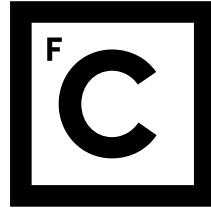


UNIVERSIDADE DE LISBOA
FACULTY OF SCIENCES



**Ciências
ULisboa**

**A Very Long and Impressive
Thesis Title with a Forced Line Break**

Doctorate in Study Program Name
Specialization in Specialization Name

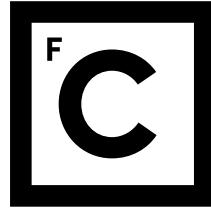
John Very Longname Doe

Thesis supervised by:

f/Mary Doe Adviser Name, m/John Doe Co-Adviser Name and f/John Doe other Co-Adviser Name

Document written to earn the degree of Doctor of Philosophy

UNIVERSIDADE DE LISBOA
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This document was produced with the `luatex` [1] typesetting system and the `NOVAtesis` template (v7.10.2) [2].

- [1] The \LaTeX Project team. *$\text{\LaTeX} - A document preparation system$* . 1985. URL: <https://www.latex-project.org>.
- [2] J. M. Lourenço. *The NOVAtesis \LaTeX Template User's Manual*. NOVA University Lisbon. 2021. URL: <https://github.com/joaomlourenco/novatheresis/raw/main/template.pdf>.

Dedicatory lorem ipsum.

ACKNOWLEDGEMENTS

Acknowledgments are personal text and should be a free expression of the author.

However, without any intention of conditioning the form or content of this text, I would like to add that it usually starts with academic thanks (instructors, etc.); then institutional thanks (Research Center, Department, Faculty, University, FCT / MEC scholarships, etc.) and, finally, the personal ones (friends, family, etc.).

But I insist that there are no fixed rules for this text, and it must, above all, express what the author feels.

“

*“You cannot teach a man anything; you can only
help him discover it in himself.”*

— **Galileo**, Somewhere in a book or speech
(Astronomer, physicist and engineer)

ABSTRACT

Regardless of the language in which the dissertation is written, usually there are at least two abstracts: one abstract in the same language as the main text, and another abstract in some other language.

The abstracts' order varies with the school. If your school has specific regulations concerning the abstracts' order, the NOVAthesis L^AT_EX (**novathesis**) (L^AT_EX) template will respect them. Otherwise, the default rule in the **novathesis** template is to have in first place the abstract in *the same language as main text*, and then the abstract in *the other language*. For example, if the dissertation is written in Portuguese, the abstracts' order will be first Portuguese and then English, followed by the main text in Portuguese. If the dissertation is written in English, the abstracts' order will be first English and then Portuguese, followed by the main text in English. However, this order can be customized by adding one of the following to the file `5_packages.tex`.

```
\ntsetup{abstractorder={<LANG_1>, ..., <LANG_N>}}  
\ntsetup{abstractorder={<MAIN_LANG>={<LANG_1>, ..., <LANG_N>}}}
```

For example, for a main document written in German with abstracts written in German, English and Italian (by this order) use:

```
\ntsetup{abstractorder={de={de,en,it}}}
```

Concerning its contents, the abstracts should not exceed one page and may answer the following questions (it is essential to adapt to the usual practices of your scientific area):

1. What is the problem?
2. Why is this problem interesting/challenging?
3. What is the proposed approach/solution/contribution?
4. What results (implications/consequences) from the solution?

Keywords: One keyword · Another keyword · Yet another keyword · One keyword more · The last keyword

Sustainable Development Goals (SDG):



RESUMO

Independentemente da língua em que a dissertação está escrita, geralmente esta contém pelo menos dois resumos: um resumo na mesma língua do texto principal e outro resumo numa outra língua.

A ordem dos resumos varia de acordo com a escola. Se a sua escola tiver regulamentos específicos sobre a ordem dos resumos, o template (L^AT_EX) **novathesis** irá respeitá-los. Caso contrário, a regra padrão no template **novathesis** é ter em primeiro lugar o resumo *no mesmo idioma do texto principal* e depois o resumo *no outro idioma*. Por exemplo, se a dissertação for escrita em português, a ordem dos resumos será primeiro o português e depois o inglês, seguido do texto principal em português. Se a dissertação for escrita em inglês, a ordem dos resumos será primeiro em inglês e depois em português, seguida do texto principal em inglês. No entanto, esse pedido pode ser personalizado adicionando um dos seguintes ao arquivo `5_packages.tex`.

```
\abstractorder(<MAIN_LANG>) := {<LANG_1>, ..., <LANG_N>}
```

Por exemplo, para um documento escrito em Alemão com resumos em Alemão, Inglês e Italiano (por esta ordem), pode usar-se:

```
\ntsetup{abstractorder={de={de,en,it}}}
```

Relativamente ao seu conteúdo, os resumos não devem ultrapassar uma página e frequentemente tentam responder às seguintes questões (é imprescindível a adaptação às práticas habituais da sua área científica):

1. Qual é o problema?
2. Porque é que é um problema interessante/desafiante?
3. Qual é a proposta de abordagem/solução?
4. Quais são as consequências/resultados da solução proposta?

Palavras-chave: Primeira palavra-chave · Outra palavra-chave · Mais uma palavra-chave · A última palavra-chave

Objetivos de Desenvolvimento Sustentável (ODS):

1 ERRADICAR A POBREZA



2 ERRADICAR A FOME



3 SAÚDE DE QUALIDADE



4 EDUCAÇÃO DE QUALIDADE



5 IGUALDADE DE GÉNERO



6 ÁGUA POTÁVEL E SANEAMENTO



7 ENERGIAS RENOVÁVEIS E ACESSÍVEIS



8 TRABALHO DIGNO E CRESCIMENTO ECONÓMICO



9 INDÚSTRIA, INovação e INFRAESTRUTURAS



10 REDUZIR AS DESIGUALDADES



11 CIDADES E COMUNIDADES SUSTENTÁVEIS



12 PRODUÇÃO E CONSUMO SUSTENTÁVEIS



13 AÇÃO CLIMÁTICA



14 PROTEGER A VIDA MARINHA



15 PROTEGER A VIDA TERRESTRE



16 PAZ, JUSTIÇA E INSTITUIÇÕES EFICAZES



17 PARCERIAS PARA A IMPLEMENTAÇÃO DOS OBJETIVOS



DISCLOSURE OF USAGE OF GENERATIVE ARTIFICIAL INTELLIGENCE

The author, John Very Longname Doe, acknowledges the use of the following generative artificial intelligence tools in the development of this thesis. These technologies were utilized under strict supervision, and all AI-generated outputs were critically reviewed and verified for accuracy. The author accepts full responsibility for the validity and originality of the content, confirming that the use of these tools aligns with all institutional policies and standards of academic integrity.¹

Generative AI tools used: ChatGPT-5.2, Gemini 3 Pro, Claude 4.5 Opus, and Perplexity 12.12.25.

