Fachhochschule Aachen
Campus Jülich

This is the title

which is long and needs to be in two lines.

Masterthesis

My name

Matr. No.: 123456

Faculty of

Medical Engineering and Applied Mathematics

Study program Biomedical Engineering M.Sc.

Aachen, March 2019

Diese Arbeit ist von mir selbstständig angefertigt und verfasst. Es sind keine anderen als die angegebenen Quellen und Hilfsmittel benutzt worden.

My name   _____

signature

Diese Arbeit wurde betreut von:

       1. Prüfer: Prof. Dr. XXX

       2. Prüfer: Dr. XYZ

       Betreuer: ZZZ

This is the english abstract

This is the english abstract

Hier kommt die deutsche Zusammenfassung

Contents

1 Introduction

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

1.1 Objectives and motivation

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

2 State of the art and theoretical background

2.1 First section

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

This is the second paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

And after the second paragraph follows the third paragraph. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

After this fourth paragraph, we start a new paragraph sequence. Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

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font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.
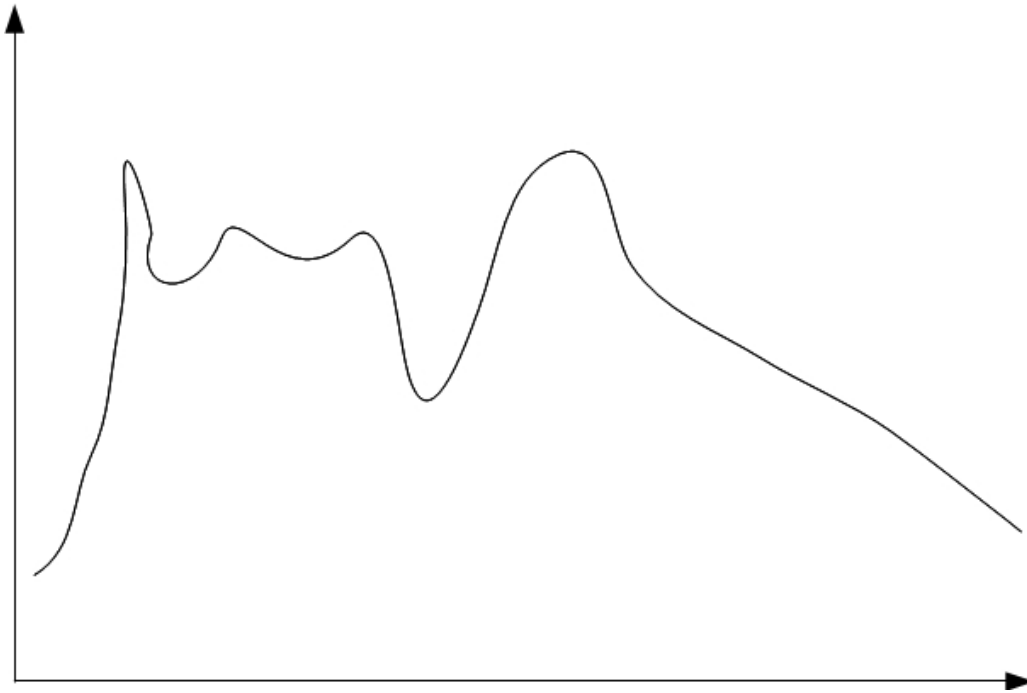

Figure 1: *First example to describe how short and long caption work for figures. Everything written in the square brackets will be listed in the list of figures, everything written in the curly brackets will be shown directly underneath the figure.*

Here I will reference the first figure (see figure 1). Also, in 4.1 a figure with multiple subfigures is shown.

The we can make a list of different things:

- First item on the list

- Second item on the list

- Third item on the list

2.2 Second section

3 Methods

3.1 Begin of a chapter

In the two-sided layout a new chapter always begins on a right side. Therefore, empty pages will be generated automatically at the end of the previous chapter if necessary. The one-sided layout does not do this. If you want an additional empty page, you have to insert it manually.

3.2 Big tables

Tables are a bit complex to generate in latex, a big help are table generators like: `https://www.tablesgenerator.com/`. Small tables fit within the text flow.
Bigger tables can be put on separate pages.

