# The coppe document class

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#### 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 format 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 format 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.

<sup>\*</sup>Send comments, suggestions, questions and bugs to goajunior@users.sourceforge.net.

## 2 License

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## 3 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 the 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 don't need to load it again. The Brazilian Portuguese is the main language and the English is only required for the foreign abstract.

\advisor \coadvisor \examiner Every COPPE student is coordinated by an advisor. It is still possible to have a co-advisor. Their names must be provided by the commands \advisor and \coadvisor. It is also required to enter the names of all examiners using the

**\examiner** macro. For the advisor and co-advisor's names, you should enter them as below:

```
\advisor{Title}{Advisor's Name}{Advisor's Surname}{Degree}
\coadvisor{Title}{Co-advisor's Name}{Co-advisor's Surname}{Degree}
```

The examiners' names are entered differently:

```
\examiner{Title}{First Examiner's Complete Name}{Degree}
\examiner{Title}{Second Examiner's Complete Name}{Degree}
...
```

The difference in providing advisors and examiners' names was introduced in version 2.0, because of the new standard approved in 3rd July 2008. 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{PEB}.

\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}
...
```

Usually, six words are enough.

## Cataloging details

This page contains cataloging information useful for librarians. It is automatically generated from the data entered by the user when calling \maketitle, except in qualifying exams.

### 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. It is numbered with roman digits.

#### Abstracts

abstract foreignabstract

As stated by the Academic Registry [1], the abstracts must be in one page each. Still, 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 \symbl

The lists of symbols and abbreviations are optionals. It is recommended to define a symbol/abbreviation in its first occurrence in the text. To define a symbol use \symbol \Some Symbol Definition}, and for abbreviations \abbrev{Some Abbreviation}{Some 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 \makelosymbols \printloabbreviations \printlosymbols These lists are lexicographically sorted by using the MakeIndex program, which is part of any LATEX implementation. Makeindex needs two commands to create a final sorted list: one which generates a list of entries and the other that indicates the position where the list will be printed out. To generate the lists of symbols and abbreviations, the coppe class has 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 the respective 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 command 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 option -s with the style file coppe.ist. Rerun latex twice to get the references correctly solved and you are done.

### References

It is well known that bibliography databases can be easily maintained when using BibTeX. Thus, the CoppeTeX project designed the BibTeX style coppe-unsrt.bst to complement the coppe class. It is a numbered style, which sorts references by order of citation. To use it, you have to select 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 references issues. This style is not compatible with natbib.

## 4 Graphics driver

Since the addition of a front cover with a Minerva's picture, it is required to use a package to enable graphical inclusion. You may choose among three standard graphical drivers, dvips, pdftex and dvipdfm, just passing it as a class option. The COPPETEX loads graphicx using the dvips driver by default, so you mustn't load it by yourself.

If you would like to generate a PDF output, we encourage the use of pdfTEX. Remember that pdfTEX turns the default graphics extension to PDF.

## 5 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. The coppe class loads hyperref by default and fills in all the document properties.

## 6 Useful tips

**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 options often comes in print dialogs of document visualization softwares.

Pictures. The default picture format of LaTeX is the Encapsulated PostScript (EPS). If you use pdfTeX, the default format becomes the PDF. The package graphicx enables handling other formats like JPEG, PNG and GIF. In this case, you must provide the bounding box of your picture. There are two ways of doing this: pass an option to the \includegraphics command (e.g. \includegraphics[bb = 0 0 35 28]{picture.png}), or provide a file with extension bb containing the bounding box values (e.g. %%BoundingBox: 0 0 9 12). This file will be automatically read by LaTeX.

Fonts. The default font in LATEX is the Computer Modern. If you would like to try its enhanced version, consider using the package lmodern. 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.

# 7 A Simple Example

- 1 (\*example)
- 2 \documentclass[dsc,pdftex]{coppe}
- 3 \usepackage[latin1]{inputenc}
- 4 \usepackage{amsmath,amssymb}