Activities supported by Generative Artificial Intelligence Tools:²

Conceptualization

- | | | |
|---|--|--|
| <input type="checkbox"/> Idea generation | <input type="checkbox"/> Formulating research questions and hypotheses | <input type="checkbox"/> Hypothesis viability assessment |
| <input checked="" type="checkbox"/> Defining the research objective | <input checked="" type="checkbox"/> Feasibility assessment and risk evaluation | <input type="checkbox"/> Simulated debate and argument testing |

Literature Review

- | | | |
|---|---|--|
| <input type="checkbox"/> Search and Discovery | <input checked="" type="checkbox"/> Concept Mapping and Systematization | <input type="checkbox"/> Gap Identification and Novelty Evaluation |
| <input type="checkbox"/> Literature summarization and synthesis | <input type="checkbox"/> Market/patent landscape analysis | <input type="checkbox"/> Cross-lingual literature comprehension |

Methodology

- | | | |
|---|--|---|
| <input type="checkbox"/> Experimental Design Optimization | <input type="checkbox"/> Development of experimental or research protocols | <input checked="" type="checkbox"/> Methodological Instrument Selection |
|---|--|---|

¹This declaration was generated using LuaLaTeX [16] and the LaTeX package `aidisclose` [9].

²This list extends the GAIDeT taxonomy [15].

Software Development and Automation

- | | | |
|---|--|--|
| <input type="checkbox"/> Code Generation | <input checked="" type="checkbox"/> Debugging and Repair | <input type="checkbox"/> Algorithm design |
| <input type="checkbox"/> Refactoring and Optimization | <input checked="" type="checkbox"/> Process automation | <input type="checkbox"/> Code documentation and comment generation |

Data Management

- | | | |
|--|--|---|
| <input type="checkbox"/> Data collection | <input type="checkbox"/> Data analysis | <input type="checkbox"/> Synthetic data generation |
| <input type="checkbox"/> Validation | <input checked="" type="checkbox"/> Quantitative Plotting and Charting | <input type="checkbox"/> De-identification and anonymization support |
| <input type="checkbox"/> Data cleaning | <input type="checkbox"/> Reproducibility and rerun checks | <input checked="" type="checkbox"/> Audio-to-text transcription and diarization |
| <input checked="" type="checkbox"/> Data curation and organization | <input type="checkbox"/> Data labeling and annotation assistance | |

Visuals and Multimedia

- | | | |
|---|---|--|
| <input type="checkbox"/> Synthetic Asset Generation | <input checked="" type="checkbox"/> Image Enhancement and Editing | <input type="checkbox"/> Diagrammatic and Schematic Design |
|---|---|--|

Writing and Editing

- | | | |
|--|---|---|
| <input type="checkbox"/> Drafting Text | <input type="checkbox"/> Formulation of conclusions | <input type="checkbox"/> Citation formatting and bibliography management |
| <input type="checkbox"/> Polishing and Editing | <input type="checkbox"/> Tone Adjustment | <input checked="" type="checkbox"/> Press releases and outreach materials |
| <input type="checkbox"/> Abstract and Executive Summary Generation | <input type="checkbox"/> Translation | <input type="checkbox"/> Title Generation |

Ethics Review

- | | | |
|---|---|--|
| <input checked="" type="checkbox"/> Bias analysis and discrimination assessment | <input type="checkbox"/> Ethical risk analysis | <input type="checkbox"/> Data confidentiality monitoring |
| | <input type="checkbox"/> Monitoring compliance with ethical standards | |

Quality Assurance

- | | | |
|--|--|--|
| <input checked="" type="checkbox"/> Simulated Peer Review | <input type="checkbox"/> Identification of limitations | <input type="checkbox"/> Publication support |
| <input type="checkbox"/> Consistency checking against field trends | <input checked="" type="checkbox"/> Publication strategy and journal selection | |

Additional comment #1: The AI was used primarily for refining the code in Section 3, but the algorithm logic was derived manually.

Additional comment #2: This is a second additional comment!

Additional comment: This is a third additional comment! It is starred and, thus, does not get a number. Also, this comment is longer and, hopefully, will span to the next line!

Additional comment #3: This is the third non-starred additional comment!

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GLOSSARY

computer An electronic device which is capable of receiving information (data) in a particular form and of performing a sequence of operations in accordance with a predetermined but variable set of procedural instructions (program) to produce a result in the form of information or signals. This is a test that adds a citation [2] to the glossary! (*p. 15*)

ACRONYMS

aaa	acronym aaa (<i>p. 15</i>)
aab	acronym aab (<i>p. 15</i>)
aba	acronym aba (<i>p. 15</i>)
abbrev	abbreviation of a longer text (<i>p. 15</i>)
 bbb	acronym bbb (<i>p. 15</i>)
 DI	Department of Computer Science (<i>p. 1</i>)
 FCT	NOVA School of Science and Technology (<i>pp. 1, 6</i>)
 NOVA	NOVA University Lisbon (<i>p. 1</i>)
 novathesis	NOVAtesis L ^A T _E X (<i>pp. vi, viii, 1–9</i>)
 xpto	and extension of a xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto (<i>p. 15</i>)

SYMBOLS

μ Mu (*p. 15*)

π the numerical value of pi (*p. 15*)

r the radius of a circle (*p. 15*)

INTRODUCTION



This is the **novathesis** L^AT_EX template Version 7.10.2 from Template!date2026-02-28.

This work is licensed under the L^AT_EX Project Public License v1.3c. To view a copy of this license, visit the [LaTeX project public license](#).

This first Chapter introduces the **novathesis** template and how it is organized. In Chapter 2 you can find some specific instructions on how to use this template. Chapter 4 shows some examples and give some hints on how to write your text. Please read these next Chapters carefully.

1.1 The NOVAthesis Template

The **novathesis** template was born at the Department of Computer Science (DI) of NOVA School of Science and Technology (FCT) of NOVA University Lisbon (NOVA), Portugal. But the user base grew... initially grew to other Departments of NOVA FCT, then to other Schools of NOVA, and later to other Schools of other Universities. Currently more than 25 Schools are natively supported by the **novathesis** template. The full list of supported Schools can be found at the [Project's GitHub page](#).

1.1.1 Your Time is Precious

Did you learn how to drive by sitting by the wheel and throwing your car into the road? Most probably you did take your time *learning the rules* and *practicing* first! Likewise, it is not wise to throw yourself at the task of writing a thesis/dissertation in L^AT_EX without seriously considering the following recommendation!

If you are going to spend zillions of hours writing your thesis/dissertation using the **novathesis** L^AT_EX template (or some other L^AT_EX template), be wise and spend a couple of hours learning how to use it properly by reading its manual. And then, be even wiser, and spend a few more hours **learning some L^AT_EX**. I am sure that the time you are investing now will pay itself countless times before you submit your thesis/dissertation.

