

# The `liuthesis` Class\*

Gustaf Hendeby      Contributors: Johan Henriksson, Niclas Wiker

November 14, 2004

## Abstract

The `liuthesis` Class provides convenient means to write master's thesis at Linköpings universitet — Institute of Technology. The class intended for both beginners and advanced users and hence the `liuthesis` provides many features, in a framework enabling for a high degree of personalization.

## 1 Introduction

Everyone studying at Linköpings universitet must sooner or later face the task of writing a report of some size. As if writing a report should not be enough, most often one have to make the layout look acceptable for printing too. Without the right tools, typesetting the report may turn out to be as time consuming as doing the research for the report.  $\text{\LaTeX}$  is a powerful tool, but to effectively typeset a report one needs to have more tools to define a nice looking document layout — or the document layout will be very time consuming. When I set out to do my master's thesis, the only package, adapted to the situation at Linköpings universitet, available was `exdef` by P. Lindskog<sup>1</sup>.

Even though `exdef` is a nice package, I soon found that I wanted more. I therefore started to design my own “thesis” package, or as I found more suitable, a completely new “thesis” class. At first this project was only intended for personal use, but people approached me showing interest for the project, and `liuthesis` Class was born. `liuthesis` Class is built on the solid foundation of the  $\text{\LaTeX}$  `book` class and ideas from `exdef`, and is suitable for master's thesis at Linköpings universitet — Institute of Technology. The class includes support for every step of the writing process, including modes for drafts, manuscripts, publishing at Linköping University Electronic Press, and much more.

## 2 Usage

Getting started with the `liuthesis` class is simple, and it will, without need for knowledge of any advanced  $\text{\LaTeX}$ , produce nice looking master's thesis manuscripts. This document describes the class `liuthesis`. If, however, a more in depth description of  $\text{\LaTeX}$  and some tips on how to best structure your work is what you are looking for, I recommend reading [OPH+04] for a quick introduction,

---

\*This file has version v0.9b last revised 2004/11/12.

<sup>1</sup>The `exdef` package was written by P. Lindskog for  $\text{\LaTeX} 2\epsilon$ , and modified by M. Jirstrand and M. Östring to better suit  $\text{\TeX}$ .

[Lam94] and [MGB+04] (the second edition of the book is a completely new book compared to [GMS94]) for more details, and [GRM97] for tips on how to produce figures and other advanced graphics.

The `liuthesis` Class is used in the same manner as any other  $\text{\LaTeX}$  class. One difference compared to many other classes you might have come across before is that the class can do much of the standardized work for you.

To use the package you need a fairly new version of  $\text{\LaTeX}$  2 $\epsilon$  including some standard packages. Those packages most often seen to cause problems are `geometry` (must be newer than July 2002), `crop` (newer than November 2001), and `lmodern` (should be standard in modern  $\text{\LaTeX}$  installations). If these packages are not installed or older versions are installed strange warnings and errors might be encountered. Furthermore the class requires  $\text{\LaTeX}$  to have access to some logotypes in postscript format. The Linköping University Electronic Press logotype is included with this distribution (`epresslogo.eps`) but some of the university logotypes need to be downloaded from the net: <http://www.liu.se/logotype/>. The following files may be needed: `LinkUniv_staende_sv.eps`, `LinkUniv_sigill_pms.eps`, `LiTH_staende_sv.eps`, and `LiTH_staende_eng_sv.eps`. These files are all available from link above. If you plan to use pdf $\text{\LaTeX}$  get the logos in an appropriate format for that.

The rest of this section will first describe the options that can be passed to the class, and after that the basic macros, whereas the more advanced macros, which are intended for the advanced user, are described in Section 3 that deals with the implementation of `liuthesis`.

## 2.1 Options

The `liuthesis` Class supports a number of options, the use of some of these are actually necessary for the class to work. Which these options are and how they are used are described below.

### 2.1.1 Output format

Which type of format the document processed by  $\text{\LaTeX}$  possesses depends on four options. Unless the standard format, suitable for proof reading and layout purposes, is what you want, one of the output options below should be selected.

**print** Produce a document that is suitable to convert to a pdf manuscript and send to the printer. Make sure to use 900 dpi and convert all graphics, both B/W and color, using 600 dpi for best result. The resulting document is in s5 format, this could however look a little suspicious in gsvie and Acrobat Reader since s5 is not one of the supported page sizes. There are no crops or crop-info created with this option.

**ePress** This option produce a document that is suitable for Linköping University Electronic Press, *i.e.*, a mandatory copyright notice is appended to the end. In the produced document the s5 pages are centered on a4 pages. This option suppresses all crops and crop-info.

**pdfRelease** The `pdfRelease` option is equivalent to the `ePress` option in all aspects, except that it leaves out the copyright notice.

**draft** The **draft** option is actually a built in L<sup>A</sup>T<sub>E</sub>X option worth trying out. Using this option all included graphics are replaced with boxes, for faster processing, and more importantly, all over full lines are emphasized with a black line in the outer margin. This can be very helpful when proof reading the manuscript with respect to how it looks in print. This option allows for both crops and crop-info.

Only one of theses should be used, the behavior if more than one of these are selected is undefined.

### 2.1.2 Crops

There are another two options that may be used in conjunction with the above ones, but only takes affect when using the implicit mode, or the **draft** mode. They are both used intended to help ease the layout and proof reading.

**crop** When the crop option is active crop marks are placed on the a4 page to indicate where the s5 page ends as well as where the midpoint on the sides are.

**info** Prints some useful information above the s5 page: name of main document, date and time of compilation, the page number and a global page number.

### 2.1.3 Language Selection

In order to support different languages in the document, *i.e.*, change some of the titles of the environments used and fill out the library page correctly, a language option *must* be specified. There are two different language options to choose among, and hopefully these should be enough: **english** and **swedish**. Make sure to specify exactly one of these as options to the **liuthesis** Class or you will encounter some strange errors while processing your document through L<sup>A</sup>T<sub>E</sub>X.

