



Osaamista
ja oivallusta
tulevaisuuden
tekemiseen

Nimi/Name

Opinnäytetyön otsikko

Metropolia Ammattikorkeakoulu

Tutkinto (esim. Insinööri (AMK))

Koulutusohjelma (esim. Tieto- ja viestintätekniikka)

Insinööri

25.11.2019

Tekijä(t) Otsikko	Nimi/Name Opinnäytetyön otsikko
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Tutkinto	Tutkinto (esim. Insinööri (AMK))
Tutkinto-ohjelma	Koulutusohjelma (esim. Tieto- ja viestintätekniikka)
Ammatillinen pääaine	Ammatillinen pääaine (esim. Mobile Solutions)
Ohjaaja(t)	Titteli Etunimi Sukunimi Titteli Etunimi Sukunimi
<p>Tämä on tiivistelmän ensimmäinen kappale. Tiivistelmän kappaleet loppuvat komentoon newline, jotta saadaan yksi tyhjä rivi aikaiseksi.</p> <p>Tämä on tiivistelmän toinen kappale.</p>	
Avainsanat	avainsanat

Author(s) Title	Nimi/Name Your title here
Number of Pages Date	11 pages + 3 appendices 25 November 2019
Degree	Bachelor of Engineering
Degree Programme	your degree programme (e.g. Information Technology)
Professional Major	your major option (e.g. Mobile Solutions)
Instructor(s)	First name Last name, Title (for example: Project Manager) First name Last name, Title (for example: Principal Lecturer)
<p>Abstract content. To force newline between paragraph in the abstract, you must have both a empty line and the newline command.</p> <p>beginning of second paragraph...</p>	
Keywords	Keywords

Sisällys

Lyhenteet

Sanasto

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Lyhenteet

HTML HyperText Markup Language.

Sanasto

L^AT_EX Is a mark up language specially suited for scientific documents.

mathematics Mathematics is what mathematicians do.

1 Introduction

Check Final Year Project Guide for the content of introduction chapter.

2 Demonstration Content

This is a chapter to demonstrate some of the \LaTeX commands that you can use to format your text. This should be **bold** and this *italic* and finally ***bolditalic***. When one want to use an abbreviation or acronym like HyperText Markup Language (HTML) using the `\gls` command in \LaTeX , the first time, it comes with it full version and for all next uses in it short HTML form. Of course, when needed, the full version is available using e.g. the `\acrlong` command.

The defined terms like mathematics use the same `\gls` \LaTeX command. The Capitalized can be obtained with `\Gls`. Should be avoided; but to have all the abbreviations and terms, even the non-used ones, use the `\glsaddall` command before printing the list of Abbreviations.

2.1 Section with references

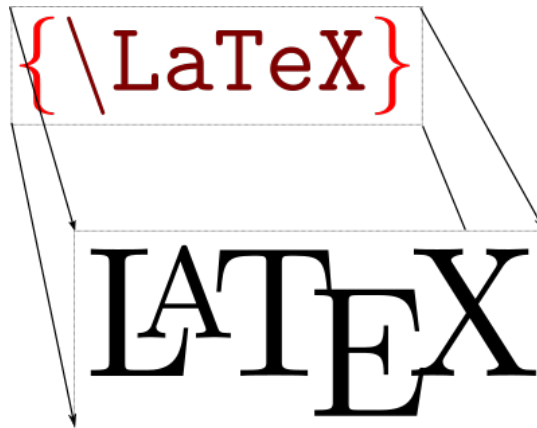
Here is an example how to cite a bibliography entry [1] using the “`\cite`” \LaTeX command [2, section 4.2]. Note that a paragraph is added by forcing a new line.

And let also try the figure (see figure 1 on the following page) and internal reference (with label and `ref` or `vref`). The reference can be done to any label, for example why not to appendix 1 or to appendix 2? To note, \LaTeX will place the figure to the best place (except with forcing). Let them float till the final of final edit... then force them to not break a paragraph.

Let's also try a long quote: From the Universal Declaration of Human Rights:

(1) Everyone has the right to education. Education shall be free, at least in the elementary and fundamental stages. Elementary education shall be compulsory. Technical and professional education shall be made generally available and higher education shall be equally accessible to all on the basis of merit.

