

English and \LaTeX for Mathematicians

Melchior Grützmann

melchiorG.freehosting.com/english
Department of Mathematics

22nd March, 2012



Outline

15th March & this week: Using L^AT_EX for publications

This week: Presentations with L^AT_EX

Next: Posters with L^AT_EX



Presentations with L^AT_EX

Minimalistic example

```
\documentclass{beamer}
\usepackage{amsmath,amsthm,eufrak,mathbbol,eucal,latexsym}
\usepackage{graphicx}
:
\mode{presentation}
\usetheme{Singapore}
:
\begin{document}

\begin{frame} % one frame
\frametitle{\langle Title of this frame \rangle}
\langle contents \rangle
\end{frame}
:
\end{document}
```



The title page

```

\renewcommand\th[1][th]{ $\text{\text{\#1}}$ }
\title{English and \LaTeX{} for Mathematicians}
\author{Melchior Grützmänn}
\institute[Mathematics]{\url{http://melchiorG.jimdo.com/english-
latex-4-math/}} \\\
    Department of Mathematics}
\date{22\th[nd] March, 2012}
\logo{\includegraphics[height=1cm]{NWPU.png}}
:
\begin{document}
\maketitle
:
\end{document}

```



English and \LaTeX for Mathematicians

Melchior Grützmann

melchiorG.freehosting.com/english
Department of Mathematics

22nd March, 2012



Making an outline

As usual, you need to typeset twice in order to get the updated outline.

```
\begin{frame}
\frametitle{Outline}
\tableofcontents
\end{frame}

\section{<Section title>}
\subsection*{ } % generates one dot per slide in the headline
...
```



Outline

15th March & this week: Using L^AT_EX for publications

This week: Presentations with L^AT_EX

Next: Posters with L^AT_EX



Designing good outlines

- whom do I address, background knowledge
- talk in 3 parts:
 1. introduction (25–40%),
 2. main theorem with explanations (50%–65%),
 3. further leading material (10%)
- 2 at most 3 sections, no more
- use `\section` and `\subsection`, not deeper
- control the amount of material



Giving definitions

Definition (Lie algebroid)

$V \rightarrow M$, $[\cdot, \cdot]$ skew bracket on $\Gamma(V)$, $\rho: V \rightarrow TM$, rules:

$$[\phi, [\psi, \chi]] + \text{cycl.} = 0$$

$$[\phi, f \cdot \psi] = \rho(\phi)[f] \cdot \psi + f \cdot [\phi, \psi]$$

where $\phi, \psi, \chi \in \Gamma(V)$ and $f \in C^\infty(M)$.



Giving examples

Hint: These are very helpful to understanding. Give simple non-trivial ones.

Example (Lie algebroids)

0. A Lie algebra $(\mathfrak{g}, [., .])$ over a point.
1. The tangent bundle TM with commutator bracket, $\rho = \text{id}_{TM}$.
2. The Atiyah algebroid of a vector bundle $V \rightarrow M$, i.e. $T\mathcal{F}(V)/GL(V)$ where $\mathcal{F}(V)$ is the frame bundle.

Hint: Not everybody understands the last example, that is OK if it is not needed in the further process.



Stating Theorems

Theorem (Euclid)

There are infinitely many primes.

Hint: Check that all notions are clear, e.g. by examples.

Hint: Formulate short, but precise.

Hint: Give reference if not your own result.



Proving Theorems

Hint: This is not the paper, so ideas are enough.

Proof of the Theorem.

Assume only finitely many primes p_1, p_2, \dots, p_N . Consider

$$p_1 p_2 \cdots p_N + 1$$



Overfull frames

Depending on the size of the problem, you have three options:

1. slightly oversized frames: Give option `[shrink]` to the frame environment, i.e.

```
\begin{frame}[shrink]
```

2. moderately too large frames: Give the option `[allowframebreaks]` to let L^AT_EX decide where to break the frame or break the frame yourself into several ones;
3. too much content: Consider reducing the amount of information given and refer to literature for more.



Pages with text

The more you type on a page, the more information you provide, but the harder it is to obtain those. If you manage to fill a whole page with text, nobody will read that and the auditory will get annoyed.

I could go on for hours about this topic without answering any questions and annoying the auditory to death. I still have more to say, because I need to fill some lines. Maybe in the meantime people think about how to improve their presentation or how to solve another more interesting math problem. The page is still not filled, so what else can I type? Actually since nobody is reading here, I can say whatever I want, even one plus one is three. Actually that is often confirmed in biology, especially when the two are of opposite sex and enough time is given. If you are still reading here, you are very patient. Nevertheless there won't be further information. . . .