```
6 \makelosymbols
7 \makeloabbreviations
9 \begin{document}
   \title{Desenvolvimento de um Algoritmo Baseado no Método de Arnoldi para
    Solução de Problemas de Autovalor Generalizado}
11
    \foreigntitle{Solution of Generalized Eigensystems with Algorithms Based on
12
    Arnoldi Methods}
13
    \author{George Oliveira}{Ainsworth Jr.}
14
    \advisor{Prof.}{Carlos}{Magluta}{D.Sc.}
15
    \coadvisor{Prof.}{Fernando Luiz Bastos}{Ribeiro}{D.Sc.}
    \examiner{Prof.}{Alvaro Luiz Gayoso Azeredo Coutinho}{D.Sc.}
    \examiner{Prof.}{Webe João Mansur}{Ph.D.}
19
    \examiner{Prof.}{Paulo Batista Gonçalves}{D.Sc.}
    \department{PEC}
20
    \del{12}{2008}
21
22
    \keyword{Problemas de Autovalor}
23
24
    \keyword{Método de Arnoldi}
    \keyword{Análise Dinâmica}
25
    \maketitle
26
27
    \frontmatter
28
29
    \dedication{\delta minha mae pelo dom da vida e pelo amparo ao longo desses anos.\\
30
    Às minhas tias Vanete e Vanilde (\emph{in memoriam}).}
31
32
    \chapter*{Agradecimentos}
33
    Agradeço ao Conselho Nacional de Desenvolvimento Científico e Tecnológico dos
34
    Estados Unidos do Brasil (CNPq) pelo suporte financeiro.
35
36
37
    \begin{abstract}
    Autovalores e autovetores de operadores lineares são importantes para muitas
    áreas da Matemática Aplicada. Na Engenharia Civil, sobretudo na Engenharia de
    Estruturas o uso de problemas de autovalor tem fundamental importância, um
    exemplo típico é a análise dinâmica, onde os autovalores representam as
    frequências naturais e os autovetores os modos de vibração associados à sua
    frequência natural correspondente. A crescente demanda da avaliação numérica
43
    de forma mais eficiente dessas quantidades, despertou o interesse na busca de
44
    novos métodos para a solução de problemas de autovalor, principalmente quando
45
    o problema a ser analisado conduz a quantidades pertencentes ao conjunto dos
46
47
    números complexos.
    \end{abstract}
49
    \begin{foreignabstract}
    Eigenvalues and eigenvectors of linear operators are important in many Applied
52
    Mathematics areas. In Civil Engineering, especially in Structural Analysis,
    eigensystems have a fundamental importance. A typical example is in dynamic
    analysis, where the eigenvalues represent the natural frequencies and
```

```
eigenvectors the mode shape. The increasing demand for efficient numeric
    evaluation of eigenvalues and eigenvectors motivated the search for new
    methods for the solution of complex eigensystems.
    \end{foreignabstract}
59
60
    \tableofcontents
    \listoffigures
61
    \listoftables
62
    \printlosymbols
63
    \printloabbreviations
64
65
66
    \mainmatter
    \chapter{Introdução}
67
    Em métodos numéricos para obter soluções aproximadas de equações
    diferenciais, tais como o método dos elementos finitos (MEF)%
    \abbrev{MEF}{método de elementos finitos}
70
    e o método dos volumes finitos (MVF)%
71
    \abbrev{MVF}{método de volumes finitos}, o domínio no qual estas
72
    equações foram definidas é discretizado em sub-domínios simples
73
74
    denominados \textit{elementos}.
75
    Denotemos o domínio por $\Omega$%
76
    \symbl{$\Omega$}{domínio de definição de uma equação diferencial}
77
78
    \chapter{Revisão Bibliográfica}
79
    \chapter{Método Proposto}
80
    \chapter{Resultados e Discussões}
81
    \chapter{Conclusões}
82
83
    \backmatter
84
    \nocite{*}
85
    \bibliographystyle{coppe-unsrt}
86
87
    \bibliography{coppe}
    \appendix
    \chapter{Código Fonte}
91 \end{document}
92 (/example)
```

## 8 Implementation

## 8.1 The 'coppe.cls' file

```
93 (*class)
94 \def\filename{coppe.dtx}
95 \def\fileversion{v2.0}
96 \def\filedate{2007/03/01}
97 \NeedsTeXFormat{LaTeX2e}[1995/12/01]
98 \ProvidesClass{coppe}[\filedate\ \fileversion\ COPPE Dissertations and Thesis]
99 \LoadClass[12pt,a4paper,oneside]{book}
```

```
100 \RequirePackage{lastpage}
101 \RequirePackage{hyperref}
102 \RequirePackage[english,brazil]{babel}
103 \RequirePackage{hyphenat}
104 \RequirePackage{ifthen}
105 \RequirePackage{graphicx}
106 \RequirePackage{tabularx}
107 \RequirePackage{eqparbox}
108 \RequirePackage [a4paper,bindingoffset=0.0cm,vcentering=true,%
109 top=2.5cm,bottom=2.5cm,left=3.0cm,right=3.0cm]{geometry}
110 \def\CoppeTeX{{\rm C\kern-.05em{\sc o\kern-.025em p\kern-.025em
111 p\kern-.025em e}}\kern-.08em\TeX}
    The default line spacing is 1.5pt.
112 \renewcommand\baselinestretch{1.5}
113 \let\@adname\@empty
114 \let\@adsurn\@empty
115 \let\@coadname\@empty
116 \let\@coadsurn\@empty
117 \newcounter{minexaminers}
118 \newboolean{isdraft}
119 \newboolean{maledoc}
120 \setboolean{maledoc}{false}
121 \setboolean{isdraft}{false}
122 \newboolean{needbb}
123 \setboolean{needbb}{false}
124 %
125 \DeclareOption{msc}{%
126
     \newcommand{\@degree}{M.Sc.}
     \newcommand{\@degreename}{Mestrado}
127
     \newcommand{\local@degname}{Mestre}
128
     \newcommand{\foreign@degname}{Master}
129
     \label{local@doctype} $$ \operatorname{Disserta}(c c)_{\ a}o$ 
130
     \newcommand\foreign@doctype{Dissertation}
131
     \setcounter{minexaminers}{2}
132
133 }
134 \DeclareOption{dscexam}{%
     \newcommand{\@degree}{D.Sc.}
135
136
     \newcommand{\@degreename}{Doutorado}
137
     \newcommand{\local@degname}{Doutor}
     \newcommand{\foreign@degname}{Doctor}
138
     \setboolean{maledoc}{true}
139
     \label{local@doctype} $$\operatorname{Exame de Qualifica(\c c)(\^a)o}$$
140
     \newcommand\foreign@doctype{Qualifying Exam}
141
     \setcounter{minexaminers}{1}
142
143 }
144 \DeclareOption{dsc}{%
     \newcommand{\@degree}{D.Sc.}
145
146
     \newcommand{\@degreename}{Doutorado}
     \newcommand{\local@degname}{Doutor}
147
```

