# The **coppe** document class

Vicente H. F. Batista      George O. Ainsworth Jr.

December 20, 2009

**Abstract**

In this work, it is described the **coppe** document class as well as other files distributed by the CoppeTeX project. This class is suitable for writing academic dissertations, thesis and qualifying exams according to the formatting rules of the Alberto Luiz Coimbra Institute for Graduate Studies and Research in Engineering. The minimalist set of macro commands allows its users to concentrate most of their efforts on text composition rather than on the document layout.

## 1 Introduction

Writing documents in LaTeX may be a laborious task when the authors have to prepare their manuscripts rigorously respecting formatting rules imposed by publishers. Regardless of difficulty, a lot of thesis presented to the Coordination of Graduate Studies and Research in Engineering of the Federal University of Rio de Janeiro (COPPE/UFRJ) is typeseted in LaTeX. This demand motivated the creation of the CoppeTeX project, which tries to facilitate and encourage the use of LaTeX within the COPPE/UFRJ scope.

The **coppe** document class is the main product of CoppeTeX. It was designed to be clear and succinct. It enables the creation of dissertations, qualifying exams and thesis in a simple and automatic way. The main goal of the **coppe** class is to maintain authors strictly focused on text composition without worrying about margins sizes, line spacing, paper size, vertical and horizontal alignment, etc. The CoppeTeX project comprehends also BibTeX and MakeIndex style files for creating lists of references, symbols and abbreviations. Although there aren't official guidelines to write qualifying exams, we provide this option just for convenience, as this exam is a requisite to obtain the DSc degree.

In which follows, it is described the user interface of the **coppe** class. Some details about using the style files cited above are also given. We use the term *thesis* to generally refer to dissertation, qualifying exam, and thesis itself.

## 2 License

# 3    Support

We maintain a mailing list where users can send questions, comments, and bugs to. More details can be found at [http://coppetex.sourceforge.net/mailing-list.html](http://coppetex.sourceforge.net/mailing-list.html).

# 4    User interface

\frontmatter
\mainmatter
\backmatter

A thesis to be approved by the Academic Registry at COPPE/UFRJ must contain three-parts: *front*, *main* and *back* matters [1]. Each one of these parts is started by calling its corresponding macro \frontmatter, \mainmatter or \backmatter. The front matter of a thesis consists of front cover and face, cataloging page, dedication, acknowledgments, abstracts, table of contents, and lists of tables, algorithms, symbols and abbreviations. The main matter is just composed by chapters, while the back matter usually consists of bibliographic references, appendices and index.

You must invoke the \frontmatter macro immediately after the \maketitle one. The \mainmatter command comes right before the first chapter, and \backmatter must be typed before the list of references.

## Front cover

This element was recently introduced by the Academic Registry. It is automatically constructed by the \maketitle command.

## Front face

The front face is unnumbered. There, it is not allowed to use hyphenation [1]. It is constructed by calling \maketitle. Next, it is described the commands used to enter the information required to create it.

\author
The \author command was redefined. Here, it takes two arguments: the author's first names and surname, e.g., \author{First Names}{Surname}. The words should be typed with only first letters in uppercase.

\title
\foreigntitle
The macros \title and \foreigntitle are used to enter the titles of your monograph in the current and foreign languages. The default languages are Brazilian Portuguese and English. The babel package is automatically loaded by coppe.cls, so you do not need to load it again. The Brazilian Portuguese is the main language and the English is only required for the foreign abstract.

\advisor
\examiner
Every COPPE student is coordinated by at least one advisor. M.Sc. and D.Sc. students can have at most 2 and 3 advisors, respectively. Their names must be provided by issuing the command \advisor as below:

```
\advisor{Title}{Advisor's Name}{Surname}{Degree}
\advisor{Title}{Second Advisor's Name}{Surname}{Degree}
\advisor{Title}{Third Advisor's Name}{Surname}{Degree}
```

The advisors are not necessarily members of the thesis examination board. Thus, it is required to enter the names of all examiners using the \examiner macro. The examiners' names are entered differently:

```
\examiner{Title}{First Examiner's Name Surname}{Degree}
\examiner{Title}{Second Examiner's Name Surname}{Degree}
...
\examiner{Title}{N-th Examiner's Name Surname}{Degree}
```

Remember that all names must be given before calling `\maketitle`.

`\department`    The Alberto Luiz Coimbra institute is divided into 12 academic units: Biomedical Engineering (PEB), Civil Engineering (PEC), Electrical Engineering (PEE), Mechanical Engineering (PEM), Metallurgical and Materials Science Engineering (PEMM), Nuclear Engineering (PEN), Ocean Engineering (PENO), Energy Planning (PPE), Production Engineering (PEP), Chemical Engineering (PEQ), Systems Engineering and Computer Science (PESC), and Transportation Engineering (PET). You must specify your department using one of the above abbreviations, e.g., `\department{PEC}`.

`\date`    This macro is used to set the month and year of defense. This information is required to create the front face, cataloging details page and abstracts. For example, October 2007 should be entered as `\date{10}{2007}`.

`\keyword`    The keywords should describe the concentration areas of your work. You must provide them as follows:

```
\keyword{First Keyword}
\keyword{Second Keyword}
...
\keyword{N-th Keyword}
```

Usually, six words are enough.

## Cataloging details

This page contains cataloging information useful for librarians. Fortunately, it is automatically generated from the data you entered at the time you call `\maketitle`. It is not needed in qualifying exams, though.

## Dedication (optional)

`\dedication`  This macro was added for convenience. The input text is placed at the right bottom of a blank page. It is emphasized and in normal size.

## Abstracts

`abstract`  As stated by the Academic Registry [1], abstracts must be in one page each. Still, `foreignabstract`  it is recommended that they should be only one paragraph long. They must be defined inside the environments `abstract` and `foreignabstract`.