— João Lourenço

1.1.2 Recognition

The **novathesis** template was born in 1996, and what you see now accumulates to many many hundreds (thousands?!?) of working hours, unpaid and stolen from family and friends. This work is available to the community under the [L^AT_EX Project Public License v1.3c](#), which means you are entitled to use it for free and change it at your will. However, if you decide to use this template to write your thesis/dissertation, **be fair to the developers** and:

1. Cite the **novathesis** manual [10] in a place of your choice (e.g., in the *Acknowledgments*) of your thesis/dissertation with “\cite{novathesis-manual}”. If you cite it this way, the correct entry will be added automatically to your bibliography (no need to worry with the necessary BibTeX entry, as it will be added automatically);
2. Go to the [project web page in GitHub](#) and give the project a star (marked with a red ellipse at the top-right in Figure 1.1); and
3. Make a donation by visiting the **novathesis** project page and clicking in the button marked with a green ellipse at the top-center in Figure 1.1). Alternatively, just click [HERE](#) and your browser will be directed to the right page.

1.2 Getting Started

The template provides an *easy to use* setting for you to write your thesis/dissertation in L^AT_EX:

- Select your school;
- Fill your thesis metadata (title, research field, etc) in the file “`template.tex`”;
- Create your thesis/dissertation contents using the files in folder “`Chapters`”; and
- Process using you favorite L^AT_EX processor (`pdflatex`, `XeLaTeX` or `LuaLaTeX`).

1.2.1 Using Overleaf

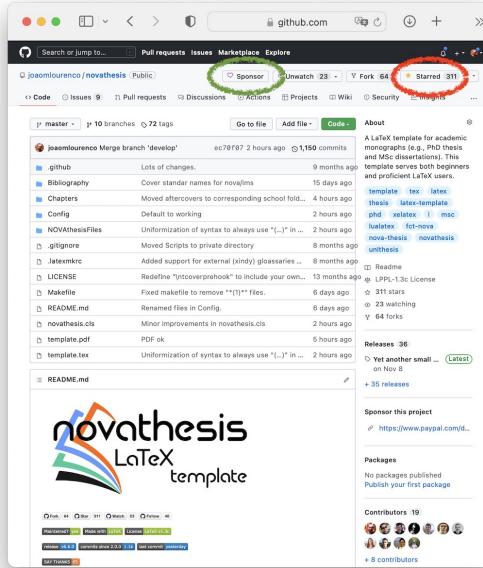


Figure 1.1: The `novathesis` project web page in GitHub.

Overleaf is a collaborative cloud-based LaTeX editor used for writing, editing and publishing scientific documents. Like “Google Docs”, for \LaTeX users. You can edit and compile your \LaTeX source on the cloud, without installing software in your own computer, and, much like *Google Docs*, you can share your document with others users and everybody can edit the same file at the same time (this may be dangerous).

If you do not have an account in Overleaf, you must [create one first](#).

Once you have an account, please access the `novathesis` template in [Overleaf](#) and select the green button *Open as Template* (see Figure 1.2).

Please notice that the version currently available in Overleaf (*v7.1.18*) is slightly outdated (current version is *v7.10.2*). A new version (*v7.1.29*) will be submitted to Overleaf soon. Until then, please:

1. Download the [latest version](#) from the GitHub repository as a Zip file.
2. Login to your favorite LaTeX cloud service. I recommend [Overleaf](#) but there are alternatives (these instructions apply to Overleaf and you'll have to adapt for other providers).
3. In the menu select: *New project* → *Upload project*.
4. Upload the zip file.
5. Select “`template.tex`” as the main file.

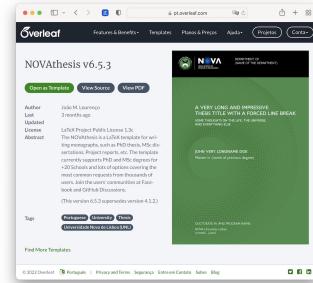


Figure 1.2: NOVAthesis template in Overleaf.

6. Let Overleaf compile the document.

Notice that you need a (student) subscription to compile the `novathesis` template in Overleaf, otherwise your compilation will always time out.

1.2.2 Using a Local L^AT_EX Installation Local

First of all, start by installing L^AT_EX in your computer. There are two main distributions, [Mik^TE_X](#) and [T_EXLive](#), and both of them are available for the 3 most popular Operating Systems: Linux, macOS and Windows.

Be aware that a full installation of Mik^TE_X or T_EXLive will take near 5 GB of hard disk space. So, think twice before installing the full distribution. See the `novathesis` Wiki for the [list of packages required to compile the template](#).

Once you have L^AT_EX up and running, remember to install a good L^AT_EX text editor. I recommend you to take a look at [this post](#) in the [tex.stackexchange.com](#) site. If you want a quick and dirty recommendation, try [TeXStudio](#).

Now, you must access the `novathesis` repository in [GitHub](#), select the green button *Code* and then *download* (or *clone*) the template. You will always get the latest version of the template (currently v7.10.2 from 2026-02-28).

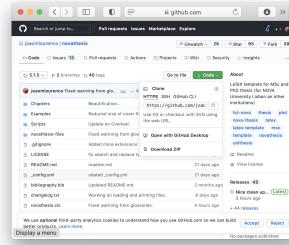


Figure 1.3: The NOVAthesis Project page in GitHub.

1.3 Getting Help

No! You don't have to use this template to write your thesis. You don't even have to use L^AT_EX. However, writing a thesis is serious stuff, and which tool you shall use to write it is not a decision to make lighthearted.

L^AT_EX is hard enough by itself. This template aims at making your life easier, but not easy. If you choose to use this template to write your thesis, you are very welcome. However, don't expect me to provide you help with L^AT_EX. Look for help with your friends (you have some friends, don't you?), or search the web, or try even to read some book(s) on L^AT_EX. In the end you will certainly find the experience rewarding.

When you come to the point of "*How do I do this with the novathesis template?*", remember...

1. To check the [novathesis wiki](#) and have some hope! :D
2. [Google](#) is your best friend.
3. Search the [GitHub Discussions page](#) for a question related to yours. *If and only if* you don't find one, then post your own question in English please!

4. Search the [NOVAtheis Facebook group](#) for a question related to yours. *If and only if* you don't find one, then post your own question in either Portuguese or English, at your preference.

When you post your own question, remember to **always** state the **novathesis** version number you are using and referring to.

Please do not attempt to contact me directly (email, Messenger, etc)...
I WILL NOT REPLY!

1.3.1 Suggestions, Bugs and Feature Requests

Help: If you just need some help, see above [Section 1.3](#).

Suggestion: Do you have a suggestion/recommendation? Please add it to the wiki and help other users!

Bug: Did you find a bug? Please open an issue. Thanks!

New Feature: Would you like to request a new feature (or support of a new School)? Please open an issue. Thanks!

1.4 Donors

The [list of Donors](#) is available in the **novathesis** Project page.

1.5 Disclaimer

Although the **novathesis** template is endorsed by some Schools (e.g., [linked from NOVA FCT web site](#)), the **novathesis** template **this not an official template** for any School.

The **novathesis** template exists to make your life easier and we do our best to make it compliant to the supported (+25) Schools' regulations but, in the end of the line, you and only you are accountable for both the look and the contents of the document you submit as your thesis/dissertation.

NOVATHESIS TEMPLATE *USER'S MANUAL*

This manual is outdated and must be revised!