### 2.1.4 Department Specifics

Since the different departments at Linköpings universitet, *e.g.*, EKI and IFM, cannot seem to agree on a standard layout for master's thesis, the **liuthesis** Class supplies some standard layouts, intended for the different departments. If none of these should be suitable, it is easy to modify the standard ones to provide the layout that is just perfect for you, how to do this is described later on. One department must always be specified. The standardized definitions are

**ida** Department of Computer and Information Science (**ida.ltd**)

**ifm** Department of Physics and Measurement Technology (**ifm.ltd**)

**ikp\_mask** Department of Electrical Engineering (**ikp\_mask.ltd**)  
Contributed by Niclas Wiker.

**ikp\_mek** Department of Electrical Engineering (**ikp\_mek.ltd**)  
Contributed by Niclas Wiker.

**isy** Department of Electrical Engineering (**isy.ltd**)

**mai** Department of Mathematics (**mai.ltd**)

Basically these options define how the front and title pages look.

## 2.2 Macros

The `liuthesis` Class provides several macros to ease the creative process. These macros can be divided into groups depending on when and where their supposed usage is; front, main, or back matter.

**Hyperreferences.** One decision must be made before doing the set up. Do I want clickable references and some other PDF related stuff in my document. If the answer to this question is yes and it should most often be, be aware that this could introduce strange errors in some cases. Anyhow, in that case use the macro `\useHyperRef` (no arguments) to initiate the `hyperref` package with suitable arguments. This should be done after inclusion of all packages in the document since `hyperref` should be the last package included.

`\useHyperRef`

### 2.2.1 Front Matter

The front matter is the part of the report including; front, title and library page, abstract(s), acknowledgements, contents, *etc.* How these look depends on basically two things: (1) Which definition file is used. (2) What information is specified.

**Setup.** A number of functions should be called, preferably in the preamble of the document, to specify the information that should be present in the front matter.

`\author`

The macro `\author` is used to specify the author(s) of the report. This is done using the only argument. The macro is used throughout the entire document, and trying to format the name here is hence not a good idea. The same goes for the title, that you specify using `\title`. You must always provide both a Swedish (first argument) and an English title (second argument).

`\title`

Some information about the report is needed too, and even though some of the information might not be known when starting to write the report. If this is the case wait with defining this information, but do not forget to fill it out later on. All information not filled out generates an warning but the code should be compilable anyhow. The `\thesisDate` should be the date when the report is defended. The syntax to use is `\thesisDate{D}{M}{YYYY}`, for best result leave out leading 0's. Equally important is it to specify the thesis no./ISRN, this is done with `\thesisNo` which take one argument — the thesis no.

`\thesisDate`

`\thesisNo`

For the library page the division where the thesis is conducted should be specified, use `\thesisDivision`. Using `\URL` it is possible to give one, or two, URL where your report may be accessed from Internet. One of these should probably point towards Linköping University Electronic Press. The content of the keywords field is specified using `\keywords`. This macro takes one argument.

`\thesisDivision`

`\URL`

`\keywords`

It should be specified on the title page who is/are your supervisor(s) and who is your examiner. There are two commands to do this `\supervisor` and `\examiner`, both taking one argument. Names are listed in both of these arguments separated with `\AND`, *e.g.*, `\supervisor{John Doe \AND J.R. Hacker}`. When doing the work with your master's thesis at some company, it is a nice idea to give the company some credit by indicating where your supervisors work, this is possible using `\AT` like this `\supervisor{John Doe \AT Company}`. The same trick works for the examiner as well. Finally, the title page also indicate what subject of the master's thesis and this should be indicated using `\subject` taking one argument. Specify the subject in Swedish, *e.g.*, "Reglerteknik".

`\supervisor`

`\examiner`

`\AND`

`\AT`

`\subject`

Three more parts do frequently appear in the front matter; an abstract in English (and one Swedish *Sammanfattning* if your work is in Swedish), acknowledgements, and a table contents (which of course L<sup>A</sup>T<sub>E</sub>X generates for you). The abstract, which is also presented on the library page, is generated using `\abstract` which takes two arguments. The first argument, the abstract in Swedish (optional) and the abstract in English is supplied as the second argument. If you want the Swedish abstract to appear on a separate page, instead of right below the English one, use `\twoAbstractPage` in your preamble. This is useful, *e.g.*, if your abstracts are too extensive to fit on one page. `\acknowledgements` takes one argument, the body of the acknowledgements. Once the information is gathered it is time to create the front matter.

`\abstract`

`\twoAbstractPage`

`\acknowledgements`

**Generation.** The `liuthesis` Class contain one handy command to generate a complete front matter, `\makeFrontMatter`. `\makeFrontMatter` generates the following, each on a separate odd page:

`\makeFrontMatter`

`\makeFrontPage`

`\makeTitlePage`

`\makeLibraryPage`

`\makeAbstract`

`\makeAcknowledgments`

1. Front page, can also be generated using `\makeFrontPage`.

2. Title page, `\makeTitlePage`.

3. Library page, `\makeLibraryPage`.

4. Abstract, `\makeAbstract`.

5. Acknowledgements, `\makeAcknowledgments`.

6. Table of Contents, `\tableofcontents` (the standard L<sup>A</sup>T<sub>E</sub>X command).

An optional argument to the `\makeFrontMatter` macro allows for easy addition of extra contents to the front matter, *e.g.*, `\listoffigures`, `\listoftables`, *etc.* The entire front matter is paginated using lower case roman numbers, starting at the title page. This is accomplished using `\frontmatter`.

`\frontmatter`

If `\makeFrontMatter` does not provide the desired layout, it is always possible to generate the parts separately and put them together in any manner you find suitable.