## Lists of symbols and abbreviations (optional)

`\abbrev`  The lists of symbols and abbreviations are optional, although highly recommended. `\symbl`  It is a good practice to define a symbol/abbreviation in its first occurrence in the text. To define a symbol use `\symbl{Symbol}{Symbol Definition}`, and for abbreviations `\abbrev{Abbreviation}{Abbreviation Definition}`. These

```

commands are called *dummy*, since they don't output anything at the place they are executed, just an entry in the correspondent list.

\makeloabbreviations  These lists are lexicographically sorted by using the MakeIndex program, which
\makelosymbols  is part of any LaTeX implementation. MakeIndex needs two commands to create a
\printloabbreviations  final sorted list: one which generates a list of entries and the other that indicates
\printlosymbols  the position where the list will be printed out. To generate the lists of symbols and abbreviations, the `coppe` class provides the commands `\makeloabbreviations` and `\makelosymbols`, respectively. They must be called in the document preamble. The commands `\printlosymbols` and `\printloabbreviations` have to be invoked at the point where you want these lists appear, e.g., following the list of tables as showed in the example. Once you call `latex`, it will be created two files with extensions `abx` and `syx`, which contain MakeIndex input data. They must be processed with `makeindex` in order to get the lists correctly produced, redirecting the output to files with extension `lab` and `los` respectively:

```
makeindex -s coppe.ist -o example.lab example.abx
makeindex -s coppe.ist -o example.los example.syx
```

Note the `-s` option for specifying the style `coppe.ist`. Now, rerun `latex` twice to get the references solved and you are done.

### References

It is well known that bibliography databases can be easily maintained with the aid of BibTeX. Thus, the CoppeTeX project designed two BibTeX styles, `coppe-plain.bst` and `coppe-unsrt.bst`. The `coppe-plain.bst` creates a list of references alphabetically sorted. The later is a numbered style, which sorts references by the order of citation. To use them, you have to select either `coppe-plain` or `coppe-unsrt` as the BibTeX style and include your BibTeX references without the `bib` extension, as in the following example:

```
\bibliographystyle{coppe-unsrt}
\bibliography{example}
```

Run in sequence LaTeX, BibTeX, and twice again LaTeX to resolve reference. These styles are `natbib` compatible. This means that you can freely issue the commands `\citet` and `\citep`, as well as any other `natbib` feature.

## 5   Class options

There are some options users can specify in order to customize the appearance of the output produced by the `coppe` class. These options can be passed to `coppe` as follows: `\documentclass[option1, option2]{coppe}`. In which follows, we give a brief description of all supported options.

**dsc, msc, dscexam** The `coppe` class is able to produce thesis, dissertations, and qualifying exams, which are enabled by the `dsc`, `msc`, and `dscexam` options, respectively.

**pdftex, dvips** Since the addition of a front cover with Minerva's picture, it is required to use a package to enable graphics inclusion. This requires the specification of a graphical driver for handling image files. You may choose between two standard graphical drivers, `pdftex` and `dvips`, just passing its name as a class option. Because the PDF is the leading format for publishing digital documents, COPPETEX loads the `pdftex` driver by default.

**doublespacing** The default line spacing is one-and-a-half. For enabling double spacing between lines, use the `doublespacing` option.

**numbers** The default citation style is the author-year scheme, which must be followed by the use of its corresponding BIBTEX style, namely, the `coppe-plain.bst` file. For numbered citations, specify the option `numbers` to the `coppe` class. In this case, it is mandatory the use of `coppe-unsrt.bst`, as the bibliography style.

## 6 Quick, useful tips

**Pictures.** The default picture format of LATEX is the Encapsulated PostScript (EPS). If you use pdfTEX, the default format becomes the PDF, but you can equally load PNG files. For such, you must enter the name of your image file without extension, e.g., `\includegraphics{filename}`, and `pdftex` will firstly look for a file called `filename.pdf` and after for file `filename.png`.

**Fonts.** The default font in LATEX is the Computer Modern. If you would like to try its enhanced version, consider using the `lmodern` package. To use Times, it is recommended to load the package `mathptmx`, rather than the deprecated `times`. There is also an enhanced Times version available with the `tgtermes` package. You can still use the Arial font face with the package `uarial`. Before including these packages you should call `\usepackage[T1]{fontenc}`. This command will tell LATEX to use high-quality PostScript Type1 fonts.

**Hyperref.** When working with PDF's, there is the possibility to add extra information to the file as the author's name, document title, subject, keywords, etc. This is easily done with the `hyperref` package. It is also useful to enable hyperlinks. Fortunately, the `coppe` class loads `hyperref` by default and fills in all the document properties for you.

**Printing.** To get your work correctly printed, you must ensure that any page scaling option (e.g., fit or shrink to printable area) isn't enabled. This kind of option often comes in print dialogs of document visualization softwares.

## 7 A simple example

```
1 ⟨∗example⟩
2 \documentclass[dsc,pdftex,numbers]{coppe}
3 \usepackage[T1]{fontenc}
4 \usepackage{amsmath,amssymb}
5 \usepackage{lmodern}
```

```latex
  6
 7 \makelosymbols
 8 \makeloabbreviations
 9
10 \begin{document}
11   \title{T\'itulo da Tese}
12   \foreigntitle{Thesis Title}
13 \author{Nome do Autor}{Sobrenome}
14 \advisor{Prof.}{Nome do Primeiro Orientador}{Sobrenome}{D.Sc.}
15 \advisor{Prof.}{Nome do Segundo Orientador}{Sobrenome}{Ph.D.}
16 \advisor{Prof.}{Nome do Terceiro Orientador}{Sobrenome}{D.Sc.}
17
18 \examiner{Prof.}{Nome do Primeiro Examinador Sobrenome}{D.Sc.}
19 \examiner{Prof.}{Nome do Segundo Examinador Sobrenome}{Ph.D.}
20 \examiner{Prof.}{Nome do Terceiro Examinador Sobrenome}{D.Sc.}
21 \examiner{Prof.}{Nome do Quarto Examinador Sobrenome}{Ph.D.}
22 \examiner{Prof.}{Nome do Quinto Examinador Sobrenome}{Ph.D.}
23   \department{PEC}
24   \date{10}{2009}
25
26   \keyword{Primeira palavra-chave}
27   \keyword{Segunda palavra-chave}
28   \keyword{Terceira palavra-chave}
29
30   \maketitle
31
32   \frontmatter
33 \dedication{A algu\'em cujo valor \'e digno desta dedicat\'oria.}
34
35   \chapter*{Agradecimentos}
36
37   Gostaria de agradecer a todos.
38
39   \begin{abstract}
40
41   Apresenta-se, nesta tese, ...
42
43   \end{abstract}
44
45   \begin{foreignabstract}
46
47   In this work, we present ...
48
49   \end{foreignabstract}
50
51   \tableofcontents
52   \listoffigures
53   \listoftables
54   \printlosymbols
55   \printloabbreviations
56
57   \mainmatter
58   \chapter{Introdu\c c}\~ao}
59
```