2.1 Introduction

This Chapter describes how to use the NOVAthesis L^AT_EX (`novathesis`) template. It is assumed that you have a working of L^AT_EX, either local (in your own computer) or remote (in [Overleaf](#)), and that you were able to generate a PDF for the default configuration of the template: a PhD thesis for NOVA School of Science and Technology (FCT).

2.2 Quick Start

2.2.1 With a Local L^AT_EX Installation

Follow these steps to get started with a local L^AT_EX installation:

1. Download L^AT_EX. There are two major L^AT_EX distributions — [Mik_TE_X](#) and [T_EXLive](#) — that share lots of similarity, and L^AT_EX documents are portable between them. This means that, for most users, both systems are equally usable.

[T_EX-Live](#) is maintained by (La)T_EX developers and is certainly the best distribution you may install in your computer: However, the default distribution will take more than 5 GB on your hard disk... so, if you are not short on disk space, install T_EXLive!

[Mik_TE_X](#) will, by default, install only a minimal set of packages. The extra/additional packages will be installed on the fly. Installing packages on the fly is useful if disk space is limited, but has its own caveats in the longer term. Definitely choose Mik_TE_X if you're short on disk space.

Which one to download? There are [pros and cons for both distributions](#) so it is essentially a question of where does your heart fall first! Mine falls to T_EXLive, but yours can fall elsewhere! :D

2. Install \LaTeX . Installation of \LaTeX is as hard as installing any other software. Just do your best and you will certainly succeed.
3. Update your \LaTeX installation using the *T_EXLiveUtility* program of the Mik T_{E} X console.
4. Download the **novathesis** template by either:

- Cloning the [GitHub repository](#) with

```
git clone --depth=1 https://github.com/joaomlourenco/novathesis.git
```

or

- Downloading the [latest version from the GitHub repository as a Zip file](#).

5. Download additional School specific files if applicable:

Universidade do Minho (UMINHO) download the required *NewsGotT* font files from <https://raw.githubusercontent.com/joaomlourenco/novathesis-extras/raw/main/Fonts/NewsGotT.zip> then unzip the file and copy the 3 font files

“n015002t.ttf”, “n015003t.ttf”, and “n015006t.ttf”

to the folder

“NOVAthesisFiles/FontStyles/Fonts”.

Escola Superior de Enfermagem do Porto (ESEP) download the required *Calibri* font files from <https://raw.githubusercontent.com/joaomlourenco/novathesis-extras/raw/main/Fonts/Calibri.zip> then unzip the file and copy the 4 font files

“Calibri.ttf”, “Calibrib.ttf”, “Calibrii.ttf”, and “Calibriz.ttf”

to the folder

NOVAthesisFiles/FontStyles/Fonts.

6. Compile the document with you favorite \LaTeX processor ($\text{pdf}\text{\LaTeX}$, $\text{Xe}\text{\LaTeX}$ or $\text{Lua}\text{\LaTeX}$).

- The main file is named “`template.tex`”, but you are free to rename it as you please.
- Either load the main file in your favorite [LaTeX text editor](#) and press the appropriate (*magic*) button to generate a PDF file, or open a terminal and compile it with “`latexmk -pdf template`”. If you use a \LaTeX text editor, please notice that the **novathesis** template uses “`biber`” and not “`bibtex`” to process the bibliography, which means that most probably you have to open the *Editor*

Preferences and somewhere (depending on the Editor you are using) change “`bibtex`” to “`biber`”.

- Notice that, due to the external font sets used, `pdflatex` will not work for both **UMINHO** and **ESEP**, and you have to use either `XeLaTeX` (“`latexmk -pdfxe template`”) or `LuaLaTeX` (“`latexmk -pdflua template`”).

7. Edit the files in the “Config” folder. See [Table 2.2](#).

8. Recompile de document.

9. And you're done with a beautifully formatted thesis/dissertation! :D

2.2.2 With a Remote Cloud-based Service

Follow these steps to get started with a remote `LATeX` installation:

- Download the [latest version from the GitHub repository as a Zip file](#).
- Login to your favorite `LaTeX` cloud service. I recommend [Overleaf](#) but there are alternatives. These instructions apply to Overleaf and you'll have to adapt for other providers.
- In the menu select `New project` → `Upload project`.
- Select “`template.tex`” as the main file.
- Follow from Step 5 above in Section [2.2.1 \(With a Local `LATeX` Installation\)](#).

2.3 Folder and Files

The `novathesis` template is organized into many files and folders. At the main level it includes the following files and folders listed in [Table 2.1](#).

Table 2.1: The folders and files (top level).

Name	Type	Access	Contents
<code>template.tex</code>			The main template file. You need to <i>compile</i> this file with one of <code>pdflatex</code> , <code>XeLaTeX</code> , or <code>LuaLaTeX</code> to obtain the PDF file (“ <code>template.pdf</code> ”). I recommend the usage of the “ <code>latexmk</code> ” command or, if you use a UN*X-like OS, you may use “ <code>make</code> ” (and the given “ <code>Makefile</code> ”).
<code>Config</code>			Configuration files. Please customize your template by changing the files in this folder!

Chapters			Examples of document contents, including Chapters, Appendices, Annexes, Abstracts, Glossaries, Lists of Symbols, etc. Replace them with your own.
Bibliography			Where all your bibliography files should be located. You may have many bibliography files as you want.
template.pdf			A possible result of applying pdflatex to the "template.tex" file. The look and feel of the document will depend on the parametrization/configuration (e.g., School) of this template.
novathesis.cls			The main class file.
NOVAthesisFiles			Additional files for the novathesis template. This is where all the juice is so, unless you are a TeXmagician, don't mess up with the files and folders inside this folder.

Table 2.2: The configuration files (Config folder).

Name	Type	Access	Contents
0_memoir.tex			Options specific for the memoir class. <i>Don't touch this file unless you know what you are doing!</i>
1_novathesis.tex			The main configuration file for the template, e.g., select the document type, the school, the used languages, etc.
2_biblatex.tex			Select how your citations and bibliographic references will be printed. The default is numbers inside square brackets, e.g. [10], but you can change it to other formats, such as author-year, e.g., Lourenço (2021).
3_cover.tex			Configure cover contents (e.g., author's name, thesis/dissertation title, author, advisers, committee, etc)
4_files.tex			Select which files shall be included in the document as chapters, appendices, annexes, etc...
5_packages.tex			User's customization, such as loading additional packages and declare user defined commands.

6_list_of.tex			Configure the lists to be printed (table of contents, list of figures, list of tables, list of listings, etc). <i>Don't touch this file unless you know what you are doing!</i>
9_nova_fct.tex			Configurations specific to NOVA FCT. <i>Otherwise ignored.</i>
9_ulisboa_fmv.tex			Configurations specific to ULISBOA FMV. <i>Otherwise ignored.</i>
9_ulisboa_ist.tex			Configurations specific to ULISBOA IST. <i>Otherwise ignored.</i>
9_uminho.tex			Configurations specific to UMINHO (all schools). <i>Otherwise ignored.</i>

2.4 Customizing the *novathesis* template

The *novathesis* template can be customized by editing the files in the Config folder.