## 2.2.2 Main Matter

The main part of the report is supposed to go in the main matter, the `liuthesis` Class therefore include some macros and environments to ease the typesetting process. These utilities will be presented in this section.

The `liuthesis` Class modifies the standard L<sup>A</sup>T<sub>E</sub>X behavior in a few ways to, in my opinion, create a better looking result. One of this modifications is that text emphasised using `\em` or `\emph{}` is not in *italic* but instead in *slanted*. This is for two reasons, I like the slanted text better and the risk of confusing emphasised text and math embedded text is removed.

A few environments are included in `liuthesis`, these are:

`theorem`

`lemma`

`corollary`

• `theorem`

• `lemma`

• `corollary`

<code>proof</code>	• <code>proof</code>
<code>definition</code>	• <code>definition</code>
<code>example</code>	• <code>example</code>

The intended use of these environments should be self evident, and they all take a optional argument — a name. Furthermore the environments are all numbered within the current chapter.

`\listofexamples`    The commands `\listofexamples`, `\listoffigures`, and `\listoftables` create lists with all examples, figures and tables in the document, respectively. In order for these to work the document must be passed through L<sup>A</sup>T<sub>E</sub>X at least twice, or the page numbers could turn out incorrectly. The same goes for the table of contents *etc.*

### 2.2.3 Back Matter

`\backmatter`    The macro `\backmatter` starts the back matter. The only difference between the back matter and the main matter is that chapters are allowed to start on both even and odd pages, hence preserving some space if many short appendices are used. It could be a good idea to use the L<sup>A</sup>T<sub>E</sub>X command `\appendix` before starting your appendices, hence producing appendices named Appendix followed by a upper case letter instead of a number.

`\makeCopyright`    When using the ePress option a copyright notice, specific for Linköping University Electronic Press, is added at the end. This copyright notice can also be produced anywhere in the document using the macro `\makeCopyright`, however keep in mind that copyright information is only valid for the document actually published at Linköping University Electronic Press.

## 2.3 Preloaded Packages

The following packages are preloaded by the `liuthesis` Class:

`babel` To get the most commonly used keywords translated.

`graphicx` Package to include graphics into your report, see [MGB+04, GRM97].

`lmodern`, `fontenc`, and `inputenc` To allow for å, Å, ä, Ä, ö, Ö, *etc.* to be entered without fuzz.

`theorem` Extends the theorem-like environments, see [MGB+04, Ch. 8].

`amsmath`, `amsfonts`, `amssymb` Some *AMS* math stuff, see [MGB+04, Ch. 8].

`hyperref` Used to create hyperreferences in the documents, these works with `acrobat` reader and some newer versions of `gsview`.

## 3 Implementation

Now to the implementation of the class. The description of the main code is sparse. The code is pretty straight forward, with few interesting details, and therefore I do not find it interesting to comment. However, it might be of interest how the definitionfiles are constructed. Explaining that code enables others to write new definitionfiles on demand. Only one definition file will be explained, that for `ISY`.

### 3.1 The Class Code

Here follows the class implementation, starting with som initiations and packages that are needed immedeately.

```

1 (*class)
2 \ProvidesClass{liuthesis}[2004/11/12 liuthesis Class v. 0.90b]
3 \NeedsTeXFormat{LaTeX2e}
4
5 \RequirePackage{lmodern}
6 \RequirePackage[T1]{fontenc}
7 \RequirePackage[latin1]{inputenc}
8 \RequirePackage{babel}
9 \RequirePackage{theorem}

```

The following code sets up some macros for use in definition files,

```

\liuthesisDefinition
10 \newcommand*{\liuthesisDefinition}[2]{%
11   \ClassInfo{liuthesis}{Loaded definition file '\CurrentOption.ltd'}%
12   \newcommand*{\thesis@divTAG}{#1}%
13   \newcommand*{\@address}{#2}}

```

and allows for optional use of hyperref.

```

14
15 \newif\ifliuthesis@hyperref
16 \liuthesis@hyperreffalse
17 \newcommand*{\phantomsection}{\relax}
18 \newcommand*{\href}[2][{}]{#1}
19

```

To provide multi-lingual support some definitions are made. So far only English and Swedish are provided, it should however not be too difficult to add more languages. What is done is to translate a couple of keywords into the target language. The rest is taken care of by the **babel** package that has already been passed the language option.

```

20
21 %%%%%%%%%%%
22 %%% Language %%%
23 %%%%%%%%%%%
24
25 \DeclareOption{english}{%
26   \def\acknowledgementsname{Acknowledgements}%
27   \def\corollaryname{Corollary}
28   \def\definitionname{Definition}
29   \def\examplename{Example}
30   \def\lemmaname{Lemma}
31   \def\listexamplename{List of Examples}
32   \def\theoremname{Theorem}
33   \newcommand*{\monthName}[1]{\ifcase#1\or
34     January\or February\or March\or
35     April\or May\or June\or
36     July\or August\or September\or
37     October\or November\or December\fi}
38 }
39

```

```

40 \DeclareOption{swedish}{%
41   \def\acknowledgementsname{Tack}%
42   \def\corollaryname{Korrolarium}
43   \def\definitionname{Definition}
44   \def\examplename{Exempel}
45   \def\lemmaname{Lemma}
46   \def\listexamplename{Exempellista}
47   \def\theoremname{Sats}
48   \newcommand*{\monthName}[1]{\ifcase#1\or
49     januari\or februari\or mars\or
50     april\or maj\or juni\or
51     juli\or augusti\or september\or
52     oktober\or november\or december\fi}
53 }