```
\newcommand{\foreign@degname}{Doctor}
             148
                  \newcommand\local@doctype{Tese}
            149
                  \newcommand\foreign@doctype{Thesis}
                  \setcounter{minexaminers}{2}
             151
            152 }
            153 \DeclareOption{draft}{%
                  \setboolean{isdraft}{true}
            154
                  \ClassWarning{coppe}{draft mode is ON}%
            155
            156 }
            157 \DeclareOption{dvips}{%
                  \PassOptionsToPackage{dvips}{hyperref,graphicx}
            158
            159 }
             160 \DeclareOption{dvipdfm}{%
                  \PassOptionsToPackage{dvipdfm}{hyperref,graphicx}
                  \setboolean{needbb}{true}
            163 }
            164 \DeclareOption{pdftex}{%
                  \PassOptionsToPackage{pdftex}{hyperref,graphicx}
                  \PassOptionsToPackage{plainpages=false,pdfpagelabels}{hyperref}
            166
            167 }
            168 \ProcessOptions\relax
\university Set the university name.
             169 \newcommand\university[1]{%
            170
                  \renewcommand\local@universityname{#1}
            171 }
            172 %
            173 % \begin{macro}{\department}
            174\ \% This macro is used to set the author's affiliation. There are twelve options
            175 % which correspond to all academic units at COPPE/UFRJ. It defines the current
            176 % and the foreign names of these units.
            177 %
                     \begin{macrocode}
            178 \newcommand\department[1]{%
                  \ifthenelse{\equal{#1}{PEB}}
            179
                    {\global\def\local@deptname{Engenharia Biom{\', e}dica}
            180
                     \global\def\foreign@deptname{Biomedical Engineering}}{}
             181
                  \ifthenelse{\equal{#1}{PEC}}
             182
                    {\global\def\local@deptname{Engenharia Civil}
             183
                     \global\def\foreign@deptname{Civil Engineering}}{}
             184
             185
                  \ifthenelse{\equal{#1}{PEE}}
                    {\global\def\local@deptname{Engenharia El{\' e}trica}
             186
                     \global\def\foreign@deptname{Electrical Engineering}}{}
             187
                  \ifthenelse{\equal{#1}{PEM}}
             188
                    {\global\def\local@deptname{Engenharia Mec{\^ a}nica}
             189
                     \global\def\foreign@deptname{Mechanical Engineering}}{}
             190
                  \ifthenelse{\equal{#1}{PEMM}}
             191
             192
                    {\global\def\local@deptname{Engenharia Metal{\' u}rgica e de Materiais}
             193 \global\def\foreign@deptname{Metallurgical and Materials Science Engineering}}{}
                  \ifthenelse{\equal{#1}{PEN}}
             194
                    {\global\def\local@deptname{Engenharia Nuclear}
            195
```

```
\global\def\foreign@deptname{Nuclear Engineering}}{}
              196
                   \ifthenelse{\equal{#1}{PENO}}
              197
                     {\global\def\local@deptname{Engenharia Oce{\^ a}nica}
              198
              199
                      \global\def\foreign@deptname{Ocean Engineering}}{}
              200
                   \ifthenelse{\equal{#1}{PPE}}
                     {\global\def\local@deptname{Planejamento Energ{\' e}tico}
              201
                      \global\def\foreign@deptname{Energy Planning}}{}
              202
                   \ifthenelse{\equal{#1}{PEP}}
              203
                     204
                      \global\def\foreign@deptname{Production Engineering}}{}
              205
                   \ifthenelse{\equal{#1}{PEQ}}
              206
                     {\global\def\local@deptname{Engenharia Qu{\', i}mica}
              207
                      \global\def\foreign@deptname{Chemical Engineering}}{}
              208
              209
                   \ifthenelse{\equal{#1}{PESC}}
              210
                     {\c}\c {\global\def\local@deptname{Engenharia de Sistemas e Computa{\c c}{\~ a}o}
              211
                      \global\def\foreign@deptname{Systems Engineering and Computer Science}}{}
              212
                   \ifthenelse{\equal{#1}{PET}}
                     {\global\def\local@deptname{Engenharia de Transportes}
              213
                      \global\def\foreign@deptname{Transportation Engineering}}{}
              214
              215 }
      \title Used to enter the foreign title.
              216 \renewcommand\title[1]{%
              217
                   \global\def\local@title{#1}%
              218 }
\foreigntitle Used to enter the foreign title.
              219 \newcommand\foreigntitle[1]{%
                  \global\def\foreign@title{#1}%
              221 }
    \advisor Defines globally the title, name and academic degree of the advisor.
              222 \newcommand\advisor[4]{%
                   \global\def\@adtitle{#1}%
              223
                   \global\def\@adname{#2}%
                   \global\def\@adsurn{#3}%
              226
                   \global\def\@addegree{#4}%
              227 }
             Defines globally the title, name and academic degree of the co-advisor.
              228 \newcommand\coadvisor[4]{%
                   \global\def\@coadtitle{#1}%
              229
                   \global\def\@coadname{#2}%
              230
              231
                   \global\def\@coadsurn{#3}%
              232
                   \global\def\@coaddegree{#4}%
                   \renewcommand\local@advisorstring{Orientadores}%
              233
                   \renewcommand\foreign@advisorstring{Advisors}%
              234
              235 }
```