Table 1: *Material needed for gels*

material (conc.)	volume per gel	conc. in gel
Chemical 1 (40 mg/mL)	15 µL	3.00 µg/mL
TBS	15 µL	—
Chemical 2	15 µL	3.75 µg/mL
Chemical 3	27.5 µL	5.7×10^5 cells
Chemical 4	27.5 µL	5.7×10^5 cells
Chemical 5	100 µL	5.00 mg/mL

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

Table 2: *A lot of complex columns and rows*

Tube 1		Tube 2		Tube 3		Tube 4	
Antibody	Volume	Antibody	Volume	Antibody	Volume	Antibody	Volume
AB1	20 µL	AB2	20 µL	AB3	20 µL	AB4	20 µL
APC	MSC-	FITC	MSC-	PE	MSC-	PE	MSC-
Antibody	Volume	Antibody	Volume	Antibody	Volume	Antibody	Volume
AB5	2 µL	AB6	5 µL	AB7	5 µL	AB8	5 µL
FITC	MSC+	APC	MSC+	PerCP-Cy5.5	MSC+	PerCP-Cy5.5	MSC-

Table 3: *Some more antibodies for FACS analysis*

Tube 1		Tube 2		Tube 3		Tube 4	
Antibody	Volume	Antibody	Volume	Antibody	Volume	Antibody	Volume
AB1	20 µL	AB2	20 µL	AB3	5 µL	AB4	5 µL
FITC	EC+	FITC	EC+	FITC	EC+	FITC	EC-
Antibody	Volume	Antibody	Volume	Antibody	Volume	Antibody	Volume
AB5	20 µL	AB6	2 µL	AB7	20 µL	AB8	20 µL
APC	EC-	APC	EC-	APC	EC+	APC	EC+

3.3 Section

3.3.1 Subsection

Subsubsection

Here we have some random equations:

$$V = d^2 \cdot \frac{\pi}{4} \cdot L \tag{3.1}$$

$$S = d^2 \cdot \frac{\pi}{4} + \pi \cdot d \cdot L \approx \pi \cdot d \cdot L \tag{3.2}$$

$$V = \frac{S^2}{\pi^2 \cdot L^2} \cdot \frac{\pi}{4} \cdot L = \frac{S^2}{4\pi \cdot L} \tag{3.3}$$
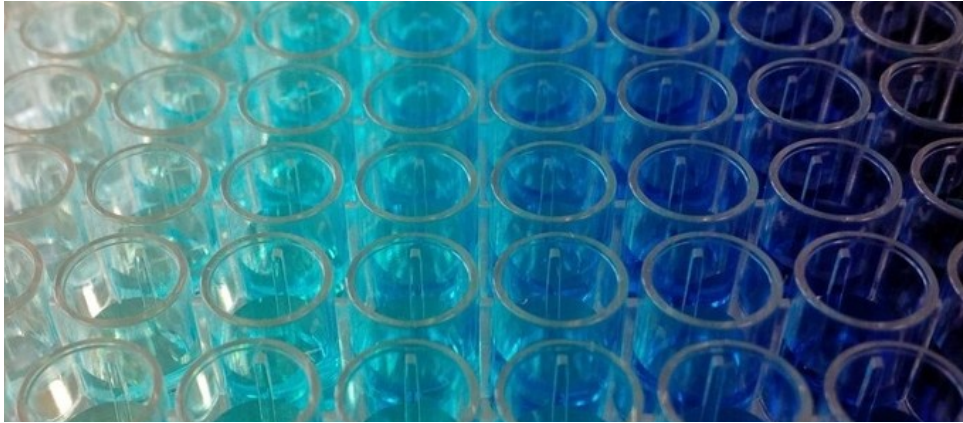
$$L = \frac{S^2}{4\pi \cdot V} \tag{3.4}$$

$$s = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{(n-1)}} \tag{3.5}$$
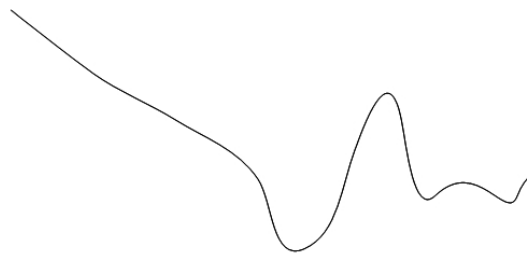
4 Results