2.4.1 Options in 1_novathesis.tex

2.4.1.1 Most Relevant Options (1_novathesis.tex)

doctype=OPT

*phd, phdprop, phdplan, msc, mscplan,
bsc, plain*

The type of the document.

phd → PhD thesis (\Leftarrow default).
phdprop → PhD thesis proposal (for NOVA FCT).
phdplan → PhD thesis plan.
msc → MSc thesis.
mscplan → MSc thesis plan.
bsc → BSc report.
plain → Other report.

school=OPT

*nova/fct, nova/fcsh, nova/ims,
nova/ims/mcsig, nova/ims/mgt,
nova/ensp, nova/itqb/green,
nova/itqb/gray, ulisboa/ist, ulisboa/fcul,
ulisboa/fmv, uminho/eaad, uminho/ec,
uminho/ed, uminho/eeg, uminho/eeng,
uminho/elach, uminho/emed,
uminho/epsi, uminho/ese, uminho/i3bs,
uminho/ics, uminho/ie, iscteiul/eta,
ips/ests, ipl/isel, ipl/isel/meb, ulht/deisi,
ulht/mge, other/esep*

Selection of the university and of the school (and degree variant).

⇒ Default: *school=nova/fct*

This option changes the typesetting of the document to some specific School formating and layout, like covers, margins, fonts, paragraph spacing and indentation, etc.

docstatus=OPT

draft, provisional, final

The current status of the document.

working → Working version (⇐ default).

provisional → Version for submission.

final → Final version.

lang=OPT

en, pt, de, es, fr, gr, it

The main language for the document.

en → English (⇐ default).

pt → Portuguese.

de → German.

es → Spanish.

fr → French.

gr → Greek.

it → Italian.

media=OPT

screen, paper

The target media for the PDF.

screen → No empty/white pages (⇐ default).

paper → Empty/white pages are added when necessary.

print/webography=OPT

User defined title

Generate a separate bibliography for @online references.

⇒ Default: *print/webography=undefined*

If undefined, the @online references are list in the main bibliography. If defined, the @online references will be printed in a separate bibliography titled as given in the option.

color/links=OPT

Color name

The color for the hyperlinks (URLs, cross references, citations).

⇒ Default: *color/links=DarkBlue*

The valid color names as listed in “xcolor” manual, the “svgnames” color set.

glossaries/color/gls=OPT	The color for the glossary managed hyperlinks (glossary, symbols, etc).
<i>Color name</i>	\Rightarrow Default: <i>glossaries/color/gls=Black</i> The valid color names as listed in “xcolor” manual, the “svgnname” color set.
print/index=OPT	Print the (words) index at the end of the document.
<i>true,</i> <i>false</i> (\Leftarrow default)	Print the index (in Portuguese <i>Índice Remissivo</i>).

2.4.1.2 Less Relevant Options (1_novathesis.tex)

abstractorder=OPT	Forces the abstracts languages and order for documents in language L_0.
$L_0 = \{L_1, L_2, \dots, L_n\}$	\Rightarrow Default: <i>abstractorder={en={en,pt}}</i> for english \Rightarrow Default: <i>abstractorder={L={L, en}}</i> for lang L L_i is a two-letters language code from the set of valid language codes, following ISO 3166-1 (alfa-2).
lang/extralang=OPT	List of additional languages are used in the document besides the main language and those used in the abstracts (above).
$\{L_1, L_2, \dots, L_n\}$	\Rightarrow Default: <i>lang/extralang={}</i> L_i is a two-letters language code from the set of valid language codes, following ISO 3166-1 (alfa-2).
glossaries/list/reverse=OPT	Shall the glossary entries list the page numbers where those entries are used? (Like a reverse index!)
<i>true, (\Leftarrow default)</i> <i>false</i>	
tocintoc=OPT	Shall table of contents be listed in the table of contents?
<i>true,</i> <i>false</i> (\Leftarrow default)	
tocintoc=OPT	Shall a second cover page be forced?
<i>true,</i> <i>false</i> (\Leftarrow default)	If the contents for the second page are not defined, the second cover will be a replica of the first cover.
print/committee=OPT	Shall the evaluation committee be printed?
<i>true,</i> <i>false</i>	\Rightarrow Default: <i>print/committee=true if docstatus=final</i> \Rightarrow Default: <i>print/committee=false otherwise</i>

print/statement=OPT <i>true,</i> <i>false</i> (\Leftarrow default)	Shall the honor/originality statement be printed?
print/copyright=OPT <i>true, (= default)</i> <i>false</i>	Shall the copyright message be printed?
print/timestamp=OPT <i>true,</i> <i>false</i>	Shall a timestamp (with the PDF generation date/time) be printed in the cover? ⇒ Default: <i>print/timestamp=true if docstatus=working</i> ⇒ Default: <i>print/timestamp=false otherwise</i>
style/url=OPT <i>default, (= default)</i> <i>same</i>	Use the same (main) font in URLs?
style/font=OPT <i>arial, bookman, calibri, erewhon,</i> <i>kieranhealy, kpfonts, libertine, newpx,</i> <i>newsgott, scholax</i>	Which font set to use in the document? arial → Use ‘arial’ font. Requires Xe ^L A _T E _X or Lua ^L A _T E _X . bookman → Use ‘bookman’ font. calibri → Use ‘calibri’ font. Requires Xe ^L A _T E _X or Lua ^L A _T E _X . erewhon → Use ‘erewhon’ font. kieranhealy → Use ‘kieranhealy’ font. kpfonts → Use ‘palatino’ font. libertine → Use ‘libertine’ font. newpx → Use ‘palatino’ font. (\Leftarrow default) newsgott → Use ‘newsgott’ font. Requires Xe ^L A _T E _X or Lua ^L A _T E _X . scholax → Use ‘scholax’ font.

style/chapter=OPT

See list on the side!

Which chapter style to use in the document?

Besides the standard `memoir` chapter styles (`default`, `section`, `article`, `reparticle`, `hangnum`, `companion`, `demo`, `bianchi`, `bringhurst`, `brotherton`, `chappell`, `culver`, `dash`, `demodemoell`, `ger`, `lyhne`, `madsen`, `pedersen`, `southall`, `thatcher`, `veelo`, `verville`, `crosshead`, `dowding`, `komalike`, `ntglike`, `tandh`, `wilsondob`), the customized list of chapter styles below is also available.

<code>bar</code>	→ Use 'bar' chapter style. ($\Leftarrow \text{default}$)
<code>bar-compact</code>	→ Use 'bar-compact' chapter style.
<code>bluebox</code>	→ Use 'bluebox' chapter style.
<code>compact</code>	→ Use 'compact' chapter style.
<code>elegant</code>	→ Use 'elegant' chapter style.
<code>fmv</code>	→ Use 'fmv' chapter style.
<code>hansen</code>	→ Use 'hansen' chapter style.
<code>ist</code>	→ Use 'ist' chapter style.
<code>ist2</code>	→ Use 'ist2' chapter style.
<code>pedersen</code>	→ Use 'pedersen' chapter style.

lang/cover=OPT

en, pt, de, es, fr, gr, it

The main language for the cover.