(2) Education shall be directed to the full development of the human personality and to the strengthening of respect for human rights and fundamental freedoms. It shall promote understanding, tolerance and friendship among all nations, racial or



Kuva 1: \LaTeX cover image (Copied from wikibooks.org (2012) [3]).

religious groups, and shall further the activities of the United Nations for the maintenance of peace.

(3) Parents have a prior right to choose the kind of education that shall be given to their children. [4, article 26]

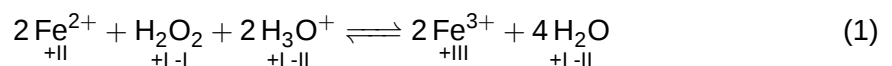
Quisque augue est, elementum ac porttitor non, porttitor ac orci. Donec hendrerit, ligula ac luctus egestas, sem dolor pretium nunc, sed vehicula magna diam a massa. Donec mattis, arcu et tempor mattis, risus tortor ultrices metus, nec sodales sem dolor eu elit.

- **A small hack** with list
- is to force the vertical space
- before and after the list

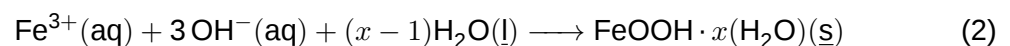
Nullam egestas enim at odio pellentesque bibendum.

2.1.1 Subsection

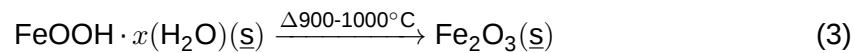
Donec et sapien ac leo condimentum vulputate id et tellus. Maecenas hendrerit malesuada interdum. Aenean dignissim sem faucibus elit congue faucibus id non risus. Morbi at dui non tortor pellentesque consequat non eget urna. Cras in sapien dui, a tincidunt velit.



Työn aluksi rauta(II)ionit hapetetaan rauta(III)ioneiksi väkevällä vetyperoksidilla, kuten reaktion 1 hapetusluvusta nähdään (rauta hapettuu, happi pelkistyy).



Rauta(III)ionit saostetaan emäksen (NH₃) avulla ja saadaan tuotteeksi kidevedellinen rauta(III)hydroksidi. Saatu saostuma pestään NH₄NO₃:lla.



2.1.2 Subsection with Mathematics

Donec et sapien ac leo condimentum vulputate id et tellus. Maecenas hendrerit malesuada interdum. Aenean dignissim sem faucibus elit congue faucibus id non risus. Morbi at dui non tortor pellentesque consequat non eget urna. Cras in sapien dui, a tincidunt velit. Tertiäärinen butyylikloridi reagoi veden kanssa oheisen reaktion mukaisesti:



Kyseessä on ensimmäisen kertaluvun reaktio, joten reaktion nopeus on

$$v = -\frac{d[\text{t-ButCl}]}{dt} = \frac{d[\text{HCl}]}{dt} = k[\text{t-ButCl}] \quad (5)$$

Jos tarkastellaan lähtöaineen t-butylikloridin häviämistä saadaan

$$\frac{d[\text{t-ButCl}]}{[\text{t-ButCl}]} = -k dt \quad (6)$$

$$\int \frac{d[\text{t-ButCl}]}{[\text{t-ButCl}]} = -k \int dt \quad (7)$$

$$\ln \int_{[\text{t-ButCl}]_0}^{[\text{t-ButCl}]} [\text{t-ButCl}] = -k \int_0^t t \quad (8)$$

$$\ln \left(\frac{[\text{t-ButCl}]}{[\text{t-ButCl}]_0} \right) = -kt \quad (9)$$

Ionivahvuus lasketaan kaavalla.

$$I = \frac{1}{2} \cdot \sum z_i^2 c_i \quad (10)$$

$$z_i = \text{ionin varausluku} \quad (11)$$

$$c_i = \text{ionin konsentraatio} \quad (12)$$

Aktiivisuuserroin γ_{\pm} lasketaan kaavalla.

$$\log \gamma_{\pm} = - |z_+ \cdot z_-| A \cdot I^{\frac{1}{2}} \quad (13)$$

$$A = 0,509 \text{ (lämpötilassa } 25^{\circ}\text{C)} \quad (14)$$

$$I = \text{ionivahvuus} \quad (15)$$

$$z = \text{ionien varaus} \quad (16)$$

2.2 Section with Source Code

Donec et sapien ac leo condimentum vulputate id et tellus. Maecenas hendrerit malesuada interdum. Aenean dignissim sem faucibus elit congue faucibus id non risus. Morbi at dui non tortor pellentesque consequat non eget urna. Cras in sapien dui, a tincidunt velit.

```

1  <?php
2  $userName = $_POST["usern"];
3  //maybe not?
4  if ($userName){
5  ^^I?>
6  ^^I<h2>Hello <?php echo $userName; ?>!</h2>
7  ^^I<p>your message got received.</p>
8  ^^I<?php
9  }
10 ?>