```

The following macros help define the crops used to indicate the s5 page on a4 paper, and some page info, when those options are selected.

```

54
55 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
56 %% CROP SETTINGS %%
57 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
58
59 \newcommand*{\@ul}{\relax}\newcommand*{\@ur}{\relax}%
60 \newcommand*{\@ll}{\relax}\newcommand*{\@lr}{\relax}%
61 \newcommand*{\@info}{\relax}%
62 \DeclareOption{crop}{% To get cropmarks
63   \renewcommand*{\@ul}{\begin{picture}(0,0)%
64     \unitlength1mm%
65     \thinlines%
66     \put(0,0){\line(-5,0){2}}%
67     \put(0,0){\line(0,5){2}}%
68   \end{picture}}%
69   \renewcommand*{\@ur}{\begin{picture}(0,0)%
70     \unitlength1mm%
71     \thinlines%
72     \put(0,0){\line(5,0){2}}%
73     \put(0,0){\line(0,5){2}}%
74   \end{picture}}%
75   \renewcommand*{\@ll}{\begin{picture}(0,0)%
76     \unitlength1mm%
77     \thinlines%
78     \put(0,0){\line(-5,0){2}}%
79     \put(0,0){\line(0,-5){2}}%
80   \end{picture}}%
81   \renewcommand*{\@lr}{\begin{picture}(0,0)%
82     \unitlength1mm%
83     \thinlines%
84     \put(0,0){\line(5,0){2}}%
85     \put(0,0){\line(0,-5){2}}%
86   \end{picture}}%
87 \PassOptionsToPackage{axes}{crop}
88
89 \DeclareOption{info}{%
90   \renewcommand*{\@info}{%

```



```

91 \global\advance\CROP@index\@ne%
92 \addtolength{\paperwidth}{-20\p@}%
93 \makebox[\z@]{%
94 \hss%
95 \raise10\p@\vbox to\z@ {
96 \centering%
97 \hsize\paperwidth %
98 \vss%
99 \normalfont%
100 \let\protect\relax%
101 \CROP@font{%
102 \texttt{\jobname}:\~\the\year-\the\month-\the\day\:\:%
103 \CROP@time\quad---\quad\thepage(\the\CROP@index)\strut%
104 }%
105 \vspace*{25\p@}
106 }%
107 \hss%
108 }
109 }}%
110 }
111
112 \DeclareOption{noCrop}{%
113 \renewcommand*{\@ul}{\relax}\renewcommand*{\@ur}{\relax}%
114 \renewcommand*{\@ll}{\relax}\renewcommand*{\@lr}{\relax}%
115 \renewcommand*{\@info}{\relax}%
116 }
117

```

The definition of the page layout, *i.e.*, **print**, **pdfrelease**, **ePress**, and **draft** layout. The macro used to use hyper references **\useHyperRef** is also defined here in lack of better placement.

```

118
119 %%%%%%%%%%%
120 %%% PAGE LAYOUT %%%
121 %%%%%%%%%%%
122 % \end{macro}
123 % \begin{macro}{\useHyperRef}
124 % \begin{macrocode}
125 \newcommand*{\useHyperRef}{%
126 \liuthesis@hyperreftrue%
127 \usepackage{hyperref}[2000/09/29]}
128 \PassOptionsToPackage{off, a4, center}{crop} % s5 centered on a4 with crops
129 % \end{macro}
130 % \end{macro}
131 % \begin{macrocode}
132 \DeclareOption{print}{% s5 format
133 \PassOptionsToPackage{off, noaxes, width=165mm, height=240mm}{crop}%
134 \ExecuteOptions{noCrop}%
135 }
136
137 \DeclareOption{pdfRelease}{% Release in pdf format without copyright notice
138 \PassOptionsToPackage{off, noaxes, a4, center}{crop}%
139 \ExecuteOptions{noCrop}%
140 \renewcommand*{\useHyperRef}{%

```

```

141 \liuthesis@hyperreftrue%
142 \usepackage[ps2pdf, hyperindex, bookmarks]{hyperref}[2000/09/29]}
143 }
144
145 \DeclareOption{ePress}{% s5 centered on a4
146 \AtEndDocument{\cleardoublepage\makeCopyright}%
147 \ExecuteOptions{pdfRelease}%
148 }
149
150 \DeclareOption{draft}{% s5 centered on a4 DRAFT
151 \PassOptionsToPackage{off, a4, center}{crop} % s5 centered on a4 with crops
152 \ClassInfo{liuthesis}{This is a DRAFT mode and should hence NOT be
153 used for other purposes. Pictures are blank and overful hboxes
154 stand out.}
155 }

```

Adjust the margin paragraph width to match the actual margin available.

```

156 \AtEndOfClass{%
157 \setlength{\marginparwidth}{\oddsidemargin}%
158 \addtolength{\marginparwidth}{-\marginparsep}%
159 \addtolength{\marginparwidth}{-\p@}%
160 }

```

This codes tries to interpret all unrecognized option as definition files (.ltd). If it is not a definition file it is passed to the base class book and is marked as unused. Then execute the option code.

```

161 \DeclareOption*{\InputIfFileExists{\CurrentOption.ltd}
162 {}{\PassOptionsToClass{\CurrentOption}{book}\OptionNotUsed}}
163 \ProcessOptions\relax
164

```

Make sure that a definition file is loaded, before loading the base class.

```

165 \ifx\thesis@divTAG\relax
166 \ClassError{liuthesis}{No division definition found.}
167 \else
168 \ClassInfo{liuthesis}{Loading division definition \thesis@divTAG.}
169 \fi
170
171 \LoadClass[twoside]{book}

```

Redefines \em and \emph{} to use a slanted font instead of an italic one.

```

172 \DeclareRobustCommand\em%
173 {\@nomath\em \ifdim \fontdimen\@ne\font >\z@
174 \upshape \else \slshape \fi}

```

Include some required packages, to be able to continue.

```

175 \RequirePackage{graphicx}
176 \RequirePackage{dvips=false, pdftex=false, vtex=false,%
177 twoside, papersize={165mm,240mm}, body={125mm,195mm},%
178 bindingoffset=4mm, marginparsep=3mm, portrait,%
179 twocolumn=false, vmarginratio={4:5}}{geometry}[2002/07/08]
180
181 \RequirePackage{crop}[2001/11/16]
182 \RequirePackage[intlimits]{amsmath}
183 \RequirePackage{amsfonts, amssymb}

```

Create some helper functions to create crops.

```
184 \cropdef[\@info]{\@ul}{\@ur}{\@ll}{\@lr}{liuthesiscrop}
185 \crop[liuthesiscrop,font=\mdseries\upshape\scriptsize]
```

The `\ifLanguageInUse` macro is used internally to do things depending on active language.