⇒ Default: *The same as the main language.*

lang/copyright=OPT

en, pt, de, es, fr, gr, it

The main language for the copyright message.

⇒ Default: *The same as the main language.*

spine/layout=OPT

no, full, trim

Print the "book spine" at the end of the document?

⇒ Default: `'trim' if docstatus=final`

⇒ Default: `'no' otherwise`

`no` → do not print the book spine.

`full` → print the book spine in a full page.

`trim` → print and trim the page to the width of the book spine.

spine/width=OPT

`\LaTeX` dimension

Force the width of the "book spine".

⇒ Default: *The "natural width".*

The default width for the book spine will be the width of the number of pages of the document if printed in standard paper ($80g/m^2$).

debug=OPT

cover, spine

Activate debug mode for cover and/or book spine.

⇒ Default: `debug={}`

2.5 How to Write Using LATEX

Please have a look at Chapter 4, where you may find many examples of LATEX constructs, such as Sectioning, inserting Figures and Tables, writing Equations, Theorems and algorithms, exhibit code listings, etc.

2.6 Example glossary, acronyms, and symbols

This is the first occurrence of an abbreviation: abbreviation of a longer text (abbrev). And now the second occurrence of the same abbreviation: abbrev. And a new acronym with capital letter: And extension of a xpto (xpto) and reused xpto. Let's also use a few other acronyms such as acronym aaa (aaa), acronym aab (aab), acronym aba (aba), acronym bbb (bbb) and xpto. In geometry, the area enclosed by a circle of radius r is πr^2 . Here the Greek letter π is equal to the ratio of the circumference of any circle to its diameter. Lets add "computer" to the glossary! Be carefull with mathematical symbols in acronyms, please see the definition of μ .

ARTIFICIAL INTELLIGENCE DISCLOSURE STATEMENT

The `novathesis` template supports the rendering of a *Artificial Intelligence Disclosure Statement*.

The rendering is controlled by the `\ntsetup{print/aidisclosure=OPTION}` option in file `0-Config/1_novathesis.tex`.

Possible values for `OPTION` are:

<code>false</code>	Will omit the AI Disclosure Statement.
<code>filename.tex</code>	Will render the given file as the AI Disclosure Statement.
<code>aidisclose</code>	Will render the <i>standard</i> AI Disclosure Statement with the help of the <code>aidisclose</code> package.

3.1 Deactivating the AI Disclosure Statement

In file `0-Config/1_novathesis.tex` add the option `\ntsetup{print/aidisclosure=false}`.

3.2 Using Your Own AI Disclosure Statement

In file `0-Config/1_novathesis.tex` add the option `\ntsetup{print/aidisclosure=filename.tex}`.

3.3 Using the `novathesis` Standard AI Disclosure Statement

The `novathesis` template uses the `aidisclose` package [9], which extends the *GAIDeT* (*Generative AI Delegation Taxonomy*) [15] to automate Generative AI disclosure statements and checklists.

The `aidisclose` configuration file can be found at `0-Config/7_aidisclose.tex`. Although you can edit/change this file, it is strongly recommended that you use the package's companion web site at aidisclose.org, illustrated in Figure 3.1.

Fill the Author name and AI tools used, optionally add comments, leave *Configuration & Rendering* as is, and then select the appropriate checkboxes in *Taxonomy of Delegated Tasks*. Finally, press the green button at the bottom, and replace the `novathesisaidisclose` configuration file (`0-Config/7_aidisclose.tex`) with the contents given in the web site.

3.3. USING THE novathesis STANDARD AI DISCLOSURE STATEMENT

Generative AI Disclosure Generator

Generate compliant LaTeX code for the [aidisclose](#) package (v1.11.0).

General Information

Authors *

Full names of authors accepting responsibility.

AI Tools Used

Comma separated list of tools.

Comments & Details

Additional information about the disclosure statement.

Configuration & Rendering

<input checked="" type="checkbox"/> Auto-generate BibTeX file (autobib) <input checked="" type="checkbox"/> Suppress footnote citation (nocite) <input type="checkbox"/> No Title (\AIDrenderDeclaration*) Columns Language 3 <input type="button" value="Default"/> Default	Custom Section Title (Optional) <small>Default: Generative AI Disclosure</small> Short Title (TOC) <input type="text" value="\section, \chapter..."/> LaTeX Label <small>e.g. sec:aid_declaration</small>
--	---

Taxonomy of Delegated Tasks

Select specific tasks delegated to Artificial Intelligence.

CONCEPTUALIZATION <input checked="" type="checkbox"/> Idea generation <input type="checkbox"/> Defining objectives <input type="checkbox"/> Research questions <input checked="" type="checkbox"/> Feasibility assessment <input type="checkbox"/> Hypothesis viability <input type="checkbox"/> Simulated debate	LITERATURE REVIEW <input type="checkbox"/> Search & Discovery <input type="checkbox"/> Summarization <input type="checkbox"/> Concept Mapping <input type="checkbox"/> Patterns & Themes <input type="checkbox"/> Identifying Gaps <input type="checkbox"/> Translation	METHODOLOGY <input type="checkbox"/> Research Design <input type="checkbox"/> Prototyping <input checked="" type="checkbox"/> Validation
SOFTWARE & AUTOMATION <input type="checkbox"/> Code Generation <input checked="" type="checkbox"/> Optimization <input checked="" type="checkbox"/> Debugging <input checked="" type="checkbox"/> Scripts <input type="checkbox"/> Algorithms <input type="checkbox"/> Documentation	DATA MANAGEMENT <input type="checkbox"/> Collection/Scraping <input type="checkbox"/> Validation/Quality <input type="checkbox"/> Cleaning <input type="checkbox"/> Curation <input type="checkbox"/> Analysis <input type="checkbox"/> Visualization <input type="checkbox"/> Reporting Results <input type="checkbox"/> Labeling <input type="checkbox"/> Synthetic Data <input type="checkbox"/> Anonymization <input type="checkbox"/> Translation	VISUALS <input type="checkbox"/> Image Generation <input type="checkbox"/> Editing <input checked="" type="checkbox"/> Charts/Diagrams
WRITING & EDITING <input checked="" type="checkbox"/> Drafting <input checked="" type="checkbox"/> Polishing <input type="checkbox"/> Summarizing <input type="checkbox"/> Connecting Ideas <input checked="" type="checkbox"/> Tone Adjustment <input type="checkbox"/> Translation <input type="checkbox"/> References <input type="checkbox"/> Proofreading <input type="checkbox"/> Title Suggestions	ETHICS <input type="checkbox"/> Bias Mitigation <input type="checkbox"/> Risk Assessment <input type="checkbox"/> Compliance <input type="checkbox"/> Conflict of Interest	CRITIQUE & FEEDBACK <input type="checkbox"/> Q&A / Querying <input type="checkbox"/> Troubleshooting <input type="checkbox"/> Identifying Limits <input type="checkbox"/> Future Work Recs <input type="checkbox"/> Response to Reviewers

Help keep this tool alive
[Donate](#) [PayPal](#)

Figure 3.1: The [aidisclose.org](#) web site

3.3.1 About the AI Tags

3.4 Detailed Taxonomy Descriptions

This appendix provides a detailed breakdown of the aidisclose taxonomy. For each category, we define the **Objective** (the high-level goal of using AI in this phase) and the **Scope** (what is generally included or excluded).