```

Koodiesimerkki 1: Descriptive Caption Text (e.g. this code do blah)

As see in listing 1, blah. It is also possible to have code inline, for example `SELECT * FROM user WHERE age >= 18` that was SQL. The listings 2 and 3 show how to load code from an external source file. In the case of listing 3 it only take few line out of the source code file.

```

1  <!DOCTYPE html>
2  <html>
3  <head>
4  <meta charset="utf-8">
5  <title>HTML5 Document Template</title>
6  </head>
7  <body>
8  Some text here (visible to the users)
9  </body>
10 </html>

```

Koodiesimerkki 2: Some html code

Donec et sapien ac leo condimentum vulputate id et tellus. Maecenas hendrerit malesuada interdum. Aenean dignissim sem faucibus elit congue faucibus id non risus.

```

3 <head>
4   <meta charset="utf-8">
5   <title>HTML5 Document Template</title>
6 </head>

```

Koodiesimerkki 3: The `<head>` section of an html page

Morbi at dui non tortor pellentesque consequat non eget urna. Cras in sapien dui, a tincidunt velit.

2.3 Section with Table

Donec et sapien ac leo condimentum vulputate id et tellus. Maecenas hendrerit malesuada interdum. Aenean dignissim sem faucibus elit congue faucibus id non risus. Morbi at dui non tortor pellentesque consequat non eget urna. Cras in sapien dui, a tincidunt velit. Taulukko 1: Some data

Test 1	test 1234 test
Some more date comes here	with more values and if the text is very long it will disappear out of the box unless you force the column size :(

As presented in table 1: Donec et sapien ac leo condimentum vulputate id et tellus. Maecenas hendrerit malesuada interdum. Aenean dignissim sem faucibus elit congue faucibus id non risus. Morbi at dui non tortor pellentesque consequat non eget urna. Cras in sapien dui, a tincidunt velit.

Taulukko 2: Another table with tabularx

Test 1	test 1234 test
Some more date comes here	with more values and if the text is very long it will disappear out of the box unless you force the table size :(

As presented in table 2: Donec et sapien ac leo condimentum vulputate id et tellus. Maecenas hendrerit malesuada interdum. Aenean dignissim sem faucibus elit congue faucibus id non risus. Morbi at dui non tortor pellentesque consequat non eget urna. Cras in sapien dui, a tincidunt velit.

Taulukko 3: Booktabs example

t (s)	[HCl]	[t-ButCl]	$\ln \frac{[t-ButCl]}{[t-ButCl]_0}$
0	4,02	160,88	0,00
10	63	101,9	-0,46
20	115,2	49,7	-1,17
30	141,3	23,6	-1,92
40	157,9	7	-3,13
50	161	3,9	-3,72
60	164,3	0,6	-5,59
70	163,5	1,4	-4,74
80	163,8	1,1	-4,99
90	164,1	0,8	-5,30
100	164,3	0,6	-5,59

As presented in table 3: Donec et sapien ac leo condimentum vulputate id et tellus. Maecenas hendrerit malesuada interdum. Aenean dignissim sem faucibus elit congue faucibus id non risus. Morbi at dui non tortor pellentesque consequat non eget urna. Cras in sapien dui, a tincidunt velit.