`\ifLanguageInUse`

```
186 \newcommand*{\ifLanguageInUse}[1]{%
187   \expandafter\ifx\csname l@#1\endcsname\relax
188   \expandafter\@secondoftwo
189   \else
190   \bbl@afterfi{\ifnum\csname l@#1\endcsname=\language
191     \expandafter\@firstoftwo
192     \else
193     \expandafter\@secondoftwo
194     \fi}%
195   \fi}
```

Introduce some macros to be able to produce front, title, and library card.

```
196
197 %%%%%%%%%%%
198 %%      Info      %%
199 %%%%%%%%%%%
200
```

`\author`

```
201 \renewcommand*{\author}[1]{\renewcommand*{\@author}{#1}%
202   \ifliuthesis@hyperref\hypersetup{pdfauthor={#1}}\fi}%

203 \newcommand*{\thesis@day}{%
204   \@latex@warning@no@line{No \noexpand\thesisDate given}}%
```

`\thesisDate`

```
205 \newcommand*{\thesisDate}[3]{%
206   \newcommand*{\thesis@month}{#1}%
207   \renewcommand*{\thesis@day}{#2}%
208   \newcommand*{\thesis@year}{#3}%
209 }

210 \newcommand*{\thesis@division}{%
211   \@latex@warning@no@line{No \noexpand\thesisDivision given}}%
```

`\thesisDivision`

```
212 \newcommand*{\thesisDivision}[1]{\renewcommand*{\thesis@division}{#1}}%

213 \newcommand*{\thesis@subject}{%
214   \@latex@warning@no@line{No \noexpand\subject given}}%
```

`\subject`

```
215 \newcommand*{\subject}[1]{\renewcommand*{\thesis@subject}{#1}%
216   \ifliuthesis@hyperref\hypersetup{pdfsubject={#1}}\fi}%

217 \newcommand*{\thesis@No}{%
218   \@latex@warning@no@line{No \noexpand\thesisNo given}}%
```

```

\thesisNo
219 \newcommand*\thesisNo}[1]{\renewcommand*\thesis@No{#1}}%

\title
220 \renewcommand*\title}[2]{\newcommand*\swe@title{#1}%
221 \renewcommand*\@title{#2}%
222 \ifliuthesis@hyperref%
223 \ifLanguageInUse{swedish}{\hypersetup{pdftitle={#1}}}%
224 {\hypersetup{pdftitle={#2}}}\fi}%

225 \newcommand*\URL@b{\@latex@warning@no@line{No \noexpand\URL given}}%
226 \newcommand*\URL@a{}%

\URL
227 \newcommand*\URL}[2] []{\renewcommand*\URL@a{#1}\renewcommand*\URL@b{#2}}%

\keywords
228 \newcommand*\keywords}[1]{\newcommand*\@keywords{#1}%
229 \ifliuthesis@hyperref\hypersetup{pdfkeywords={#1}}\fi}%

230 \newcommand{\@abstract}{\@latex@warning@no@line{No \noexpand\abstract given}}%

\abstract
231 \newcommand{\abstract}[2] []{%
232 \renewcommand{\@abstract}{\ignorespacesafterend\noindent #2\unskip}%
233 \newcommand{\swe@abstract}{\ignorespacesafterend\noindent #1\unskip}}%

234 \newcommand{\@acknowledgements}{%
235 \@latex@warning@no@line{No \noexpand\acknowledgements given}}%

\acknowledgements
236 \newcommand{\acknowledgements}[1]{%
237 \renewcommand{\@acknowledgements}{\ignorespacesafterend\noindent#1\unskip}}%

238 \newcommand*\@supervisor{\@latex@warning@no@line{No \noexpand\supervisor given}}%

\supervisor
239 \newcommand*\supervisor}[1]{\renewcommand*\@supervisor{\ignorespaces#1\ignorespaces}}%

240 \newcommand*\@examiner{\@latex@warning@no@line{No \noexpand\examiner given}}%

\examiner
241 \newcommand*\examiner}[1]{\renewcommand*\@examiner{\ignorespaces#1\ignorespaces}}

242 \newcommand*\AND{\>\bfseries\ignorespaces}%
243 \newcommand*\AT{\>\small\ignorespaces}%

Define the library card. Numerous \makebox's with zero width to avoid some
overfull boxes.

244
245 %%%%%%%%%%%%%%
246 % Library page %
247 %%%%%%%%%%%%%%
248