```
236 \newcount\@examiner\@examiner0
                   237 \newcommand\examiner[3] {%
                        \global\@namedef{S:\expandafter\the\@examiner}{#1\ #2, #3}
                   239
                         \global\advance\@examiner by 1
                   240\,\% Should we use this check?
                   241 % \ifnum\@examiner>6
                   242 %
                            \ClassWarning{coppe}{%
                   243 %
                              Maximum number of examiners exceeded.\MessageBreak
                   244 %
                              Printing only six of them}
                   245 %
                            \@examiner=6
                   246 %
                         \fi
                   247 }
           \author It is redefined to allow the identification of the author's first names and surname.
                   248 \renewcommand\author[2]{%
                         \global\def\@authname{#1}
                        \global\def\@authsurn{#2}
                   251 }
             \date This code enables makes easy to switch from dates in different languages.
                   252 \renewcommand\date[2]{%
                        \month=#1
                   254
                        \year=#2
                   255 }
  \local@monthname
                   256 \mbox{ } \mbox{newcommand} \mbox{local@monthname{\color=}} \
                         Janeiro\or Fevereiro\or Março\or Abril\or Maio\or Junho\or
                         Julho\or Agosto\or Setembro\or Outubro\or Novembro\or Dezembro\fi}
\foreign@monthname
                   259 \newcommand\foreign@monthname{\ifcase\month\or
                         January\or February\or March\or April\or May\or June\or
                         July\or August\or September\or October\or November\or December\fi}
            \place Used to enter the place of defense.
                   262 \newcommand\place[3]{%
                         \renewcommand\local@cityname{#1}
                         \renewcommand\local@statename{#2}
                   265
                         \renewcommand\local@countryname{#3}
                   266 }
          \keyword
                   267 \newcounter{keywords}
                   268 \newcommand\keyword[1]{%
                         \global\@namedef{K:\expandafter\the\c@keywords}{#1}
                   270
                        \global\addtocounter{keywords}{1}
                   271 }
```

\examiner It was fixed a maximum of 6 examiners, just for the sake of page layout.

```
catalográfica, utilizou-se uma referência. Assim, mesmo com uma main vazia, será
             necessário re-executar o LATEX para obter as referências corretas.
            272 \renewcommand\frontmatter{%
            273 \cleardoublepage
                 \@mainmatterfalse
            274
                  \pagenumbering{roman}
            275
            276
                  \thispagestyle{empty}
            277
                  \setcounter{page}{2}
            278
                  \makefrontpage
            279
                  \clearpage
            280
                 \pagestyle{plain}
            281
                  \label{local} $$ \left( boolean\{maledoc\}\}{}{\mathbb{}}_{\infty}. $$
            282 }
\mainmatter
            283 \renewcommand\mainmatter{%
            284 \immediate\write\@auxout{%
                    \string\newlabel{front:pageno}{{}\Roman{page}}{}{page.\roman{page}}{}}
            285
                 \cleardoublepage
            286
                 \@mainmattertrue
            287
                 \pagestyle{plain}
            288
                 \pagenumbering{arabic}}
\backmatter
            290 \renewcommand\backmatter{%
            291 \if@openright
            292
                    \cleardoublepage
            293
                 \else
                    \clearpage
            294
            295 \fi}
            296 %
 \maketitle
            297 \renewcommand\maketitle{%
            298 \pagenumbering{alph}
            299 \config@hypersetup
            300 % Should we use this check?
            301 %\ifthenelse{\@examiner<\value{minexaminers}}{%
            302 % \ifthenelse{\boolean{isdraft}}{%
            303 %
                     \ClassWarning{coppe}{Too few examiners for a \local@doctype}%
            304 % }{%
                     \ClassError{coppe}{%
            305 %
            306 %
                     Too few examiners for a \local@doctype}{%
                     This value is regulated by the Academic Registry at COPPE/UFRJ.\MessageBreak
            307 %
                     To disable this check, enable the draft option of the coppe class.}%
            308 %
            309 % }%
```

\frontmatter Para os números de páginas do frontmatter e do mainmatter aparecerem na ficha

310 %}{}

311 \begin{titlepage}