```latex
60  Segundo a norma de formata{\c c}\~ao de teses e disserta{\c c}\~oes do Instituto Alberto
61  Luiz Coimbra de P\'os-gradua{\c c}\~ao e Pesquisa de Engenharia (COPPE), toda
62  abreviatura deve ser definida antes de utilizada.\abbrev{COPPE}{Instituto
63  Alberto Luiz Coimbra de P\'os-gradua{\c c}\~ao e Pesquisa de Engenharia}
64
65  Do mesmo modo, \'e imprescind\'ivel definir os s\'imbolos, tal como o conjunto dos
66  n\'umeros reais $\mathbb{R}$ e o conjunto vazio $\emptyset$.
67  \symbl{$\mathbb{R}$}{Conjunto dos n\'umeros reais} \symbl{$\emptyset$}{Conjunto
68  vazio}
69
70  \chapter{Revis\~ao Bibliogr\'afica}
71
72  Para ilustrar a completa ades\~ao ao estilo de cita{\c c}\~oes e listagem de
73  refer\^encias bibliogr\'aficas, a Tabela~\ref{tab:citation} apresenta cita{\c c}\~oes
74  de alguns dos trabalhos contidos na norma fornecida pela CPGP da COPPE,
75  utilizando o estilo num\'erico.
76
77  \begin{table}[h]
78  \caption{Exemplos de cita{\c c}\~oes utilizando o comando padr\~ao
79    \texttt{\textbackslash cite} do \LaTeX\ e
80    o comando \texttt{\textbackslash citet},
81    definidos pelo pacote \texttt{natbib}.}
82  \label{tab:citation}
83  \centering
84  {\footnotesize
85  \begin{tabular}{|c|c|c|}
86    \hline
87    Tipo da Publica{\c c}\~ao & \verb|\cite| & \verb|\citet|\\
88    \hline
89    Livro & \cite{book-example} & \citet{book-example}\\
90    Artigo & \cite{article-example} & \citet{article-example}\\
91    Relat\'orio & \cite{techreport-example} & \citet{techreport-example}\\
92    Relat\'orio & \cite{techreport-exampleIn} & \citet{techreport-exampleIn}\\
93    Anais de Congresso & \cite{inproceedings-example} &
94      \citet{inproceedings-example}\\
95    S\'eries & \cite{incollection-example} & \citet{incollection-example}\\
96    Em Livro & \cite{inbook-example} & \citet{inbook-example}\\
97    Disserta{\c c}\~ao de mestrado & \cite{mastersthesis-example} &
98      \citet{mastersthesis-example}\\
99    Tese de doutorado & \cite{phdthesis-example} & \citet{phdthesis-example}\\
100   \hline
101 \end{tabular}}
102 \end{table}
103
104 \chapter{M\'etodo Proposto}
105 \chapter{Resultados e Discuss\~oes}
106 \chapter{Conclus\~oes}
107
108 \backmatter
109 \bibliographystyle{coppe-unsrt}
110 \bibliography{example}
111
112 \appendix
113 \chapter{Algumas Demonstra{\c c}\~oes}
```

```
114 \end{document}
115 ⟨/example⟩
```

# 8  Implementation

## 8.1  The 'coppe.cls' file

```
116 ⟨∗class⟩
117 \def\filename{coppe.dtx}
118 \def\fileversion{v2.1.1}
119 \def\filedate{2009/11/17}
120 \NeedsTeXFormat{LaTeX2e}[1995/12/01]
121 \ProvidesClass{coppe}[\filedate\ \fileversion\ COPPE Dissertations and Thesis]
122 \LoadClass[12pt,a4paper,oneside]{book}
123 \RequirePackage[sort&compress]{natbib}
124 \RequirePackage{hyphenat}
125 \RequirePackage{lastpage}
126 \RequirePackage{hyperref}
127 \RequirePackage[english,brazil]{babel}
128 \RequirePackage{ifthen}
129 \RequirePackage{graphicx}
130 \RequirePackage{setspace}
131 \RequirePackage{tabularx}
132 \RequirePackage{eqparbox}
133 \RequirePackage[a4paper,bindingoffset=0.0cm,vcentering=true,%
134 top=2.5cm,bottom=2.5cm,left=3.0cm,right=3.0cm]{geometry}
135 \def\CoppeTeX{{\rm C\kern-.05em{\sc o\kern-.025em p\kern-.025em
136 p\kern-.025em e}}\kern-.08em
137 T\kern-.1667em\lower.5ex\hbox{E}\kern-.125emX\spacefactor1000}
138 \newboolean{isdraft}
139 \newboolean{maledoc}
140 \setboolean{maledoc}{false}
141 \setboolean{isdraft}{false}
142 %
143 \DeclareOption{msc}{%
144   \newcommand{\@degree}{M.Sc.}
145   \newcommand{\@degreename}{Mestrado}
146   \newcommand{\local@degname}{Mestre}
147   \newcommand{\foreign@degname}{Master}
148   \newcommand\local@doctype{Disserta\c c{}\~ a}o}
149   \newcommand\foreign@doctype{Dissertation}
150 }
151 \DeclareOption{dscexam}{%
152   \newcommand{\@degree}{D.Sc.}
153   \newcommand{\@degreename}{Doutorado}
154   \newcommand{\local@degname}{Doutor}
155   \newcommand{\foreign@degname}{Doctor}
156   \setboolean{maledoc}{true}
157   \newcommand\local@doctype{Exame de Qualifica\c c{}\~ a}o}
158   \newcommand\foreign@doctype{Qualifying Exam}
159 }
160 \DeclareOption{dsc}{%
161   \newcommand{\@degree}{D.Sc.}
162   \newcommand{\@degreename}{Doutorado}
```

```
163    \newcommand{\local@degname}{Doutor}
164    \newcommand{\foreign@degname}{Doctor}
165    \newcommand\local@doctype{Tese}
166    \newcommand\foreign@doctype{Thesis}
167 }
168 \DeclareOption{draft}{%
169    \setboolean{isdraft}{true}
170    \ClassWarning{coppe}{draft mode is ON}%
171 }
172 \DeclareOption{numbers}{%
173    \PassOptionsToPackage{numbers}{natbib}
174 }
175 \DeclareOption{pdftex}{%
176    \PassOptionsToPackage{pdftex}{hyperref,graphicx}
177    \PassOptionsToPackage{plainpages=false,pdfpagelabels}{hyperref}
178 }
179 \DeclareOption{dvips}{%
180    \PassOptionsToPackage{dvips}{hyperref,graphicx}
181 }
```

Here is the default one-and-a-half line spacing. Users can change to double spacing by passing the `doublespacing` option.