Lightweight pages

- structure with `itemize`, `description` or `enumerate`
- give keywords / phrases only,
- talk in whole sentences.
- `\pause` stops the presentation, further items follow after page forward



Pages with math

$$\begin{aligned}
 & \overleftarrow{\nabla}_\alpha (a_1 \diamond_A a_2) - (\overleftarrow{\nabla}_\alpha a_1) \diamond_A a_2 - (a_1 \diamond_A \overleftarrow{\nabla}_\alpha a_2) - \\
 & - \overleftarrow{\nabla}_{\overrightarrow{\nabla}_{a_2} \alpha} a_1 + \overleftarrow{\nabla}_{\overrightarrow{\nabla}_{a_1} \alpha} a_2 = \\
 & = -w(\alpha, \omega(a_1, a_2) + \frac{1}{2}D_2\langle a_1, a_2 \rangle) - \frac{1}{2}D_1\langle \alpha, \omega(a_1, a_2) + \frac{1}{2}D_2\langle a_1, a_2 \rangle \rangle \\
 & \overrightarrow{\nabla}_a (\alpha_1 \diamond_* \alpha_2) - (\overrightarrow{\nabla}_a \alpha_1) \diamond_* \alpha_2 - (\alpha_1 \diamond_* \overrightarrow{\nabla}_a \alpha_2) - \\
 & - \overrightarrow{\nabla}_{\overleftarrow{\nabla}_{\alpha_2} a} \alpha_1 + \overrightarrow{\nabla}_{\overleftarrow{\nabla}_{\alpha_1} a} \alpha_2 = \\
 & = -\omega(a, w(\alpha_1, \alpha_2) + \frac{1}{2}D_1\langle \alpha_1, \alpha_2 \rangle) - \frac{1}{2}D_2\langle a, w(\alpha_1, \alpha_2) + \frac{1}{2}D_1\langle \alpha_1, \alpha_2 \rangle \rangle \\
 & \quad \overrightarrow{R} + \overleftarrow{R} = 0 \\
 & 0 = \overleftarrow{\nabla}_{\omega(a_1, a_2)} a_3 + \text{cycl.} \\
 & 0 = \overrightarrow{\nabla}_{w(\alpha_1, \alpha_2)} \alpha_3 + \text{cycl.}
 \end{aligned}$$



Short formulas, intuitive symbols

∇ an E -connection on E' , then

$$\begin{aligned} \alpha(\overrightarrow{\nabla}_a \diamond')\beta &:= \overrightarrow{\nabla}_a(\alpha \diamond' \beta) - (\overrightarrow{\nabla}_a \alpha) \diamond' \beta - \alpha \diamond' (\overrightarrow{\nabla}_a \beta) \\ &\quad + \overrightarrow{\nabla}_{\overleftarrow{\nabla}_\beta a} \alpha - \overrightarrow{\nabla}_{\overleftarrow{\nabla}_\alpha a} \beta \end{aligned}$$

$$\alpha(\overrightarrow{\nabla}_a \diamond')\beta = -\omega(a, w(\alpha_1, \alpha_2) + \frac{1}{2}D_1\langle \alpha_1, \alpha_2 \rangle) - \frac{1}{2}D_2\langle a, w(\alpha_1, \alpha_2) + \frac{1}{2}D_1$$

$$a(\overleftarrow{\nabla}_\alpha \diamond)b = \text{analogous}$$

$$\overrightarrow{R} + \overleftarrow{R} = 0$$

$$0 = \overleftarrow{\nabla}_{\omega(a_1, a_2)} a_3 + \text{cycl.}$$

$$0 = \overrightarrow{\nabla}_{w(\alpha_1, \alpha_2)} \alpha_3 + \text{cycl.}$$



More about formulas

Hint: formulas often shorter than words

Hint: no lengthy calculations, just say “A somewhat lengthy computation leads to . . .”



Literature

Give few most important references on the last page. Use the `thebibliography` environment, e.g.



T. Tantau: *User's Guide to the Beamer Class*,
bitbucket.org/rivanvx/beamer.



wikibooks: *L^AT_EX / Presentations*,
en.wikibooks.org/wiki/LaTeX/Presentations.



Amount of material

- approx. 2min / slide \Rightarrow 20–35 slides for 60min.
- Insert pictures if appropriate
- test your presentation & practice vocabulary, pronunciation



Before, during, and after the talk

- check place, start time, and duration
- check if the presentation is well visible
- check if you are understandable / use microphone
- expect questions during, maybe after the talk.
 - short, general interest questions: answer immediate,
 - longer, difficult, too special questions: “Maybe we can discuss this after the talk.”
 - It is no shame if you cannot answer a difficult question: “That is an interesting question and I don’t know the answer yet.”
- be available after the talk



Next: Making posters with L^AT_EX

- Using the classes `a0poster`/`myposter`
- Tips for organizing a poster