```
\begin{flushleft}
312
     \setlength\baselineskip{0pt}
313
     \setlength\parskip{1mm}
315
     \makebox[20mm][c]{%
       \ifthenelse{\boolean{needbb}}{%
316
         \label{localization} $$ \include graphics [bb = -1 -1 48 64] {minerva}} {\%} $$
317
         \includegraphics{minerva}}}\par
318
     \makebox[20mm][c]{{\fontfamily{phv}\textbf{\small COPPE/UFRJ}}}
319
     \end{flushleft}
320
     \begin{center}
321
     \nohyphens{\MakeUppercase\local@title}\par
322
     \vspace*{28mm}
323
     \nohyphens{\@authname\ \@authsurn}\par
324
325
     \end{center}
326
     \vspace*{16mm}
     \begin{flushright}
327
     \begin{minipage}{80mm}
328
     \frontcover@maintext
329
     \end{minipage}\par
330
     \vspace*{7.5mm}
331
     \begin{tabularx}{80mm}[b]{@{}1@{}}}
332
       \local@advisorstring: & \nohyphens{\@adname\ \@adsurn}\\
333
       334
         & \nohyphens{\@coadname\ \@coadsurn}\\}
335
336
     \end{tabularx}\par
     \end{flushright}
337
     \vspace*{\fill}
338
     \begin{center}
339
     \local@cityname\par
340
     \local@monthname\ de \number\year
341
     \end{center}
342
     \end{titlepage}
343
344
     \global\let\maketitle\relax%
     \global\let\and\relax}
346 \newcommand\makefrontpage{%
347
     \begin{center}
348
       \sloppy\nohyphens{\MakeUppercase\local@title}\par
349
       \vspace*{7mm}
       350
     \end{center}\par
351
352
     \vspace*{4mm}
     \frontpage@maintext
353
     \vspace*{8mm}
354
     \noindent\local@approvedname:\par
355
        \begin{center}
356
     \begin{flushright}
357
           \vskip16\p@ \baselineskip12pt
358
359
           \eqparbox{signture@list}{\hrulefill}\\
360
           \eqparbox{signture@list}{\protect\centering%
```

```
\\\\\@adtitle\\@adname\\@adsurn, \@addegree\\\\}\\
361
                          \ifthenelse{\equal{\@coadname}{\@empty}}{}{}
362
                          \vskip26\p@ \baselineskip12pt
363
364
                          \eqparbox{signture@list}{\hrulefill}\\
365
                          \eqparbox{signture@list}{\protect\centering%
                              \\\\@coadtitle\\@coadname\\@coadsurn, \@coaddegree\\\}\\}
366
                          \count1=0
367
                          \@whilenum \count1<\@examiner \do {
368
                                   \vskip26\p@ \baselineskip12pt
369
                          \eqparbox{signture@list}{\hrulefill}\\
370
                          \eqparbox{signture@list}{\protect\centering%
371
                                   \ \ \csname S:\the\count1 \endcsname\ \ \ }\\
372
                                   \advance\count1 by 1}
373
374
            \end{flushright}
375
                   \end{center}
            \vspace*{\fill}
376
            \frontpage@bottomtext}
377
378 \newcommand\config@hypersetup{%
379 \begingroup
           % changes to \toks@ and \count@ are kept local;
           \% it's not necessary for them, but it is usually the case
           % for \count1, because the first ten counters are written
383
           % to the DVI file, thus you got lucky because of PDF output
384
           \toks@={}% in this special case not necessary
385
            \count@=0 %
            \verb|\whilenum| count@<\value{keywords}\\ do{%| count@<\walue{keywords}\\ do{white with a secont@<\walue{keywords}\\ do{white with a secont@<\walue{key
386
                % * a keyword separator is not necessary,
387
                           if there is just one keyword
                %
388
                % * \csname K:\the\count@\endcsname must be expanded
389
                           at least once, to get rid of the loop depended \count@
390
                \ifcase\count@ % same as \ifnumO=\count@
391
                     \toks@=\expandafter{\csname K:\the\count@\endcsname}%
392
                \else
393
394
                     \toks@=\expandafter\expandafter\expandafter{%
395
                          \expandafter\the\expandafter\toks@
                          \expandafter;\expandafter\space
396
397
                          \csname K:\the\count@\endcsname
                    }%
398
                \fi
399
400
                 \advance\count@ by 1 %
401
            \edef\x{\endgroup
402
403
                \noexpand\hypersetup{%
404
                     pdfkeywords={\the\toks@}%
405
                }%
           }%
406
407 \x
408 \hypersetup{%
           pdfauthor={\@authname\ \@authsurn},
```

```
410 pdftitle={\local@title},
411 pdfsubject={\local@doctype\ de \@degreename\ em \local@deptname\ da COPPE/UFRJ},
412 pdfcreator={LaTeX with CoppeTeX toolkit}
413 }}
```

\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 TFX command \@isundefined [7].