```
182 \onehalfspacing
183 \DeclareOption{doublespacing}{%
184    \doublespacing
185 }
186 \ProcessOptions\relax
```

`\university`  Set the university name.

```
187 \newcommand\university[1]{%
188    \renewcommand\local@universityname{#1}
189 }
190 %
191 % \begin{macro}{\department}
192 % This macro is used to set the author's affiliation. There are twelve options
193 % which correspond to all academic units at COPPE/UFRJ. It defines the current
194 % and the foreign names of these units.
195 %     \begin{macrocode}
196 \newcommand\department[1]{%
197    \ifthenelse{\equal{#1}{PEB}}
198      {\global\def\local@deptname{Engenharia Biom{\' e}dica}
199       \global\def\foreign@deptname{Biomedical Engineering}}{}
200    \ifthenelse{\equal{#1}{PEC}}
201      {\global\def\local@deptname{Engenharia Civil}
202       \global\def\foreign@deptname{Civil Engineering}}{}
203    \ifthenelse{\equal{#1}{PEE}}
204      {\global\def\local@deptname{Engenharia El{\' e}trica}
205       \global\def\foreign@deptname{Electrical Engineering}}{}
206    \ifthenelse{\equal{#1}{PEM}}
207      {\global\def\local@deptname{Engenharia Mec{\^ a}nica}
208       \global\def\foreign@deptname{Mechanical Engineering}}{}
209    \ifthenelse{\equal{#1}{PEMM}}
210      {\global\def\local@deptname{Engenharia Metal{\' u}rgica e de Materiais}
211 \global\def\foreign@deptname{Metallurgical and Materials Engineering}}{}
212    \ifthenelse{\equal{#1}{PEN}}
```

```
213    {\global\def\local@deptname{Engenharia Nuclear}
214     \global\def\foreign@deptname{Nuclear Engineering}}{}
215  \ifthenelse{\equal{#1}{PENO}}
216    {\global\def\local@deptname{Engenharia Oce{\^ a}nica}
217     \global\def\foreign@deptname{Ocean Engineering}}{}
218  \ifthenelse{\equal{#1}{PPE}}
219    {\global\def\local@deptname{Planejamento Energ{\' e}tico}
220     \global\def\foreign@deptname{Energy Planning}}{}
221  \ifthenelse{\equal{#1}{PEP}}
222    {\global\def\local@deptname{Engenharia de Produ{\c c}{\~ a}o}
223     \global\def\foreign@deptname{Production Engineering}}{}
224  \ifthenelse{\equal{#1}{PEQ}}
225    {\global\def\local@deptname{Engenharia Qu{\' i}mica}
226     \global\def\foreign@deptname{Chemical Engineering}}{}
227  \ifthenelse{\equal{#1}{PESC}}
228    {\global\def\local@deptname{Engenharia de Sistemas e Computa{\c c}{\~ a}o}
229     \global\def\foreign@deptname{Systems Engineering and Computer Science}}{}
230  \ifthenelse{\equal{#1}{PET}}
231    {\global\def\local@deptname{Engenharia de Transportes}
232     \global\def\foreign@deptname{Transportation Engineering}}{}
233 }
```

`\title`  Used to enter the foreign title.

```
234 \renewcommand\title[1]{%
235  \global\def\local@title{#1}%
236 }
```

`\foreigntitle`  Used to enter the foreign title.

```
237 \newcommand\foreigntitle[1]{%
238  \global\def\foreign@title{#1}%
239 }
```

`\advisor`  Defines globally the title, name and academic degree of the advisor.

```
240 \newcount\@advisor\@advisor0
241 \newcommand\advisor[4]{%
242  \global\@namedef{CoppeAdvisorTitle:\expandafter\the\@advisor}{#1}
243  \global\@namedef{CoppeAdvisorName:\expandafter\the\@advisor}{#2}
244  \global\@namedef{CoppeAdvisorSurname:\expandafter\the\@advisor}{#3}
245  \global\@namedef{CoppeAdvisorDegree:\expandafter\the\@advisor}{#4}
246  \global\advance\@advisor by 1
247  \ifnum\@advisor>1
248    \renewcommand\local@advisorstring{Orientadores}
249    \renewcommand\foreign@advisorstring{Advisors}
250  \fi
251 }
```

`\examiner`

```
252 \newcount\@examiner\@examiner0
253 \newcommand\examiner[3]{%
254  \global\@namedef{CoppeExaminer:\expandafter\the\@examiner}{#1\ #2, #3}
255  \global\advance\@examiner by 1
256 }
```

`\author`     It was redefined to allow the identification of the author's first names and surname.

```
257 \renewcommand\author[2]{%
258   \global\def\@authname{#1}
259   \global\def\@authsurn{#2}
260 }
```

`\date`     This code enables makes easy to switch from dates in different languages.

```
261 \renewcommand\date[2]{%
262   \month=#1
263   \year=#2
264 }
```

`\local@monthname`

```
265 \newcommand\local@monthname{\ifcase\month\or
266   Janeiro\or Fevereiro\or Mar{\c c}o\or Abril\or Maio\or Junho\or
267   Julho\or Agosto\or Setembro\or Outubro\or Novembro\or Dezembro\fi}
```

`\foreign@monthname`

```
268 \newcommand\foreign@monthname{\ifcase\month\or
269   January\or February\or March\or April\or May\or June\or
270   July\or August\or September\or October\or November\or December\fi}
```

`\place`     Used to enter the place of defense.

