



Introduction to Scientific Working

Aart Middeldorp

Outline

- 1. Organisation**
- 2. LaTeX**
- 3. Research Integrity**
- 4. LaTeX**
- 5. TikZ**
- 6. Homework**

Keywords

acknowledgement

awards

beamer

bibliography

CORE ranking

DBLP

conference

editorial board

generative AI

Google Scholar

h-index

impact factor

journal

L^AT_EX

LIPICs

LNCS

open access

plagiarism

presentation

program committee

rebuttal

review

submission

TikZ

workshop

...

Types of Scientific Works

- ▶ seminar report
- ▶ bachelor thesis
- ▶ master thesis
- ▶ PhD thesis
- ▶ habilitation thesis
- ▶ workshop paper
- ▶ conference paper
- ▶ journal article
- ▶ book chapter
- ▶ book

Typical Structure

- ① title, author(s), affiliation(s)
- ② abstract
- ③ introduction
- ④ preliminaries
- ⑤ main content
- ⑥ conclusion
- ⑦ citations

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```
\documentclass{article}

\title{Very Important Title}
\author{Max Mustermann}

\date{12 March 2026}

\begin{document}

\maketitle

\end{document}
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src

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\end{document}
```

src

- ▶ `\usepackage[options]{authblk}`
offers more flexibility

```
\documentclass{article}
\usepackage{authblk}

\title{Joint Paper}

\author[1,3]{Max Mustermann}
\author[2]{Hanako Yamada}
\author[3]{Kari Nordmann}

\affil[1]{University of Innsbruck}
\affil[2]{University of Tokyo}
\affil[3]{Norwegian University of Sciences and Technology}

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

src

THE AUTHOR LIST: GIVING CREDIT WHERE CREDIT IS DUE

The first author

Senior grad student on the project. Made the figures.

The third author

First year student who actually did the experiments, performed the analysis and wrote the whole paper. Thinks being third author is "fair".

The second-to-last author

Ambitious assistant professor or post-doc who instigated the paper.

Michaels, C., Lee, E. F., Sap, P. S., Nichols, S. T., Oliveira, L., Smith, B. S.

The second author

Grad student in the lab that has nothing to do with this project, but was included because he/she hung around the group meetings (usually for the food).

The middle authors

Author names nobody really reads. Reserved for undergrads and technical staff.

The last author

The head honcho. Hasn't even read the paper but, hey, he/she got the funding, and their famous name will get the paper accepted.

WWW.PHDCOMICS.COM

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4. LaTeX
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- ▶ What is a violation of good scientific practice?

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Any infringement of intellectual property

- ▶ Plagiarism (use of foreign text passages or data by direct, paraphrased or translated adoption without appropriate citation of the source and the author)

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- ▶ Unauthorized publication

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- ▶ Removal or inadequate documentation of primary data

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Breach of supervisory duties, lack of cooperation or collegiality

- ▶ Lack of or inadequate academic discussion in working groups

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- ▶ Defamation in relation to good scientific practice
- ▶ Breach of trust as a reviewer

YOUR THESIS TITLE

CONDENSING OVER HALF A DECADE OF YOUR LIFE IN ONE SENTENCE.

www.phdcomics.com
JORGE CHAM © 2006

the colon

Can't decide what to title your thesis? Use a colon!

a preposition

A good preposition tells your readers "hey, this is not just a futile exercise"

"Witty catch-phrase"

:

Length-enhanced superlative verbiage with prolixity

in/of/for

Obscure topic few people care about.

witty catchphrase

Makes people think you're hip and culturally relevant. Only marginally related to the actual thesis? No problem.

the boring stuff

Nothing says "academic rigor" like a long string of dry scientific-sounding terminology and fancy buzzwords.

obscure topic

few people care about
Sad, but true.

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```
\documentclass{article}

\usepackage{lipsum}

\title{P = NP}

\author{Jan Janssen \ \ Vrije Universiteit Amsterdam}

\begin{document}

\maketitle

\begin{abstract}

\lipsum[1]

\end{abstract}

\end{document}
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src

Abstract MadLibs!!

This paper presents a _____ method for _____
(synonym for new) (sciencey verb)
the _____. Using _____, the
(noun few people have heard of) (something you didn't invent)
_____ was measured to be _____ +/- _____
(property) (number) (number)
_____. Results show _____ agreement with
(units) (sexy adjective)
theoretical predictions and significant improvement over
previous efforts by _____, et al. The work presented
(Loser)
here has profound implications for future studies of
_____ and may one day help solve the problem of
(buzzword)
_____.
(supreme sociological concern)

Keywords: _____, _____, _____
(buzzword) (buzzword) (buzzword)

Exemplary Bachelor Theses

- ▶ Number Link Benjamin Ruppachter 2009
- ▶ Kurodoko Johannes Koch 2020
- ▶ Five Cells Diana Gründlinger 2023

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- | | | |
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Common Ingredients

- | | | |
|-----------------------|----------------|---------------------|
| ▶ appendices | ▶ formulas | ▶ screen shots |
| ▶ bibliography | ▶ hyper links | ▶ table of contents |
| ▶ chapters / sections | ▶ lists | ▶ tables |
| ▶ figures | ▶ plots | |
| ▶ footnotes | ▶ program code | |