```
414 \newcommand\makecatalog{%
     \vspace*{\fill}
416
     \begin{center}
       \setlength{\fboxsep}{5mm}
417
       \framebox[120mm][c]{\makebox[5mm][c]{}%}
418
         \begin{minipage}[c]{105mm}
419
         \setlength{\parindent}{5mm}
420
         \noindent\sloppy\nohyphens\@authsurn,
421
         \nohyphens\@authname\par
422
         \nohyphens{\local@title/\@authname\ \@authsurn. -- \local@cityname:
423
424
         UFRJ/COPPE, \number\year.}\par
         \pageref{front:pageno},
425
         \pageref{LastPage}
426
427
         p.\@ifundefined{r@cat:lofflag}{}\pageref{cat:lofflag}} $29,7$cm.\par
428
         % There is an issue here. When the last entry must be split between lines,
429
         \% the spacing between it and the next paragraph becomes smaller.
430
         % Should we manually introduce a fixed space? But how could we know that
431
         % a name was split?
         \begin{tabularx}{100mm}[b]{@{}l@{}}}
432
           \local@advisorstring: & \nohyphens{\@adname\ \@adsurn}%
433
           \ifthenelse{\equal{\@coadname}{\@empty}}{}{\\
434
             & \nohyphens{\@coadname\ \@coadsurn}}
435
         \end{tabularx}\par
436
437
         \nohyphens{\local@doctype\ ({\MakeLowercase\@degreename}) --
438
         UFRJ/COPPE/Programa de \local@deptname, \number\year.}\par
439
         \bibname: p. \pageref{bib:begin} -- \pageref{bib:end}.\par
         \count1=0
440
         \count2=1
441
         \nohyphens{\@whilenum \count1<\value{keywords} \do {%
442
           \number\count2. \csname K:\the\count1 \endcsname.
443
           \advance\count1 by 1
444
445
           \advance\count2 by 1}
         I. \@adsurn, \@adname%
446
         \ifthenelse{\equal{\@coadname}{\@empty}}{}{\emph{~et~al.}}.
447
448
         II. \local@universityname, COPPE, Programa de \local@deptname.
449
         III. T{\' i}tulo.}
       \end{minipage}}
450
     \end{center}
451
     \vspace*{\fill}}
```

```
\dedication
                453 \newcommand\dedication[1]{
                     \gdef\@dedic{#1}
                455
                     \chapter*{\vfill
                       \begin{flushright}
                456
                         \begin{minipage}{60mm}
                457
                           \it \normalsize \@dedic
                458
                459
                         \end{minipage}
                460
                       \end{flushright}}}
                This is a specialization of the abstract in the article standard class.
                461 \newenvironment{abstract}{%
                462
                     \clearpage
                     \thispagestyle{plain}
                463
                     \abstract@toptext\par
                464
                     \vspace*{8.6mm}
                465
                     \begin{center}
                466
                       \sloppy\nohyphens{\MakeUppercase\local@title}\par
                467
                       \vspace*{13.2mm}
                468
                       \@authname\ \@authsurn \par
                469
                470
                       \vspace*{7mm}
                471
                       \local@monthname/\number\year
                472 \end{center}\par
                473 % Old style
                474 % \vspace*{3mm}
                475
                     \vspace*{\fill}
                     \noindent%
                476
                     \begin{tabularx}{\textwidth}[b]{@{}l@{}}
                477
                       \local@advisorstring: & \nohyphens{\@adname\ \@adsurn}\\
                478
                       479
                         & \nohyphens{\@coadname\ \@coadsurn}\\}
                480
                     \end{tabularx}\par
                481
                482
                     \vspace*{2mm}
                     \noindent\local@deptstring: \local@deptname\par
                483
                     \vspace*{7mm}}{\vspace*{\fill}}
                484
foreignabstract
                485 \newenvironment{foreignabstract}{%
                486
                     \clearpage
                487
                     \thispagestyle{plain}
                     \begin{otherlanguage}{english}
                488
                489
                     \foreignabstract@toptext\par
                490
                     \vspace*{8.6mm}
                     \begin{center}
                491
                       \sloppy\nohyphens{\MakeUppercase\foreign@title}\par
                492
                       \vspace*{13.2mm}
                493
                       \@authname\ \@authsurn \par
                494
                       \vspace*{7mm}
                495
                       \foreign@monthname/\number\year
                496
```

```
\end{center}\par
              498 % Old style
              499 % \vspace*{3mm}
              500
                   \vspace*{\fill}
              501
                   \noindent%
                   \begin{tabularx}{\textwidth}[b]{0{}l0{}}X0{}}
              502
                     503
                     504
                       & \nohyphens{\@coadname\ \@coadsurn}\\}
              505
                   \end{tabularx}\par
              506
                   \vspace*{2mm}
              507
                   \noindent\foreign@deptstring: \foreign@deptname\par
              508
                   510
                   \end{otherlanguage}
                   \vspace*{\fill}
              511
                   \global\let\@author\@empty
              512
                   \global\let\@date\@empty
              513
                   \global\let\foreign@title\@empty
              514
                   \global\let\foreign@title\relax
              515
              516
                   \global\let\local@title\@empty
              517
                   \global\let\local@title\relax
                   \global\let\author\relax
              518
                   \global\let\author\relax
              519
                   \global\let\date\relax}
\listoffigures
              521 \renewcommand\listoffigures{%
              522
                   \immediate\write\@auxout{%
                   \string\newlabel{cat:lofflag}{{}{:~il.;}{}{page.\roman{page}}{}}}
              523
              524
                     \if@twocolumn
                       \@restonecoltrue\onecolumn
              525
              526
                     \else
              527
                       \@restonecolfalse
              528
                     \fi
                     \chapter*{\listfigurename}%
              529
                       \addcontentsline{toc}{chapter}{\listfigurename}%
              530
                       \@mkboth{\MakeUppercase\listfigurename}%
              531
                              {\MakeUppercase\listfigurename}%
              532
                     \@starttoc{lof}%
              533
                     \if@restonecol\twocolumn\fi
              534
              535
 \listoftables
              536 \renewcommand\listoftables{%
                     \if@twocolumn
              537
                       \@restonecoltrue\onecolumn
              538
              539
                     \else
                       \@restonecolfalse
              540
              541
                     \fi
```