```
271 \newcommand\place[3]{%
272   \renewcommand\local@cityname{#1}
273   \renewcommand\local@statename{#2}
274   \renewcommand\local@countryname{#3}
275 }
```

`\keyword`

```
276 \newcounter{keywords}
277 \newcommand\keyword[1]{%
278   \global\@namedef{CoppeKeyword:\expandafter\the\c@keywords}{#1}
279   \global\addtocounter{keywords}{1}
280 }
```

`\frontmatter`     The number of pages for both frontmatter and mainmatter printed in the cataloging details page is computed by means of simple LaTeX labels.

```
281 \renewcommand\frontmatter{%
282   \cleardoublepage
283   \@mainmatterfalse
284   \pagenumbering{roman}
285   \thispagestyle{empty}
286   \setcounter{page}{2}
287   \makefrontpage
288   \clearpage
289   \pagestyle{plain}
290   \ifthenelse{\boolean{maledoc}}{}{\makecatalog}%
291 }
```

`\mainmatter`

```
292 \renewcommand\mainmatter{%
293   \immediate\write\@auxout{%
```

```
294    \string\newlabel{front:pageno}{{}{\Roman{page}}{}{page.\roman{page}}{}}}}
295    \cleardoublepage
296    \@mainmattertrue
297    \pagestyle{plain}
298    \pagenumbering{arabic}}
```

<code>\backmatter</code>

```
299  \renewcommand\backmatter{%
300    \if@openright
301      \cleardoublepage
302    \else
303      \clearpage
304    \fi}
305  %
```

<code>\maketitle</code>

```
306  \renewcommand\maketitle{%
307  \pagenumbering{alph}
308  \config@hypersetup
309    \begin{titlepage}
310    \begin{flushleft}
311    \setlength\baselineskip{0pt}
312    \setlength\parskip{1mm}
313    \makebox[20mm][c]{\includegraphics{minerva}}\par
314    \makebox[20mm][c]{\bf\sf\small COPPE/UFRJ}
315    \end{flushleft}
316    \begin{center}
317    \nohyphens{\MakeUppercase\local@title}\par
318    \vspace*{28mm}
319    \nohyphens{\@authname\ \@authsurn}\par
320    \end{center}
321    \vspace*{16mm}
322    \begin{flushright}
323    \begin{minipage}{80mm}
324    \frontcover@maintext
325    \end{minipage}\par
326    \vspace*{7.5mm}
327    \nohyphens{%
328    \begin{tabularx}{80mm}[b]{@{}l@{ }X@{}}
329      \local@advisorstring: &
330      \count1=0
331      \toks@={}
332      \@whilenum \count1<\@advisor \do{%
333      \ifcase\count1 % same as \ifnum0=\count1
334        \toks@=\expandafter{\csname CoppeAdvisorName:\the\count1%
335          \expandafter\endcsname\expandafter\space%
336          \csname CoppeAdvisorSurname:\the\count1\endcsname\\}
337      \else
338        \toks@=\expandafter\expandafter\expandafter{%
339          \expandafter\the\expandafter\toks@%
340          \expandafter&\expandafter\space%
341          \csname CoppeAdvisorName:\the\count1\expandafter\endcsname%
342          \expandafter\space\csname CoppeAdvisorSurname:\the\count1\endcsname\\
343        }%
```

```latex
344     \fi
345     \advance\count1 by 1}
346     \the\toks@
347 \end{tabularx}}\par
348 \end{flushright}
349 \vspace*{\fill}
350 \begin{center}
351 \local@cityname\par
352 \local@monthname\ de \number\year
353 \end{center}
354 \end{titlepage}
355 \global\let\maketitle\relax%
356 \global\let\and\relax}

357 \newcommand\makefrontpage{%
358   \begin{center}
359     \sloppy\nohyphens{\MakeUppercase\local@title}\par
360     \vspace*{7mm}
361     {\@authname\ \@authsurn}\par
362 \end{center}\par
363 \vspace*{4mm}
364 \frontpage@maintext
365 \vspace*{8mm}
366 \noindent\local@approvedname:\par
367     \begin{center}
368 \begin{flushright}
369         \count1=0
370         \@whilenum \count1<\@examiner \do {
371             \vskip26\p@ \baselineskip12pt
372         \eqparbox{signture@list}{\hrulefill}\\
373         \eqparbox{signture@list}{\protect\centering%
374             \ \ \ \csname CoppeExaminer:\the\count1 \endcsname\ \ \ }\\
375             \advance\count1 by 1}
376 \end{flushright}
377     \end{center}
378 \vspace*{\fill}
379 \frontpage@bottomtext}
380 \newcommand\config@hypersetup{%
381 \begingroup
382 % changes to \toks@ and \count@ are kept local;
383 % it's not necessary for them, but it is usually the case
384 % for \count1, because the first ten counters are written
385 % to the DVI file, thus you got lucky because of PDF output
386 \toks@={}% in this special case not necessary
387 \count@=0 %
388 \@whilenum\count@<\value{keywords}\do{%
389   % * a keyword separator is not necessary,
390   %     if there is just one keyword
391   % * \csname CoppeKeyword:\the\count@\endcsname must be expanded
392   %     at least once, to get rid of the loop depended \count@
393   \ifcase\count@ % same as \ifnum0=\count@
394     \toks@=\expandafter{\csname CoppeKeyword:\the\count@\endcsname}%
395   \else
396     \toks@=\expandafter\expandafter\expandafter{%
```

```
397        \expandafter\the\expandafter\toks@
398        \expandafter;\expandafter\space
399        \csname CoppeKeyword:\the\count@\endcsname
400      }%
401    \fi
402    \advance\count@ by 1 %
403  }%
404  \edef\x{\endgroup
405    \noexpand\hypersetup{%
406      pdfkeywords={\the\toks@}%
407    }%
408  }%
409 \x
410 \hypersetup{%
411    pdfauthor={\@authname\ \@authsurn},
412    pdftitle={\local@title},
413 pdfsubject={\local@doctype\ de \@degreename\ em \local@deptname\ da COPPE/UFRJ},
414    pdfcreator={LaTeX with CoppeTeX toolkit},
415    breaklinks={true},
416    raiselinks={true},
417    pageanchor={true},
418 }}
```

\makecatalog   When the document has illustrations, it is required to insert ": il.;" between the number of pages of the textual part and the page dimension. We have created a label to flag the existence of lists of figures. It is checked to be undefined using the plain TeX command \@isundefined [7].