1. Conceptualization

Objective: To use AI as a thought partner for brainstorming, refining the research direction, and establishing the theoretical foundation before empirical work begins.

Scope: Includes ideation, hypothesis formation, and feasibility checks. Excludes the actual execution of experiments or data collection.

Keys:

Idea generation: Using AI to brainstorm new research topics, interdisciplinary connections, or novel angles on existing problems.

Objective refinement: Refining vague goals into concrete, actionable research objectives.

Research questions: Drafting and iterating on specific research questions (RQs) to ensure they are clear and answerable.

Feasibility check: Assessing whether the proposed study is viable regarding resources, time, and data availability.

Preliminary research: Conducting quick background checks or “pre-studies” to see if the idea has already been solved.

Simulation/Scenarios: Using AI to conceptualize theoretical models, simulate persona responses, or design hypothetical scenarios.

2. Literature Review

Objective: To accelerate the discovery, synthesis, and organization of existing knowledge.

Scope: Includes searching, summarizing, and translating papers. Excludes the final critical argumentation (which remains the author’s responsibility).

Keys:

Search & Discovery: Using AI tools (e.g., semantic search) to find relevant papers that keyword searches might miss.

Summarization: Generating summaries or abstracts of long papers to quickly assess relevance.

Mapping: Visualizing connections, citation networks, or thematic clusters in the literature.

Pattern recognition: Identifying trends or recurring themes across a large corpus of text.

Gap identification: Using AI to suggest areas where current research is lacking or contradictory.

Translation: Translating foreign-language literature to make it accessible for the review.

3. Methodology

Objective: To assist in the structural design of the research study.

Scope: Includes experimental design and instrument creation. Excludes the physical conduct of experiments.

Keys:

Experimental design: Designing the logic, control groups, and variables of the study.

Prototyping: Creating early drafts of survey instruments, interview guides, or experimental apparatus designs.

Method selection: Suggesting appropriate statistical methods or qualitative frameworks for the data.

4. Software Development and Automation

Objective: To facilitate the creation, optimization, and maintenance of code used in the research.

Scope: Includes coding, debugging, and documentation.

Keys:

Code generation: Generating boilerplate code, scripts, or functions from natural language descriptions.

Optimization: Refactoring code for better performance or readability.

Debugging: Identifying syntax errors or logical bugs in scripts.

Automation: Writing scripts to automate file management, backups, or batch processing.

Algorithm design: Assisting in the logic and mathematical formulation of algorithms.

Documentation: Generating docstrings, comments, and README files for research software.

5. Data Management

Objective: To handle the data lifecycle from collection to reporting.

Scope: Includes cleaning, analysis, and synthetic generation. Excludes the fabrication of results (which is ethical misconduct, distinct from declared synthetic data).

Keys:

Collection: Writing scrapers or using AI agents to gather public data.

Validation: Checking data for consistency, outliers, or errors.

Cleaning: Automating the formatting, parsing, and repair of messy datasets.

Curation: Organizing and categorizing large datasets.

Analysis: Suggesting or performing statistical tests and interpreting raw outputs.

Visualization: Generating code for plots, graphs, and data dashboards.

Reporting: Summarizing data findings in textual or tabular format.

Labeling: Using LLMs to annotate or classify text/image datasets (zero-shot/few-shot labeling).

Synthesis: Generating synthetic datasets to preserve privacy or augment small samples.

Anonymization: Detecting and removing Personally Identifiable Information (PII).

Translation: Translating textual data (e.g., survey responses) into the analysis language.

6. Visuals and Multimedia

Objective: To create or enhance non-data visual elements.

Scope: Includes illustrative diagrams and image editing. Excludes scientific data plots (covered in Data Management).

Keys:

Generation: Creating conceptual images, illustrations, or diagrams from scratch.

Editing: Enhancing, cropping, or modifying existing images (e.g., removing background).

Charts/Infographics: Creating flowcharts, process diagrams, or high-level infographics.

7. Writing and Editing

Objective: To assist in the textual articulation of the research.

Scope: Includes drafting, polishing, and translation. Note: Authors remain accountable for accuracy.

Keys:

Drafting: Generating initial text for sections based on bullet points or notes.

Polishing: Correcting grammar, spelling, and punctuation.

Summarizing: Creating the abstract or plain-language summary.

Conclusions: Synthesizing the discussion into a final concluding statement.

Tone adjustment: Rewriting text to be more formal, concise, or accessible.

Translation: Translating the manuscript from the author's native language to the publication language.

References: Formatting citations and bibliography styles.

Presentation: Drafting slide decks or conference poster text.

Title generation: Brainstorming catchy and accurate titles for the work.

8. Ethics Review

Objective: To act as a check on the ethical integrity of the work.

Scope: Includes bias detection and risk assessment.

Keys:

Bias detection: Scanning text or study designs for potential cultural or gender bias.

Risk assessment: Identifying potential dual-use concerns or societal risks.

Compliance: Checking against specific ethical guidelines or checklists.

Confidentiality: Ensuring no private data is inadvertently leaked in the text.

9. Quality Assurance (Supervisor Role)

Objective: To use AI as a critical reviewer or “devil’s advocate.”

Scope: Includes simulated peer review and limitation checking.

Keys:

Simulated Peer Review: Using AI as a reviewer to identify unclear sections or potential critiques.

Field Trends & Consistency: Checking the manuscript against current research trends and ensuring internal consistency.

Limitations: Identifying weaknesses or limitations in the study that the authors missed.

Publication strategy: Suggesting suitable journals or conferences and helping with the submission strategy.

Publication support: Assisting in drafting cover letters, responses to reviewers, or other publication-related materials.

A SHORT LATEX TUTORIAL WITH EXAMPLES

This Chapter aims at exemplifying how to do common stuff with LATEX. We also show some stuff which is not that common! ;)

Please, use these examples as a starting point, but you should always consider using the *Big Oracle* (aka, [Google](#), your best friend) to search for additional information or alternative ways for achieving similar results.

4.1 Document Structure

4.2 Dealing with Bibliography

Citing something online [4, 12, 7].

