If you decide to change names or styles after a meeting means that you'll only have to modify the one command instead of a hundred lines of text.

SECTION 5

Homework

Before Session 3

Three things

1. Build one table from your own work using `booktabs` — captioned, labelled, and referred to from prose.
2. Add a `.bib` file, cite three references, get the bibliography printing. Then change the style once.
3. Define one custom command for something you type repeatedly, and use it at least twice.

Bring an image file

Questions?

https://www.overleaf.com/learn • https://tex.stackexchange.com