3 Dummy Content

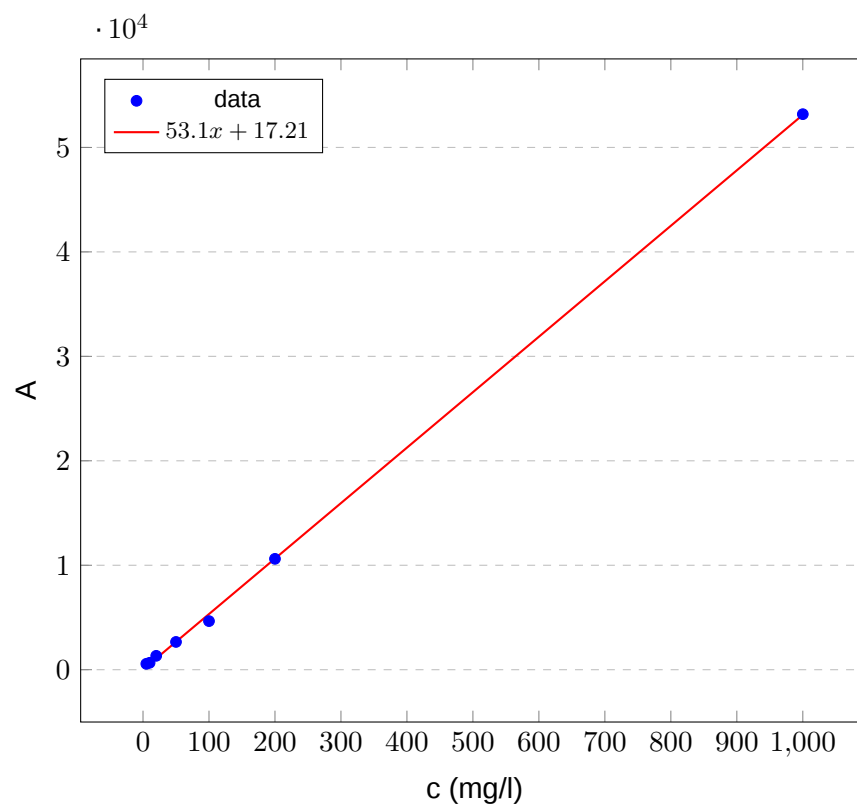
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4 Graph

Data to plot the graph 2 are in data.dat file. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aliquam aliquam aliquam purus, in ornare nulla imperdiet molestie. Nam tempus erat eu dui rhoncus et vestibulum mi elementum. Ut porttitor elit sit amet justo dignissim sit amet sagittis massa egestas. Mauris sed dolor eget dui fermentum sodales ut eu nibh.



Kuva 2: Simple linear regression plot (cannot get r^2 value)

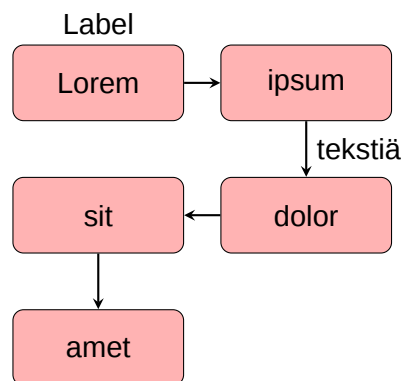
Quisque augue est, as seen in figure 2 elementum ac porttitor non, porttitor ac orci. Donec hendrerit, ligula ac luctus egestas, sem dolor pretium nunc, sed vehicula magna diam a massa. Donec mattis, arcu et tempor mattis, risus tortor ultrices metus, nec sodales sem dolor eu elit. Nullam egestas enim at odio pellentesque bibendum.

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dui non tortor pellentesque consequat non eget urna. Cras in sapien dui, a tincidunt velit.

4.1 Section

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Kuva 3: Example tikz-picture

As seen in figure 3, ut porttitor elit sit amet justo dignissim sit amet sagittis massa egestas. Mauris sed dolor eget dui fermentum sodales ut eu nibh.

4.2 Section

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Lähteet

- 1 Kopka, Helmut. Guide to \LaTeX . Boston: Addison-Wesley. 2004.
- 2 Tobias Oetiker and Hubert Partl and Irene Hyna and Elisabeth Schlegl. The Not So Short Introduction to \LaTeX 2e. Switzerland. 2011.
- 3 \LaTeX . 2012. Verkkodokumentti. wikibooks.org.
<<http://en.wikibooks.org/wiki/LaTeX>>. Luettu November 05, 2012.
- 4 international community, United Nations. The Universal Declaration of Human Rights. 1948;<<http://www.un.org/en/documents/udhr>>.

1 Some Appendix

Note that every appendix will be a chapter.

Sorry for the ugly hack on how to count the total pages per appendix.

Of course with section and subsection.

1.1 Appendix Section

And you can cite [2] stuff, it will go into the main bibliography.

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1.1.1 With a Subsection

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2 Dummy Appendix

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elementum. Ut porttitor elit sit amet justo dignissim sit amet sagittis massa egestas. Mauris sed dolor eget dui fermentum sodales ut eu nibh.

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3 R examples

TODO