4.3 Inserting Tables

4.4 Importing Images

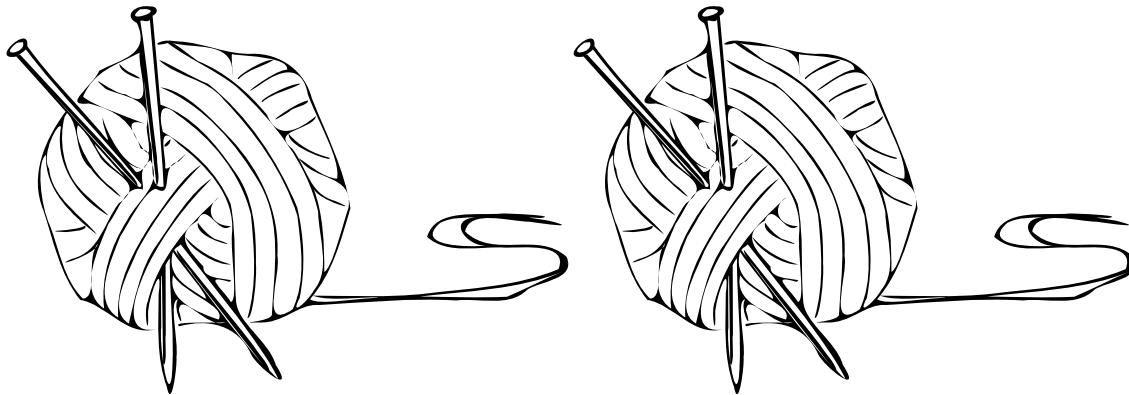
4.5 Floats, Figures and Captions

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetuer id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet,

tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.



(a) One sub-figure

(b) Another sub-figure

Figure 4.1: A figure with two sub-figures!

And this is a small text that references the Figure 4.1 and its Subfigures 4.1(a) and 4.1(b).

 Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

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4.6 Text Formatting

4.7 Generating PDFs from L^AT_EX

4.7.1 Generating PDFs with pdflatex

You may create PDF files either by using `latex` to generate a DVI file, and then use one of the many DVI-2-PDF converters, such as `dvipdfm`.

Alternatively, you may use `pdflatex`, which will immediately generate a PDF with no intermediate DVI or PS files. In some systems, such as Apple, PDF is already the default format for L^AT_EX. I strongly recommend you to use this approach, unless you have a very good argument to go for `latex + dvipdfm`.

A typical pass for a document with figures, cross-references and a bibliography would be:

```
$ pdflatex template
$ bibtex template
$ pdflatex template
$ pdflatex template
```

You will notice that there is a new PDF file in the working directory called `template.pdf`. Simple :)

Please note that, to be sure all table of contents, cross-references and bibliographic citations are up-to-date, you must run `latex` once, then `bibtex`, and then `latex` twice.

4.7.2 Dealing with Images

You may process the same source files with both `latex` or `pdflatex`. But, if your text include images, you must be careful. `latex` and `pdflatex` accept images in different (exclusive) formats. For `latex` you may use EPS ou PS figures. For `pdflatex` you may use JPG, PNG or PDF figures. I strongly recommend you to use PDF figures in vectorial format (do not use bitmap images unless you have no other choice).

4.7.3 Dealing with Citations

To make citations, the reference key in the BibTeX file should be used. If it is a single reference [2], use a “~” to link the `\cite{...}` to the word that precedes it (...reference~`\cite[Artho04]`). If you want to make multiple citations [13, 14, 11], they should be grouped within a single `\cite{...}` and separated by commas.

Note that the bibliography file can have as many entries as you want. Only those whose keys are referenced in the text will be included in the bibliography list.

4.7.4 Footnotes

Footnotes¹ will be numbered and shown in the bottom of the page.

4.7.5 Tables

The Table 4.1 illustrates some important concepts associated with table construction:

- i) Do not use vertical lines;
- ii) The caption should be above the table;
- iii) Use the macros `\toprule`, `\midrule` and `\bottomrule` to make the top, inner and bottom horizontal lines, respectively.

Table 4.1: Test results summary.

Test	Anomalies	Warnings	Correct	Categories	Missed
Connection [3]	2	2	1	C	1
Coordinates'03 [1]	1	4	1	2B, 1C	0
Local Variable [1]	1	2	1	A	0
NASA [1]	1	1	1	—	0
Coordinates'04 [2]	1	4	1	3C	0
Buffer [2]	0	7	0	2A, 1B, 2C, 2D	0
Double-Check [2]	0	2	0	1A, 1B	0
StringBuffer [6]	1	0	0	—	1
Account [17]	1	1	1	—	0
Jigsaw [17]	1	2	1	C	0

¹This is a simple footnote.

Over-reporting [17]	0	2	0	1A, 1C	0
Under-reporting [17]	1	1	1	—	0
Allocate Vector [8]	1	2	1	C	0
Knight Moves [3]	1	3	1	2B	0
Total	12	33	10	5A, 6B, 10C, 2D	2

4.7.6 Figures

The images inserted in the document must be of good quality, preferably in vector format (vector PDF) and not in *bitmap* (PNG, JPG, etc.). *bitmap* images (Figure 4.2) do not scale well and have negative effects on the quality of your document. On the other hand, *vector* images Figure 4.3 scale as much as necessary without degrading the quality of the image.

You should only use *screenshots* for your plots, charts, etc, if you absolutely have no other alternative. Instead of generating a *screenshot*, try using a virtual PDF printer and printing to a PDF file. As a general rule, you will get a vector PDF. Even if your PDF contains images, they will always be of higher or equal quality than what you would get with a *screenshot*.

To combine several figures into a single one... You can then reference the set as Figure 4.4 or the sub-figures separately as 4.4(a) and 4.4(b).

4.8 Equations

LaTeX is a powerful tool for writing in a mathematical style. It allows you to insert formulas into the text, such as this: $ax^2 + bx + c = 0$. It also allows formulas to be highlighted on a separate line and centered on the page.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

or numbered

$$e = mc^2 \tag{4.1}$$

which can later be referenced as equation 4.1

4.9 Test for listings

Testing the package “listings”...

Listing 4.1: cap

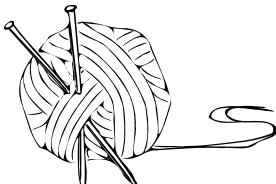
```
if (a==b)
  puts ("YESS!")
```



Figure 4.2: Bitmap image (JPG/PNG)



Figure 4.3: Vectorial image (PDF)



(a) Wool ball



(b) Snowstorm

Figure 4.4: Example of *subbottom* usage

4.10 Test for minted

Testing the package “minted”...

```
if(a==b)
  puts("YESS!")
```

Listing 1: Example of a listing.

4.11 Test for algorithms

Uncomment the algorithms source below and add the following to file “5_packages.tex”

```
\usepackage{algorithm2e}
\RestyleAlgo{ruled}
```

and uncomment

```
\ntaddlistof{listofalgorithms}
```

in file “6_list_of.tex”.

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A

NOVATHESIS COVERS SHOWCASE

This Appendix shows examples of covers for some of the supported Schools. When the Schools have very similar covers (e.g., all the schools from Universidade do Minho), just one cover is shown. If the covers for MSc dissertations and PhD thesis are considerable different (e.g., for NOVA FCT and UMinho), then both are shown.

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B

APPENDIX 2 LOREM IPSUM

This is a test with citing something [5] in the appendix.

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ANNEX 1 LOREM IPSUM

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A Very Long and Impressive Thesis Title with a Forced Line Break