```

\makeLibraryPage

```

249 \newcommand{\makeLibraryPage}{%
250   \clearpage \thispagestyle{empty}%
251   \enlargethispage*{27mm} {\centering%
252     \vspace*{-11mm}
253     \hspace*{3mm}}%
254   \makebox[\z@][l]{%
255     \begin{minipage}[t][212mm]{126mm}%
256       \scriptsize \setlength{\unitlength}{1mm}%
257       \fontsize{7}{8\p@} \selectfont%
258       \begin{picture}(126,212)(0,0)%
259         %% Department and division
260         \put(0,190){\makebox[\z@][l]{\framebox(92,22){}}}%
261         \put(1,191){\includegraphics[width=20mm]{LiTH_sigill_sv}}%
262         \put(25,209){\parbox[t]{5cm}{\textbf{Avdelning, Institution}}\%
263           Division, Department}}%
264         \put(28,197){\parbox[c]{64mm}{\thesis@division\\@address}}%
265         %% Date
266         \put(93,190){\makebox[\z@][l]{\framebox(33,22){}}}%
267         \put(94,209){\parbox[t]{5cm}{\textbf{Datum}}\%
268           Date}}%      % Must be Swedish style
269         \put(95,197){\thesis@year-%
270           \ifnum\thesis@month<10 0\fi\thesis@month-%
271           \ifnum\thesis@day<10 0\fi\thesis@day}%
272         %% Language
273         \put(0,157){\makebox[\z@][t]{\framebox(30,32){}}}%
274         \put(1,186){\parbox[t]{3cm}{\textbf{Språk}}\Language}}%
275         \put(1,178){\Box Svenska/Swedish}%
276         \put(1,174){\Box Engelska/English}%
277         \put(1,162){\Box} \put(5,162){\line(1,0){20}}%
278         \ifLanguageInUse{swedish}{\put(1,178){\boxtimes}}%
279         \ifLanguageInUse{english}{\put(1,174){\boxtimes}}}%
280         %% Report category
281         \put(31,157){\makebox[\z@][t]{\framebox(30,32){}}}%
282         \put(32,186){\parbox[t]{5cm}{\textbf{Rapporttyp}}\Report category}}%
283         \put(32,178){\Box Licentiatavhandling}%
284         \put(32,174){\Box Examensarbete}%
285         \put(32,170){\Box C-uppsats}%
286         \put(32,166){\Box D-uppsats}%
287         \put(32,162){\Box Övrig rapport}%
288         \put(32,158){\Box} \put(35,158){\line(1,0){20}}%
289         \put(32,174){\boxtimes} % set kind of report
290         %% URL
291         \put(0,143){\makebox[\z@][t]{\framebox(61,13){}}}%
292         \put(1,153){\textbf{URL för elektronisk version}}%
293         \put(4,148){%
294           \sbox{\@tempboxa}{\mbox{\URL@a}}%
295           \ifdim\wd\@tempboxa > \z@%
296             \parbox[c]{58mm}{\href{\URL@a}{\texttt{\URL@a}}}%
297             \href{\URL@b}{\texttt{\URL@b}}}%
298           \else%
299             \parbox[c]{58mm}{\href{\URL@b}{\texttt{\URL@b}}}%
300             \fi}%
301         %% ISBN etc

```

```

302 \put(62,143){\makebox[\z@][t]{\framebox(64,46){}}}%
303 \put(63,186){\textbf{ISBN}}}%
304 \put(63,181){\line(1,0){62}}\put(69,182){---}%
305 \put(63,178){\textbf{ISRN}}}%
306 \put(63,171){\line(1,0){62}} \put(70,174){\thesis@No}%
307 \put(63,168){\parbox[t]{5cm}{\textbf{Serietitel och serienummer}}\%
308 Title of series, numbering}}}%
309 \put(102,168){\textbf{ISSN}}}%
310 \put(102,163){\line(1,0){23}} \put(102,164){---}%
311 %% Title
312 \put(0,108){\makebox[\z@][t]{\framebox(126,34){}}}%
313 \put(1,138){\parbox[t]{5cm}{\textbf{Titel}}\Title}}}%
314 \put(17,138){\parbox[t]{100mm}{\swe@title\par\smallskip\@title}}}%
315 \put(1,117){\parbox[t]{5cm}{\textbf{Författare}}\Author}}}%
316 \put(17,117){\@author}%
317 %% Abstract
318 \put(0,12){\makebox[\z@][t]{\framebox(126,95){}}}%
319 \put(1,104){\parbox[t]{5cm}{\textbf{Sammanfattning}}\Abstract}}}%
320 \put(17,96){\parbox[t]{100mm}{\setlength{\parindent}{1.5em}\@abstract}}}%
321 %% Keywords
322 \put(0,0){\makebox[\z@][t]{\framebox(126,11){}}}%
323 \put(1,8){\parbox[t]{5cm}{\textbf{Nyckelord}}\Keywords}}}%
324 \put(17,5){\parbox[t]{100mm}{\@keywords}}
325 \end{picture}%
326 \end{minipage}%
327 }}%
328 \clearpage%
329 }

```

Define the acknowledgement page.

```

330
331 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
332 %% Acknowledgements %%
333 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

```

\makeAcknowledgments

```

334 \newcommand*{\makeAcknowledgements}{%
335 \clearpage%
336 \chapter*{\acknowledgementsname}%
337 \@acknowledgements%
338 \clearpage%
339 }

```

Define the abstract page.

```

340
341 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
342 %% Abstract %%
343 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
344
345 \newcommand{\lt@twoAbstractPages}{}

```

\twoAbstractPage

```

346 \newcommand{\twoAbstractPage}{%
347 \renewcommand{\lt@twoAbstractPages}{\cleardoublepage}}

```

\makeAbstract

```

348 \newcommand*{\makeAbstract}{%
349   \clearpage \thispagestyle{plain}%
350   \vspace*{-3\baselineskip}%
351   \@makeschapterhead{Abstract} % MIGHT CHANGE!!!
352   \vspace*{-1.5\baselineskip}%
353   \@abstract%
354   \vfill \sbox{\@tempboxa}{\mbox{\swe@abstract}}}%
355   \ifdim\wd\@tempboxa > \z@%
356     \lt@twoAbstractPages
357     \thispagestyle{plain}
358     \vspace*{-3\baselineskip}%
359     \@makeschapterhead{Sammanfattning} %MIGHT CHANGE!!!
360     \vspace*{-1.5\baselineskip}%
361     \frenchspacing \swe@abstract \nonfrenchspacing%
362   \fi%
363   \vfill \clearpage%
364 }
```