```
\chapter*{\listtablename}%
                       542
                                 \addcontentsline{toc}{chapter}{\listtablename}%
                       543
                       544
                                 \@mkboth{%
                                     \MakeUppercase\listtablename}%
                       545
                                    {\MakeUppercase\listtablename}%
                       546
                              \@starttoc{lot}%
                       547
                              \if@restonecol\twocolumn\fi
                       548
                       549
                              }
      \printlosymbols
                       550 \newcommand\printlosymbols{%
                       551 \renewcommand\glossaryname{\listsymbolname}%
                       552 \@input@{\jobname.los}}
       \makelosymbols
                       553 \def\makelosymbols{%
                            \newwrite\@losfile
                            \immediate\openout\@losfile=\jobname.syx
                       556
                            \def\symbl{\@bsphack\begingroup
                       557
                                        \@sanitize
                                        \@wrlos}\typeout
                       558
                            {Writing index of symbols file \jobname.syx}%
                       559
                            \let\makelosymbols\@empty
                       560
                       561 }
                       562 \ensuremath{\verb|Conlypreamble||} makelosymbols
                       563 \AtBeginDocument{%
                       564 \@ifpackageloaded{hyperref}{%
                            \def\@wrlos#1#2{%
                       565
                       566
                              \protected@write\@losfile{}%
                       567
                                 {\string\indexentry{[#1] #2|hyperpage}{\thepage}}%
                       568
                              \endgroup
                       569
                              \@esphack}}{%
                       570
                            \def\@wrlos#1#2{%
                              \protected@write\@losfile{}%
                       571
                                {\string\indexentry{[#1] #2}{\thepage}}%
                       572
                       573
                              \endgroup
                              \@esphack}}}
                       574
\printloabbreviations
                       575 \newcommand\printloabbreviations{%
                       576 \renewcommand\glossaryname{\listabbreviationname}%
                       577 \@input@{\jobname.lab}}
\makeloabbreviations
                       578 \def\makeloabbreviations{%
                       579
                            \newwrite\@labfile
                            \immediate\openout\@labfile=\jobname.abx
                       580
                            \def\abbrev{\@bsphack\begingroup
                       581
```

```
\@sanitize
582
                \@wrlab}\typeout
583
     {Writing index of abbreviations file \jobname.abx}%
584
585
     \let\makeloabbreviations\@empty
586 }
587 \@onlypreamble\makeloabbreviations
588 \AtBeginDocument{%
589 \@ifpackageloaded{hyperref}{%
    \def\@wrlab#1#2{%
590
       \protected@write\@labfile{}%
591
         592
593
       \endgroup
       \@esphack}}{%
594
     \def\@wrlab#1#2{%
595
       \protected@write\@labfile{}%
596
         {\string\indexentry{[#1] #2}{\arabic{page}}}%
597
598
       \endgroup
      \@esphack}}}
599
600 \newdimen\bibindent%
601 \setlength\bibindent{1.5em}%
602 \renewenvironment{thebibliography}[1]%
        {\chapter*{\bibname}%
603
         \addcontentsline{toc}{chapter}{\bibname}%
604
605
         \immediate\write\@auxout{%
         606
607
         \list{\@biblabel{\@arabic\c@enumiv}}%
             {\setlength{\labelwidth}{0ex}%
608
              \setlength{\leftmargin}{9.0ex}%
609
610
              \setlength{\itemindent}{-9.0ex}%
611
              \advance\leftmargin\labelsep%
              \@openbib@code%
612
613
              \usecounter{enumiv}%
              \let\p@enumiv\@empty%
614
              \renewcommand\theenumiv{\@arabic\c@enumiv}}%
615
616
        \sloppy%
         \clubpenalty4000%
617
         \@clubpenalty \clubpenalty%
618
         \widowpenalty4000%
619
         \sfcode'\.\@m}%
620
        {\def\@noitemerr%
621
622
         {\@latex@warning{Empty 'thebibliography' environment}}%
623
         \immediate\write\@auxout{%
         \string\newlabel{bib:end}{{}\arabic{page}}{}{page.\arabic{page}}{}}}%
624
         \endlist}
626 \newenvironment{theglossary}{%
    \if@twocolumn%
627
      \@restonecoltrue\onecolumn%
628
    \else%
629
```