4.1 Figure with subfigures

As in this case the figure with subfigures is quite big, it will appear in the next page. If they are smaller, they also fit within the text flow.
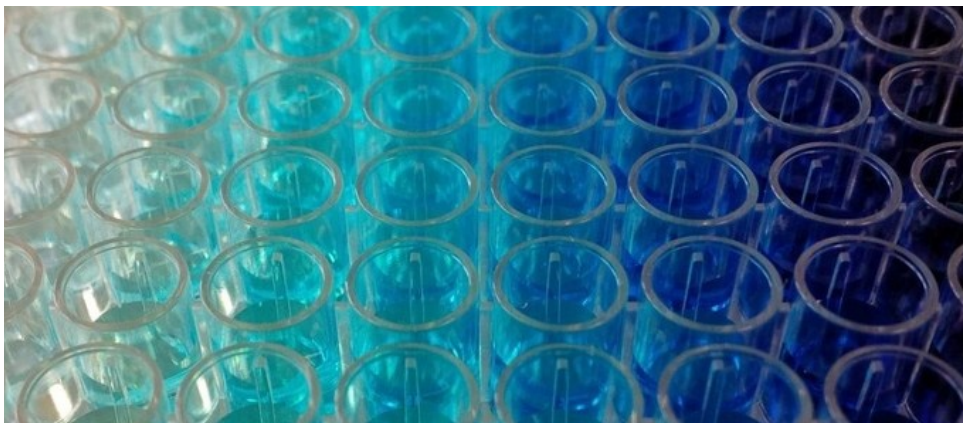
In the square brackets after 'begin figure' or 'begin subfigure, the command 'trim = l b r t' is cutting the figures on the left, bottom, right and top. Additionally, 'clip' is needed afterwards. 'rotate' can be used to rotate the figure. In the curly brackets the size of the figure can be adjusted either by using a defined width eg. 4 cm or by a percentage of the textwidth.

(a) *Caption for the first subfigure*

(b) *Caption for the second subfigure*

(c) *Caption for the third subfigure*

Figure 2: *3 subfigures can be combined in one figure. Each subfigure has a short caption and the figure itself has a caption underneath*

5 Discussion

5.1 References in the text

Here we want to discuss and will use some references from our bib file.

In the bib file all your references are collected. Best is to use google scholar (`https://scholar.google.com`), as you can directly copy the Latex code. To add a reference in your text, you cite it [1]. By using the style unsrtdin and its extension, references are sorted automatically in the text [1, 2]. Also, they are compressed if there are more than 3 references in 'a row' [3–6]. The command 'nocite' is used to add a references to your List of References without mentioning in the text .

6 Outlook

References

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List of abbreviations

ABM	Antibiotic/Antimycotic
$AcLDL$	acetylated low density lipoprotein
EGF	Epidermal growth factor
$EGM-2$	Endothelial cell growth medium 2
$ELISA$	Enzyme-linked immunosorbent assay
$FACS$	Fluorescence-activated cell sorting
HE	Hematoxylin and eosin
$HEPES$	4-(2-hydroxyethyl)-1-piperazineethanesulfonic acid
RNA	Ribonucleic acid
RT	Room temperature
vWf	Von Willebrand factor