Define the copyright notice, as defined by ePress on November 12, 2004. Do not change this page unless this copyright notice changes.

```

365
366 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
367 %% Copyright notice %%
368 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
369
```

\makeCopyright

```

370 \newcommand*{\makeCopyright}{\begingroup%
371   \clearpage \thispagestyle{empty}%
372   %
373   \vspace*{-22mm}%
374   \noindent%
375   \includegraphics[height=14mm]{epresslogo}
376   \hfill%
377   \includegraphics[height=18mm]{LinkUniv_staende_pms}%
378   %
379   \vspace{3\baselineskip} \frenchspacing%
380   \par\noindent{\fontsize{12pt}{14pt}\selectfont%
381     \normalfont\large\bfseries Upphovsrätt}\[1.5ex]
382   \fontsize{10pt}{12pt}\selectfont
383   Detta dokument hålls tillgängligt på Internet --- eller dess
384   framtida ersättare --- under 25 år från publiceringsdatum under
385   förutsättning att inga extraordinära omständigheter uppstår.
386   \par
387   Tillgång till dokumentet innebär tillstånd för var och en att läsa,
388   ladda ner, skriva ut enstaka kopior för enskilt bruk och att använda
389   det oförändrat för icke-kommersiell forskning och för undervisning.
390   Överföring av upphovsrätten vid en senare tidpunkt kan inte
391   upphäva detta tillstånd. All annan användning av dokumentet kräver
392   upphovsmannens medgivande. För att garantera äktheten, säkerheten
393   och tillgängligheten finns det lösningar av teknisk och
394   administrativ art.
395   \par
```

```

396 Upphovsmannens ideella rätt innefattar rätt att bli nämnd som
397 upphovsman i den omfattning som god sed kräver vid användning av
398 dokumentet på ovan be\-skrivna sätt samt skydd mot att dokumentet
399 ändras eller presenteras i sådan form eller i sådant sammanhang som
400 är kränkande för upphovsmannens litterära eller konstnärliga
401 anseende eller egenart.
402 \par
403 För ytterligare information om Linköping University Electronic Press
404 se förlagets hemsida
405 \href{http://www.ep.liu.se/}{\texttt{http://www.ep.liu.se/}}
406 \nonfrenchspacing
407 %
408 \vspace*{4\baselineskip}
409 \par\noindent{\fontsize{12pt}{14pt}\selectfont%
410 \normalfont\large\bfseries Copyright}\[1.5ex]
411 \fontsize{10pt}{12pt}\selectfont
412 The publishers will keep this document online on the Internet --- or
413 its possible replacement --- for a period of 25 years from the date
414 of publication barring exceptional circumstances.
415 \par
416 The online availability of the document implies a permanent permission
417 for anyone to read, to download, to print out single copies for your
418 own use and to use it unchanged for any non-commercial research and
419 educational purpose. Subsequent transfers of copyright cannot revoke
420 this permission. All other uses of the document are conditional on the
421 consent of the copyright owner. The publisher has taken technical and
422 administrative measures to assure authenticity, security and
423 accessibility.
424 \par
425 According to intellectual property law the author has the right to
426 be men\-tioned when his/her work is accessed as described above and to
427 be protected against infringement.
428 \par
429 For additional information about the Linköping University Electronic
430 Press and its procedures for publication and for assurance of
431 document integrity, please refer to its www home page:
432 \href{http://www.ep.liu.se/}{\texttt{http://www.ep.liu.se/}} \par
433 {\vspace*{\baselineskip} \flushright \copyright\ \@author
434 \clearpage} \endgroup
435 }

```

Define some environments.

```

436
437 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
438 %%      Environments      %%
439 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
440
441 \theorembodyfont{\normalfont\slshape}

```

theorem

```

442 \newtheorem{theorem}{\theoremname}[chapter]

```

lemma

```

443 \newtheorem{lemma}{\lemmaname}[chapter]

```



```

definition
444 \newtheorem{definition}{\definitionname}[chapter]

corollaryname
445 \newtheorem{corollary}{\corollaryname}[chapter]
446
447 %%% Proof%%%

proof
448 \newenvironment{proof}[1][]{
449   \sbox{\@tempboxa}{\mbox{#1}}%
450   \par\noindent%
451   \ifdim\wd\@tempboxa > \z@%
452     \textbf{\proofname~( #1 )}%
453   \else%
454     \textbf{\proofname}%
455   \fi%
456   \begingroup\small%
457   }%
458   {%
459   \endgroup%
460   \hspace*{\stretch{ 1}}$\Box$\par\bigskip%
461   \ignorespacesafterend%
462 }

463
464 %%% Example %%%

\listofexamples
465 \DeclareRobustCommand*\listofexamples{%
466   \section*\listexamplename%
467   \@starttoc{xmp}%
468 }

469 \newcommand*\l@example{\l@figure}%
470 \newcounter{Example}[chapter]%
471 \renewcommand*\theExample{\thechapter.\arabic{Example}}%

example
472 \newenvironment{example}[1][]{%
473   \refstepcounter{Example}%
474   \sbox{\@tempboxa}{\ignorespaces#1\unskip}%
475   \ifdim \wd\@tempboxa>\z@%
476     \sbox{\@tempboxa}{\textbf{%
477       \thinspace\ignorespaces\examplename\unskip~\theExample:~#1\thinspace}}%
478   \else%
479     \sbox{\@tempboxa}{\textbf{\thinspace\examplename~\theExample\thinspace}}%
480   \fi%
481   \addcontentsline{xmp}{example}{\protect\numberline{\theExample}#1}%
482   \setlength{\@tempskipa}{\textwidth}%
483   \addtolength{\@tempskipa}{-\wd\@tempboxa}%
484   \addtolength{\@tempskipa}{-1em}%
485   \pagebreak[0]%
486   \strut\[\.5\baselineskip]%