```
419 \newcommand\makecatalog{%
420    \vspace*{\fill}
421    \begin{center}
422      \setlength{\fboxsep}{5mm}
423      \framebox[120mm][c]{\makebox[5mm][c]{}%
424        \begin{minipage}[c]{105mm}
425        \setlength{\parindent}{5mm}
426        \noindent\sloppy\nohyphens\@authsurn,
427        \nohyphens\@authname\par
428        \nohyphens{\local@title/\@authname\ \@authsurn. -- \local@cityname:
429        UFRJ/COPPE, \number\year.}\par
430        \pageref{front:pageno},
431        \pageref{LastPage}
432        p.\@ifundefined{r@cat:lofflag}{}{\pageref{cat:lofflag}} $29,7$cm.\par
433        % There is an issue here. When the last entry must be split between lines,
434        % the spacing between it and the next paragraph becomes smaller.
435        % Should we manually introduce a fixed space? But how could we know that
436        % a name was split? Is this happening yet?
437        \nohyphens{%
438        \begin{tabularx}{100mm}[b]{@{}l@{ }X@{}}
439          \local@advisorstring: &
440          \count1=0
441          \toks@={}
442          \@whilenum \count1<\@advisor \do{%
443          \ifcase\count1 % same as \ifnum0=\count1
444            \toks@=\expandafter{\csname CoppeAdvisorName:\the\count1%
445            \expandafter\endcsname\expandafter\space%
```

14

```
446       \csname CoppeAdvisorSurname:\the\count1\endcsname\\}
447     \else
448       \toks@=\expandafter\expandafter\expandafter{%
449         \expandafter\the\expandafter\toks@
450         \expandafter&\expandafter\space
451         \csname CoppeAdvisorName:\the\count1\expandafter\endcsname%
452         \expandafter\space\csname CoppeAdvisorSurname:\the\count1\endcsname\\
453       }%
454     \fi
455     \advance\count1 by 1}
456     \the\toks@
457   \end{tabularx}}\par
458   \nohyphens{\local@doctype\ ({\MakeLowercase\@degreename}) --
459   UFRJ/COPPE/Programa de \local@deptname, \number\year.}\par
460   \bibname: p. \pageref{bib:begin} -- \pageref{bib:end}.\par
461   \count1=0
462   \count2=1
463   \nohyphens{\@whilenum \count1<\value{keywords} \do {%
464     \number\count2. \csname CoppeKeyword:\the\count1 \endcsname.
465     \advance\count1 by 1
466     \advance\count2 by 1}
467   I. \csname CoppeAdvisorSurname:0\endcsname,%
468   \ \csname CoppeAdvisorName:0\endcsname%
469   \ifthenelse{\@advisor>1}{\ \emph{et~al.}}{}}.
470   II. \local@universityname, COPPE, Programa de \local@deptname.
471   III. T{\' i}tulo.}
472   \end{minipage}}
473 \end{center}
474 \vspace*{\fill}}
```

**\dedication**

```
475 \newcommand\dedication[1]{
476   \gdef\@dedic{#1}
477     \cleardoublepage
478     \vspace*{\fill}
479     \begin{flushright}
480       \begin{minipage}{60mm}
481         \raggedleft \it \normalsize \@dedic
482       \end{minipage}
483     \end{flushright}}
```

abstract    This is a specialization of the abstract in the article standard class.

```
484 \newenvironment{abstract}{%
485   \clearpage
486   \thispagestyle{plain}
487   \abstract@toptext\par
488   \vspace*{8.6mm}
489   \begin{center}
490     \sloppy\nohyphens{\MakeUppercase\local@title}\par
491     \vspace*{13.2mm}
492     \@authname\ \@authsurn \par
493     \vspace*{7mm}
494     \local@monthname/\number\year
495   \end{center}\par
```

```
496 % Old style
497 % \vspace*{3mm}
498 \vspace*{\fill}
499 \noindent%
500 \begin{tabularx}{\textwidth}[b]{@{}l@{ }X@{}}
501   \local@advisorstring: &
502   \count1=0
503   \toks@={}
504   \@whilenum \count1<\@advisor \do{%
505   \ifcase\count1 % same as \ifnum0=\count1
506     \toks@=\expandafter{\csname CoppeAdvisorName:\the\count1%
507     \expandafter\endcsname\expandafter\space%
508     \csname CoppeAdvisorSurname:\the\count1\endcsname\\}
509   \else
510     \toks@=\expandafter\expandafter\expandafter{%
511       \expandafter\the\expandafter\toks@
512       \expandafter&\expandafter\space
513       \csname CoppeAdvisorName:\the\count1\expandafter\endcsname%
514       \expandafter\space\csname CoppeAdvisorSurname:\the\count1\endcsname\\
515     }%
516   \fi
517   \advance\count1 by 1}
518   \the\toks@
519 \end{tabularx}\par
520 \vspace*{2mm}
521 \noindent\local@deptstring: \local@deptname\par
522 \vspace*{7mm}}{\vspace*{\fill}}
```

foreignabstract

```
523 \newenvironment{foreignabstract}{%
524   \clearpage
525   \thispagestyle{plain}
526   \begin{otherlanguage}{english}
527   \foreignabstract@toptext\par
528   \vspace*{8.6mm}
529   \begin{center}
530     \sloppy\nohyphens{\MakeUppercase\foreign@title}\par
531     \vspace*{13.2mm}
532     \@authname\ \@authsurn \par
533     \vspace*{7mm}
534     \foreign@monthname/\number\year
535   \end{center}\par
536 % Old style
537 % \vspace*{3mm}
538 \vspace*{\fill}
539 \noindent%
540 \begin{tabularx}{\textwidth}[b]{@{}l@{ }X@{}}
541   \foreign@advisorstring: &
542   \count1=0
543   \toks@={}
544   \@whilenum \count1<\@advisor \do{%
545   \ifcase\count1 % same as \ifnum0=\count1
546     \toks@=\expandafter{\csname CoppeAdvisorName:\the\count1%
547     \expandafter\endcsname\expandafter\space%
```