List of Figures

List of Tables

Danksagung

Wenn Du hier auf Deutsch schreiben möchtest, wird durch den Befehl 'selectlanuage' die deutsche Rechtschreibung bzw. Silbentrennung aufgerufen.
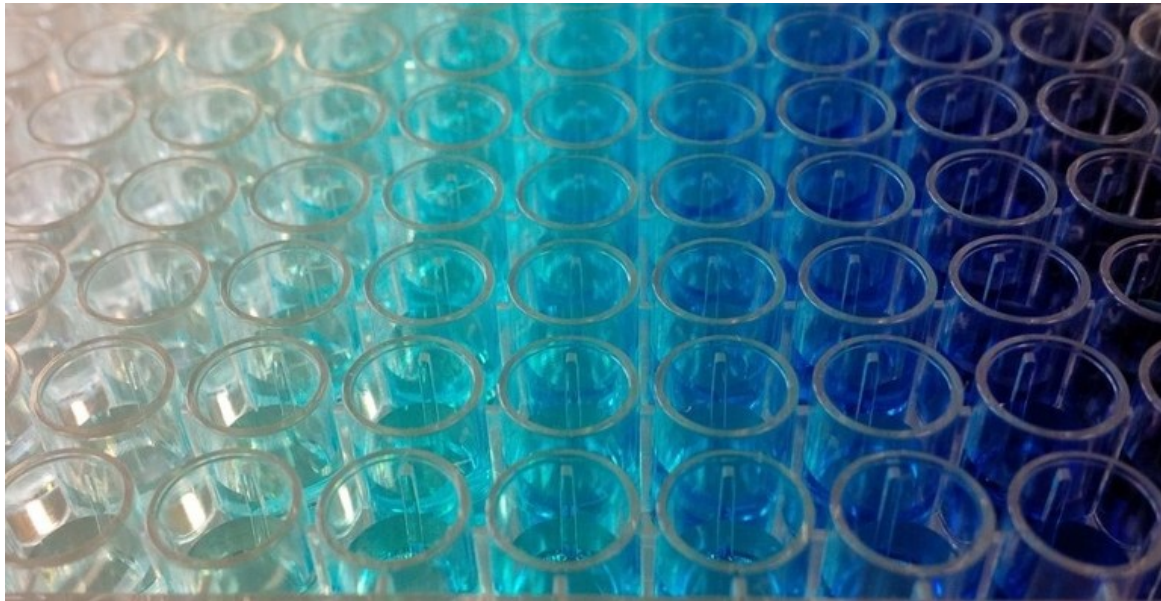
Appendix

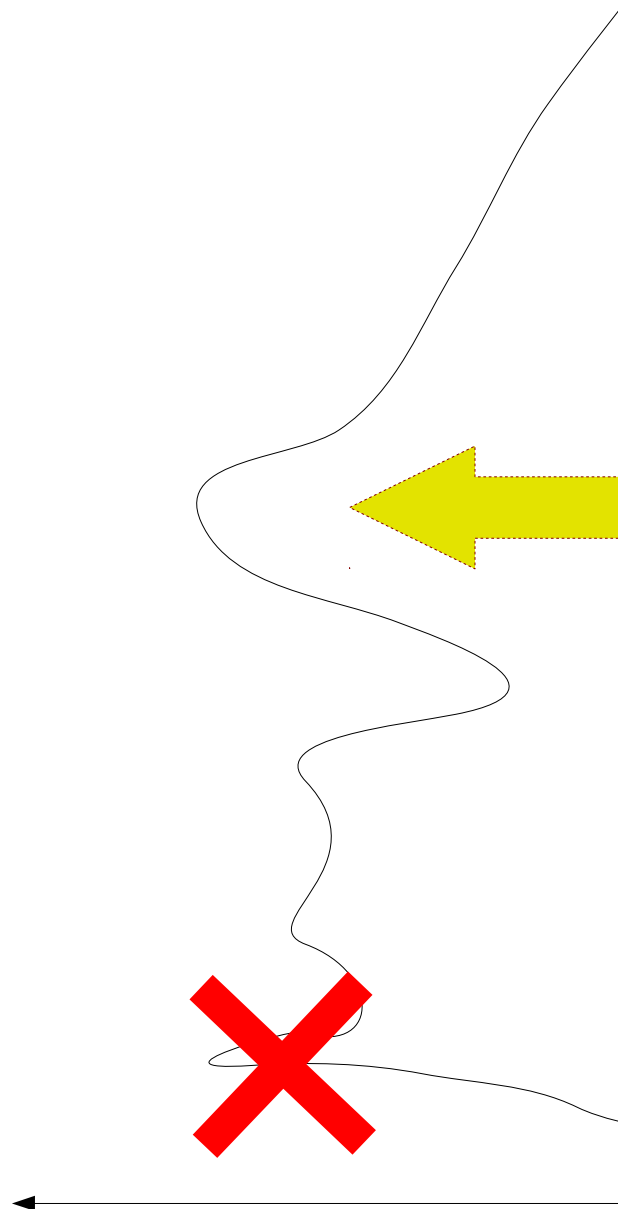

Abbildung 3: *Some cool photo taken in the lab.*

Abbildung 4: *It is possible to add pdf files as figure, while keeping your header and footer from your document. Mostly useful in the appendix.*