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```
\documentclass{report}
\usepackage{lipsum}
\begin{document}
\tableofcontents
\chapter{First Chapter}
\lipsum[2-3]
\chapter{Second Chapter}
\section{First Section of Second Chapter}
\lipsum[4-6]
\section{Second Section of Second Chapter}
\subsection{Subsection}
\lipsum[7]
\section*{Unnumbered Section}
\lipsum[8-9]
\appendix
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[src](#)

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\documentclass{article}
\usepackage{graphicx}
\begin{document}
\begin{figure}
\begin{center}
\includegraphics[width=8cm]{ari.png}
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\caption{Great illustration.}
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options (key=value)

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src

► `\includegraphics[options]{filename}`

supported formats: eps jpeg pdf png

options (key=value): width height angle scale ...

```
\documentclass{article}
\usepackage{graphicx}
\begin{document}
\begin{figure} [htb]
\begin{center}
\includegraphics [width=8cm] {ari.png}
\end{center}
\caption{Great illustration.}
\end{figure}
\end{document}
```

src

► `\includegraphics [options] {filename}`

supported formats: eps jpeg pdf png

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Special Characters

#	\#	~	\~{}	-	_	\	\textbackslash
\$	\\$	&	\&	{	\{		
%	\%	}	\}	~	\~{}	\textasciitilde	

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Font Sizes

\tiny	tiny	\large	large
\scriptsize	very small	\Large	larger
\footnotesize	quite small	\LARGE	larger
\small	small	\huge	huge
\normalize	normal	\Huge	largest

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- ▶ 1300+ page manual

```
\documentclass[tikz,border=10pt]{standalone}
\begin{document}
\begin{tikzpicture}
\draw[thin,dotted] (-4,-4) grid (4,4);
\draw[->] (-4,0) -- (4,0);
\draw[->] (0,-4) -- (0,4);
\end{tikzpicture}
\end{document}
```

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src

► `\draw[options] coordinate picture-element coordinate ...`

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\documentclass[tikz,border=10pt]{standalone}
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\end{document}
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▶ `\draw[options] coordinate picture-element coordinate ...`

▶ Cartesian coordinates

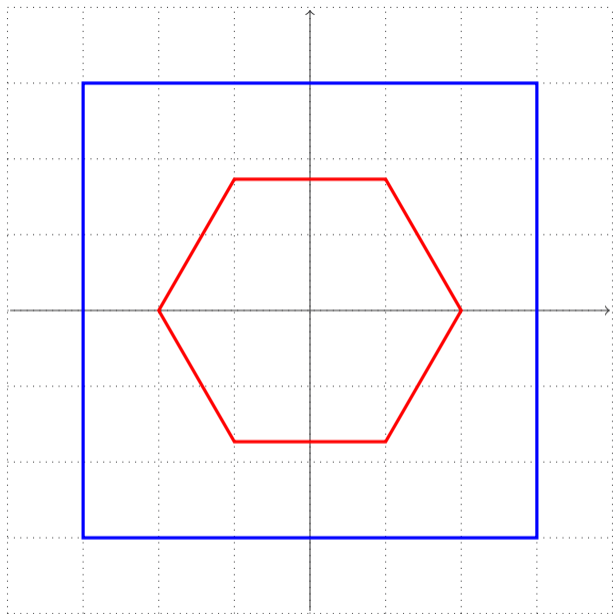
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\documentclass[tikz,border=10pt]{standalone}
\begin{document}
\begin{tikzpicture}
\draw[thin,dotted] (-4,-4) grid (4,4);
\draw[->] (-4,0) -- (4,0);
\draw[->] (0,-4) -- (0,4);
\draw[very thick,blue]
  (-2,-2) -- (-2,2) -- (2,2) -- (2,-2) -- cycle;

\end{tikzpicture}
\end{document}
```

- ▶ `\draw[options] coordinate picture-element coordinate ...`
- ▶ Cartesian coordinates, **polar coordinates**

```
\documentclass[tikz,border=10pt]{standalone}
\begin{document}
\begin{tikzpicture}
\draw[thin,dotted] (-4,-4) grid (4,4);
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\draw[->] (0,-4) -- (0,4);
\draw[very thick,blue]
  (-2,-2) -- (-2,2) -- (2,2) -- (2,-2) -- cycle;
\draw[very thick,red]
  (0:2) -- (60:2) -- (120:2) -- (180:2) -- (240:2) -- (300:2) -- cycle;
\end{tikzpicture}
\end{document}
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Homework Exercises for March 19

- ① Read Chapters 1 and 2 of The Not So Short Introduction to $\text{\LaTeX} 2_{\epsilon}$. 0
- ② Give at least five examples of recent scientific misconduct, from different domains. 2
- ③ What are the legal consequences of plagiarism for UIBK students? 1
- ④ Use TikZ to typeset the following Sudoku puzzle: 2

8								
		3	6					
	7			9		2		
	5				7			
				4	5	7		
			1				3	
		1					6	8
		8	5			4	1	
	9							