```
548      \csname CoppeAdvisorSurname:\the\count1\endcsname\\}
549    \else
550      \toks@=\expandafter\expandafter\expandafter{%
551        \expandafter\the\expandafter\toks@
552        \expandafter&\expandafter\space
553        \csname CoppeAdvisorName:\the\count1\expandafter\endcsname%
554        \expandafter\space\csname CoppeAdvisorSurname:\the\count1\endcsname\\
555      }%
556    \fi
557    \advance\count1 by 1}
558    \the\toks@
559  \end{tabularx}\par
560  \vspace*{2mm}
561  \noindent\foreign@deptstring: \foreign@deptname\par
562  \vspace*{7mm}}{%
563  \end{otherlanguage}
564  \vspace*{\fill}
565  \global\let\@author\@empty
566  \global\let\@date\@empty
567  \global\let\foreign@title\@empty
568  \global\let\foreign@title\relax
569  \global\let\local@title\@empty
570  \global\let\local@title\relax
571  \global\let\author\relax
572  \global\let\author\relax
573  \global\let\date\relax}
```

\listoffigures

```
574 \renewcommand\listoffigures{%
575    \immediate\write\@auxout{%
576    \string\newlabel{cat:lofflag}{{}{:~il.;}{}{page.\roman{page}}{}}}
577    \if@twocolumn
578      \@restonecoltrue\onecolumn
579    \else
580      \@restonecolfalse
581    \fi
582    \chapter*{\listfigurename}%
583      \addcontentsline{toc}{chapter}{\listfigurename}%
584      \@mkboth{\MakeUppercase\listfigurename}%
585              {\MakeUppercase\listfigurename}%
586    \@starttoc{lof}%
587    \if@restonecol\twocolumn\fi
588      }
```

\listoftables

```
589 \renewcommand\listoftables{%
590    \if@twocolumn
591      \@restonecoltrue\onecolumn
592    \else
593      \@restonecolfalse
594    \fi
595    \chapter*{\listtablename}%
596      \addcontentsline{toc}{chapter}{\listtablename}%
597      \@mkboth{%
```

```
598        \MakeUppercase\listtablename}%
599          {\MakeUppercase\listtablename}%
600      \@starttoc{lot}%
601      \if@restonecol\twocolumn\fi
602        }
```

\printlosymbols

```
603 \newcommand\printlosymbols{%
604 \renewcommand\glossaryname{\listsymbolname}%
605 \@input@{\jobname.los}}
```

\makelosymbols

```
606 \def\makelosymbols{%
607   \newwrite\@losfile
608   \immediate\openout\@losfile=\jobname.syx
609   \def\symbl{\@bsphack\begingroup
610              \@sanitize
611              \@wrlos}\typeout
612   {Writing index of symbols file \jobname.syx}%
613   \let\makelosymbols\@empty
614 }
615 \@onlypreamble\makelosymbols
```

```
616 \AtBeginDocument{%
617 \@ifpackageloaded{hyperref}{%
618   \def\@wrlos#1#2{%
619     \protected@write\@losfile{}%
620       {\string\indexentry{[#1] #2|hyperpage}{\thepage}}%
621     \endgroup
622     \@esphack}}{%
623   \def\@wrlos#1#2{%
624     \protected@write\@losfile{}%
625       {\string\indexentry{[#1] #2}{\thepage}}%
626     \endgroup
627     \@esphack}}}
```

\printloabbreviations

```
628 \newcommand\printloabbreviations{%
629 \renewcommand\glossaryname{\listabbreviationname}%
630 \@input@{\jobname.lab}}
```

\makeloabbreviations

```
631 \def\makeloabbreviations{%
632   \newwrite\@labfile
633   \immediate\openout\@labfile=\jobname.abx
634   \def\abbrev{\@bsphack\begingroup
635              \@sanitize
636              \@wrlab}\typeout
637   {Writing index of abbreviations file \jobname.abx}%
638   \let\makeloabbreviations\@empty
639 }
640 \@onlypreamble\makeloabbreviations
```

```latex
641 \AtBeginDocument{%
642 \@ifpackageloaded{hyperref}{%
643   \def\@wrlab#1#2{%
644     \protected@write\@labfile{}%
645       {\string\indexentry{[#1] #2|hyperpage}{\thepage}}%
646     \endgroup
647     \@esphack}}{%
648   \def\@wrlab#1#2{%
649     \protected@write\@labfile{}%
650       {\string\indexentry{[#1] #2}{\arabic{page}}}%
651     \endgroup
652     \@esphack}}}

653 \newdimen\bibindent%
654 \setlength\bibindent{1.5em}%
655 \renewenvironment{thebibliography}[1]%
656     {\chapter*{\bibname}%
657      \addcontentsline{toc}{chapter}{\bibname}%
658      \immediate\write\@auxout{%
659      \string\newlabel{bib:begin}{{}{\arabic{page}}{}{page.\arabic{page}}{}}}%
660      \list{\@biblabel{\@arabic\c@enumiv}}%
661          {\setlength{\labelwidth}{0ex}%
662           \setlength{\leftmargin}{9.0ex}%
663           \setlength{\itemindent}{-9.0ex}%
664           \advance\leftmargin\labelsep%
665           \@openbib@code%
666           \usecounter{enumiv}%
667           \let\p@enumiv\@empty%
668           \renewcommand\theenumiv{\@arabic\c@enumiv}}%
669      \sloppy%
670      \clubpenalty4000%
671      \@clubpenalty \clubpenalty%
672      \widowpenalty4000%
673      \sfcode`\.\@m}%
674     {\def\@noitemerr%
675       {\@latex@warning{Empty `thebibliography' environment}}%
676      \immediate\write\@auxout{%
677      \string\newlabel{bib:end}{{}{\arabic{page}}{}{page.\arabic{page}}{}}}%
678      \endlist}