```
\@restonecolfalse%
630
631
     \fi%
     \@mkboth{\MakeUppercase\glossaryname}%
632
     {\MakeUppercase\glossaryname}%
633
634
     \chapter*{\glossaryname}%
     \addcontentsline{toc}{chapter}{\glossaryname}
635
     \list{}
636
     {\tt \{\setlength{\listparindent}{0in}}\%
637
      \setlength{\labelwidth}{1.0in}%
638
      \setlength{\leftmargin}{1.5in}%
639
      \setlength{\labelsep}{0.5in}%
640
      \setlength{\itemindent}{Oin}}%
641
642
      \sloppy}%
     {\if@restonecol\twocolumn\fi%
643
644 \endlist}
645 %
646 \renewenvironment{theindex}{%
647
     \if@twocolumn
       \@restonecolfalse
648
     \else
649
650
       \@restonecoltrue
651
     \twocolumn[\@makeschapterhead{\indexname}]%
652
     \@mkboth{\MakeUppercase\indexname}%
653
     {\MakeUppercase\indexname}%
654
     \thispagestyle{plain}\parindent\z@
655
     \addcontentsline{toc}{chapter}{\indexname}
656
     \parskip\z@ \@plus .3\p@\relax
657
     \columnseprule \z0
658
     \columnsep 35\p@
659
     \let\item\@idxitem}
660
     {\if@restonecol\onecolumn\else\clearpage\fi}
662 \newcommand\glossaryname{Glossary}
663 \newcommand\listabbreviationname{Lista de Abreviaturas}
664 \newcommand\listsymbolname{Lista de S{\' i}mbolos}
665 %
666 \newcommand\local@advisorstring{Orientador}
667 \newcommand\foreign@advisorstring{Advisor}
668 \ifthenelse{\boolean{maledoc}}{%
     \newcommand\local@approvedname{Aprovado por}%
669
670 }{%
     \newcommand\local@approvedname{Aprovada por}%
671
672 }
673 \newcommand\foreign@approvedname{Approved by}
674 \newcommand\local@universityname{Universidade Federal do Rio de Janeiro}
675 \newcommand\local@deptstring{Programa}
676 \newcommand\foreign@deptstring{Department}
677 \newcommand\local@cityname{Rio de Janeiro}
678 \newcommand\local@statename{RJ}
679 \newcommand\local@countryname{Brasil}
```

```
681 \newcommand\frontcover@maintext{
     \sloppy\nohyphens{\local@doctype\ de \@degreename\
     \ifthenelse{\boolean{maledoc}}{apresentada}
683
     ao Programa de P{\' o}s-gradua{\c c}{\~ a}o em \local@deptname,
684
     COPPE, da \local@universityname, como parte dos requisitos
685
     necess{\' a}rios {\' a} obten{\c c}{\^ a}o do t{\' i}tulo de
686
     \local@degname\ em \local@deptname.}
687
688 }
689 %
690 \newcommand\frontpage@maintext{
     \noindent {\MakeUppercase\local@doctype}
     \ifthenelse{\boolean{maledoc}}{SUBMETIDO}{SUBMETIDA}
     \sloppy\nohyphens{AO CORPO DOCENTE DO INSTITUTO ALBERTO LUIZ COIMBRA
693
     DE P{\' O}S-GRADUA{\c C}{\~ A}O E PESQUISA DE ENGENHARIA (COPPE) DA
694
     UNIVERSIDADE FEDERAL DO RIO DE JANEIRO COMO PARTE DOS REQUISITOS
695
     NECESS{\' A}RIOS PARA A OBTEN{\c C}{\~ A}O DO GRAU DE
696
     {\MakeUppercase\local@degname} EM CI{\^E}NCIAS EM}
697
     {\MakeUppercase\local@deptname. \par}%
698
699 }
700 %
701 \newcommand\frontpage@bottomtext{%
    \begin{center}
    {\MakeUppercase{\local@cityname, \local@statename\ -- \local@countryname}}\par
    {\MakeUppercase\local@monthname\ DE \number\year}
704
705
     \end{center}%
706 }
707 %
708 \newcommand\abstract@toptext{%
    \noindent Resumo \ifthenelse{\boolean{maledoc}}{do}{da}
709
    \local@doctype\ \ifthenelse{\boolean{maledoc}}{apresentado}{apresentada}
710
    \sloppy\nohyphens{{\'a} COPPE/UFRJ como parte dos requisitos
711
712
     necess{\' a}rios para a obten{\c c}{\~ a}o do grau de
713
     \local@degname\ em Ci{\^ e}ncias (\@degree)}
714 }
715 \newcommand\foreignabstract@toptext{%
    \noindent \sloppy\nohyphens{Abstract of \foreign@doctype\ presented to
    COPPE/UFRJ as a partial fulfillment of the requirements for the
718 degree of \foreign@degname\ of Science (\@degree)}
719 }
720 %
721 (/class)
722 (*glossary)
723 actual '='
724 quote '!'
725 level '>'
726 \; \text{delim\_0} ", p. "
727 lethead_flag 0
728 headings_flag 0
```

```
729 preamble  
730 "\n\begin{theglossary}\n \makeatletter"  
731 postamble  
732 "\n \\end{theglossary}\n"  
733 \langle |g|ossary \rangle
```

## Acknowledgments

The authors would like to thank the National Council for Scientific and Technological Development (CNPq). They are also grateful to Alvaro Cuno for setting up the initial SVN repository, Caio Graco and Paula Faragó for being the first COPPETEX users and for their feedbacks, and professor Fernando Lizarralde and Heiko Oberdiek for helpful comments.

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- [7] T<sub>E</sub>X Frequently Asked Questions. http://www.tex.ac.uk/cgi-bin/texfaq2html?introduction=yes.

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	${f E}$	
. 579, 580, 591, 596		\glossaryname . 551,
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. 579, 580, 591, 596	$\begin{array}{llllllllllllllllllllllllllllllllllll$	\glossaryname . 551,
. 579, 580, 591, 596 \@losfile . 554, 555, 566, 571	\edef	\glossaryname . 551,
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