School of Engineering

Institute of Computer Science

BACHELOR THESIS

ZHAW Thesis Template

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Abstract

Title   ZHAW Thesis Template
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Date   January 23, 2026
Institution   ZHAW University of Applied Sciences

This template serves as a demonstration of Typst features and the structure of a thesis at ZHAW. It includes examples of cross-references, a glossary, bibliography, mathematical equations, and code snippets.

Keywords   template, typst, zhaw, thesis

Zusammenfassung

Titel   ZHAW Thesis Template

Autoren   Alice Müller, Bob Schmidt

Datum   January 23, 2026

Institution   ZHAW Zürcher Hochschule für Angewandte Wissenschaften

Diese Vorlage dient als Demonstration der Funktionen von Typst und der Struktur einer Abschlussarbeit an der ZHAW. Sie umfasst Beispiele für Querverweise, ein Glossar, ein Literaturverzeichnis, mathematische Gleichungen und Codeausschnitte.

Schlüsselwörter   template, typst, zhaw, thesis

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We sincerely thank Prof. Dr. Charlie Meier for his/her expertise and continuous advice. his/her guidance and support was invaluable to the successful completion of this project.

Declaration of Originality

By submitting this project work, the undersigned students confirm that this work is their own work and was written without the help of a third party. (Group works: the performance of the other group members are not considered as third party).

The students declare that all sources in the text (including Internet pages) and appendices have been correctly disclosed. This means that there has been no plagiarism, i.e. no sections of the project work have been partially or wholly taken from other texts and represented as the student's own work or included without being correctly referenced.

AI systems were used in the process of this work, as specified in Appendix 1.1.

Any misconduct will be dealt with according to paragraphs 39 and 40 of the General Academic Regulations for Bachelor's and Master's Degree courses at the Zurich University of Applied Sciences (Rahmenprüfungsordnung ZHAW (RPO)) and subject to the provisions for disciplinary action stipulated in the University regulations.

Zürich, January 23, 2026

Alice Müller: _____

Bob Schmidt: _____

Table of Contents

1 Introduction

This document serves as a demo of both Typst features and the template itself.

1.1 What is Typst?

Typst is a modern typesetting system that combines the simplicity of Markdown with the power of LaTeX. It allows you to create beautiful documents with ease, keeping styling separate from content.

1.2 Is Typst better than Latex?

That's subjective, but:
- it compiles much faster and provides real-time preview (no compilation delays)
- its syntax is much nicer to write and look at
- it has built-in support for features that require packages in LaTeX (bibliography, cross-references, glossary, code snippets, etc.)
- its web editor works better than Overleaf

2 Features showcase

2.1 Glossary, references and labels

Here we have a glossary reference: Internet of Things. We can also use the acronym form: IoT. See the Glossy documentation for more details.

Here we refer to a source from our bibliography [1]. The template uses IEEE style by default, but you can change it with the `bibliography-style` option in `zhaw-thesis.with()`.

We can also refer to equations, such as Equation 1, and figures, such as Table 2.

Finally, here we refer to a section: Section 1.

2.2 Maths

$$f(x) = \sigma(W_L \sigma(W_{L-1}...\sigma(W_1 x + b_1)... + b_{L-1}) + b_L)$$
$$= (\sigma \cdot W_L \cdot \sigma \cdot W_{L-1} \cdot ... \cdot \sigma \cdot W_1)(x, b_1, ..., b_L)$$

$$(1)$$

The equation above (Equation 1) shows the forward pass of a neural network with L layers, weights W_i, biases b_i, and activation function σ.

Equations can also be inline: $V_k^*(s) = \max_a \sum_{s'} \underbrace{P(s' \mid s, a)}_{\text{transition proba}} \Big(\underbrace{r_{t+1}}_{\text{reward s} \rightarrow \text{s'}} + \gamma \underbrace{V_{k-1}^*(s')}_{\text{precalc. val of s'}} \Big).$

2.3 Figures

Figures allow to wrap images, tables, code snippets, and more in captions and labels that you can refer to.

2.3.1 Tables

Metric	Best Value	Interpretation
Precision	1.0	All predictions are correct
Recall	1.0	All targets are found
F_1 Score	1.0	Perfect balance
False Positive Rate	0.0	No false alarms

Table 1: *Table with custom alignment*

Approach	Speed	Beauty	Ease	Overall
Word	0.2	0.3	0.7	0.4
LaTeX	0.3	0.9	0.3	0.5
Markdown	0.9	0.4	0.9	0.7
Google Docs	0.7	0.2	0.8	0.6
Typst	**0.95**	**0.98**	**0.92**	**0.95**

Table 2: *Table that spans full width*

2.3.2 Code

Listing 1 below shows how code snippets look like. This is handled by the Codly package, which provides many customisation options.

```python
import numpy as np
from sklearn.preprocessing import StandardScaler
from sklearn.ensemble import IsolationForest

class Model:
    def __init__(self, temp=1):
        self.scaler = StandardScaler()
        self.excitement = IsolationForest(
            temp=temp,
            random_state=42
        )
```

Listing 1: *Sample code demonstrating syntax highlighting and professional formatting*

> **In summary**
>
> This template showcases:
>
> 1. Cross-references to sections, equations, tables, and figures
> 2. Glossary integration with short (ML) and long (Network Time Protocol) forms
> 3. Bibliography citations [1]
> 4. Mathematical equations with proper labeling
> 5. Code listings with syntax highlighting
> 6. Professional tables and figures

Glossary

IoT (Internet of Things)

A network of physical devices embedded with sensors, software, and connectivity that enables them to collect and exchange data. IoT systems often generate massive amounts of monitoring data that require automated analysis.

ML (machine learning)

A subset of artificial intelligence focused on building systems that learn from data. ML algorithms identify patterns and make predictions without being explicitly programmed for specific tasks.

NTP (Network Time Protocol)

A networking protocol for clock synchronization between computer systems over packet-switched networks. NTP is critical for distributed systems to maintain consistent timestamps across multiple machines.

Bibliography

[1] A. Garcia and others, 'Monitoring and Anomaly Detection in Microservices: A Systematic Literature Review', in *IEEE International Conference on Software Architecture*, 2021, pp. 201–212.

Appendix

1.1 AI Usage Declaration

During the preparation of this thesis, AI tools were used for the following purposes:

AI Tool	Purpose
Gemini	Text summarisation and formulation
GitHub Copilot	Code completion and refactoring suggestions
Grammarly	Grammar and spelling corrections in English text
Perplexity	Literature search assistance

Table 3: *AI tools used during thesis preparation*

All AI-generated content was thoroughly reviewed, validated, and modified as necessary. The core ideas, analysis, and conclusions are entirely the work of the authors.