679 \newenvironment{theglossary}{%
680   \if@twocolumn%
681     \@restonecoltrue\onecolumn%
682   \else%
683     \@restonecolfalse%
684   \fi%
685   \@mkboth{\MakeUppercase\glossaryname}%
686   {\MakeUppercase\glossaryname}%
687   \chapter*{\glossaryname}%
688   \addcontentsline{toc}{chapter}{\glossaryname}
689   \list{}
690   {\setlength{\listparindent}{0in}%
691    \setlength{\labelwidth}{1.0in}%
692    \setlength{\leftmargin}{1.5in}%
693    \setlength{\labelsep}{0.5in}%
```

```latex
694    \setlength{\itemindent}{0in}}%
695    \sloppy}%
696   {\if@restonecol\twocolumn\fi%
697 \endlist}
698 %
699 \renewenvironment{theindex}{%
700    \if@twocolumn
701      \@restonecolfalse
702    \else
703      \@restonecoltrue
704    \fi
705    \twocolumn[\@makeschapterhead{\indexname}]%
706    \@mkboth{\MakeUppercase\indexname}%
707    {\MakeUppercase\indexname}%
708    \thispagestyle{plain}\parindent\z@
709    \addcontentsline{toc}{chapter}{\indexname}
710    \parskip\z@ \@plus .3\p@\relax
711    \columnseprule \z@
712    \columnsep 35\p@
713    \let\item\@idxitem}
714   {\if@restonecol\onecolumn\else\clearpage\fi}
715 \newcommand\glossaryname{Glossary}
716 \newcommand\listabbreviationname{Lista de Abreviaturas}
717 \newcommand\listsymbolname{Lista de S{\' i}mbolos}
718 %
719 \newcommand\local@advisorstring{Orientador}
720 \newcommand\foreign@advisorstring{Advisor}
721 \ifthenelse{\boolean{maledoc}}{%
722    \newcommand\local@approvedname{Examinado por}%
723 }{%
724    \newcommand\local@approvedname{Examinada por}%
725 }
726 \newcommand\local@universityname{Universidade Federal do Rio de Janeiro}
727 \newcommand\local@deptstring{Programa}
728 \newcommand\foreign@deptstring{Department}
729 \newcommand\local@cityname{Rio de Janeiro}
730 \newcommand\local@statename{RJ}
731 \newcommand\local@countryname{Brasil}
732 %
733 \newcommand\frontcover@maintext{
734    \sloppy\nohyphens{\local@doctype\ de \@degreename\
735    \ifthenelse{\boolean{maledoc}}{apresentado}{apresentada}
736    ao Programa de P{\' o}s-gradua{\c c}{\~ a}o em \local@deptname,
737    COPPE, da \local@universityname, como parte dos requisitos
738    necess{\' a}rios {\' a} obten{\c c}{\~ a}o do t{\' i}tulo de
739    \local@degname\ em \local@deptname.}
740 }
741 %
742 \newcommand\frontpage@maintext{
743    \noindent {\MakeUppercase\local@doctype}
744    \ifthenelse{\boolean{maledoc}}{SUBMETIDO}{SUBMETIDA}
745    \sloppy\nohyphens{AO CORPO DOCENTE DO INSTITUTO ALBERTO LUIZ COIMBRA
746    DE P{\' O}S-GRADUA{\c C}{\~ A}O E PESQUISA DE ENGENHARIA (COPPE) DA
747    UNIVERSIDADE FEDERAL DO RIO DE JANEIRO COMO PARTE DOS REQUISITOS
```

```
748    NECESS{\' A}RIOS PARA A OBTEN{\c C}{\~ A}O DO GRAU DE
749    {\MakeUppercase\local@degname} EM CI{\^E}NCIAS EM
750    {\MakeUppercase\local@deptname.\par}}%
751 }
752 %
753 \newcommand\frontpage@bottomtext{%
754    \begin{center}
755    {\MakeUppercase{\local@cityname, \local@statename\ -- \local@countryname}}\par
756    {\MakeUppercase\local@monthname\ DE \number\year}
757    \end{center}%
758 }
759 %
760 \newcommand\abstract@toptext{%
761    \noindent Resumo \ifthenelse{\boolean{maledoc}}{do}{da}
762    \local@doctype\ \ifthenelse{\boolean{maledoc}}{apresentado}{apresentada}
763    \sloppy\nohyphens{{\` a} COPPE/UFRJ como parte dos requisitos
764    necess{\' a}rios para a obten{\c c}{\~ a}o do grau de
765    \local@degname\ em Ci{\^ e}ncias (\@degree)}
766 }
767 \newcommand\foreignabstract@toptext{%
768    \noindent \sloppy\nohyphens{Abstract of \foreign@doctype\ presented to
769    COPPE/UFRJ as a partial fulfillment of the requirements for the
770    degree of \foreign@degname\ of Science (\@degree)}
771 }
772 %
773 ⟨/class⟩

774 ⟨∗glossary⟩
775 actual '='
776 quote '!'
777 level '>'
778 delim_0    ", p. "
779 lethead_flag   0
780 headings_flag 0
781 preamble
782 "\n\\begin{theglossary}\n  \\makeatletter"
783 postamble
784 "\n  \\end{theglossary}\n"
785 ⟨/glossary⟩
```

## Acknowledgments

## References

[1] CPGP/COPPE/UFRJ. *Norma para a Elaboração Gráfica de Teses*. Rio de
    Janeiro, RJ, Brasil, Julho de 2008.

[2] Donald E. Knuth. *The TEXbook*. Addison-Wesley, Reading, MA, USA, 1984.

[3] Leslie Lamport. *LATEX*: *A Document Preparation System*. Addison-Wesley, Reading, MA, USA, 1986.

[4] Oren Patashnik. Bibtexing. Documentation for general BibTEX users, February 1988.

[5] Oren Patashnik. Designing bibtex styles. The part of BibTeX 's documentation that's not meant for general users, February 1988.

[6] William Strunk, Jr. and E. B. White. *The Elements of Style*. Macmillan, 3 edition, 1979.

[7] TEX Frequently Asked Questions.
http://www.tex.ac.uk/cgi-bin/texfaq2html?introduction=yes.

# Index

Numbers written in italic refer to the page where the corresponding entry is described; numbers underlined refer to the code line of the definition; numbers in roman refer to the code lines where the entry is used.