```

```

487 \hspace*{-\p@}\hspace*{-.5em}%
488 \rule[\p@]{\p@}{1ex}\rule[1ex]{2em}{\p@}%
489 \raisebox{.5ex}{\box\@tempboxa}%
490 \rule[1ex]{\@tempskipa}{\p@}\rule[\p@]{\p@}{1ex}%
491 \hspace*{-\p@}\hspace*{-.5em}%
492 \newline\begin{group}\ignorespaces%
493 \ignorespacesafterend%
494 }%
495 {%
496 \unskip\endgroup\strut\newline%
497 \hspace*{-\p@}\hspace*{-.5em}%
498 \rule{1\p@}{1ex}\rule{\textwidth}{\p@}\rule{1em}{\p@}\rule{\p@}{1ex}%
499 \hspace*{-\p@}\hspace*{-.5em}\[\.5\baselineskip]%
500 \pagebreak[0]%
501 \ignorespacesafterend%
502 }

```

Reconfigure the page headers.

```

503
504 %%%%%%%%%%%%%%
505 %%      Headings      %%
506 %%%%%%%%%%%%%%
507

```

`\chaptermark`

```

508 \DeclareRobustCommand*\chaptermark[1]{\markboth{#1}{}}

```

`\sectionmark`

```

509 \DeclareRobustCommand*\sectionmark[1]{\markright{\thesection~#1}{}}
510 \renewcommand*\ps@headings{%
511   \renewcommand*\@oddfoot{}%
512   \renewcommand*\@evenfoot{}%
513   \renewcommand*\@evenhead{%
514     \setlength{\@tempskipa}{\textwidth}%
515     \addtolength{\@tempskipa}{-.25em}%
516     \parbox{\@tempskipa}{\bfseries \thepage\hfill\ \ \leftmark%
517       \vspace*{2\p@}\hrule}}%
518   \renewcommand*\@oddhead{%
519     \setlength{\@tempskipa}{\textwidth}%
520     \addtolength{\@tempskipa}{-.25em}%
521     \parbox{\@tempskipa}{\bfseries\rightmark\hfill\ \ \thepage
522       \vspace*{2\p@}\hrule}}%
523 }}

```

Redefine the `thebibliography` environment to enable for `hyperref` to work properly, and the page heads to be consistent.

```

524
525 %%%%%%%%%%%%%%
526 %%      Bibliography      %%
527 %%%%%%%%%%%%%%
528

```

`thebibliography`

```

529 \renewenvironment{thebibliography}[1]{%
530   \chapter*{\bibname}%
531   \phantomsection\addcontentsline{toc}{chapter}{\bibname}%
532   \markboth{\bibname}{\bibname}%
533   \list{\@biblabel{\@arabic\c@enumiv}}%
534   {\settowidth{\labelwidth}{\@biblabel{#1}}%
535     \setlength{\leftmargin}{\labelwidth}%
536     \addtolength{\leftmargin}{\labelsep}%
537     \@openbib@code%
538     \usecounter{enumiv}%
539     \let\p@enumiv\@empty%
540     \renewcommand\theenumiv{\@arabic\c@enumiv}}%
541   \sloppy%
542   \clubpenalty4000%
543   \@clubpenalty \clubpenalty%
544   \widowpenalty4000%
545   \sfcode'\.\@m}%
546 {\def\@noitemerr%
547   {\@latex@warning{Empty 'thebibliography' environment}}%
548   \endlist}%

```

Redefine the `theindex` environment to enable for `hyperref` to work properly, and the page heads to be consistent.

```

549
550 %%%%%%%%%%%
551 %%      Index      %%
552 %%%%%%%%%%%
553

```

`theindex`

```

554 \renewenvironment{theindex}
555   {\if@twocolumn
556     \@restonecolfalse
557     \else
558       \@restonecoltrue
559     \fi
560     \columnseprule \z@
561     \columnsep 35\p@
562     \twocolumn[\@makeschapterhead{\indexname}]%
563     \phantomsection\addcontentsline{toc}{chapter}{\indexname}%
564     \markboth{\indexname}{\indexname}%
565     \thispagestyle{plain}\setlength{\parindent}{\z@}%
566     \setlength{\parskip}{\z@ \@plus .3\p@}%
567     \let\item\@idxitem}%
568   {\if@restonecol\onecolumn\else\clearpage\fi}

```

Redefine the macros used for sectioning to suit our other definitions. *E.g.*, use allow for chapters to start on right pages in the backmatter.

```

569
570 %%%%%%%%%%%
571 %%      Sectioning      %%
572 %%%%%%%%%%%
573

```

```

\frontmatter
574 \renewcommand{\frontmatter}{%
575   \thispagestyle{empty}%
576   \cleardoublepage%
577   \@mainmatterfalse%
578   \pagenumbering{roman}}

\mainmatter
579 \renewcommand{\mainmatter}{%
580   \thispagestyle{empty}%
581   \cleardoublepage%
582   \pagestyle{headings}
583   \@mainmattertrue%
584   \pagenumbering{arabic}}

\backmatter
585 \renewcommand*{\backmatter}{%
586   \if@openright%
587     \cleardoublepage%
588   \else%
589     \clearpage%
590   \fi%
591 %   \@mainmatterfalse%
592   \@openrightfalse}

\makeFrontMatter
593 \newcommand{\makeFrontMatter}[1][1]{%
594   \makeFrontPage \thispagestyle{empty} \cleardoublepage%
595   \frontmatter \makeTitlePage \thispagestyle{empty} \cleardoublepage%
596   \makeLibraryPage \thispagestyle{empty} \cleardoublepage%
597   \pagestyle{headings} \makeAbstract \thispagestyle{empty} \cleardoublepage%
598   \makeAcknowledgements \thispagestyle{empty} \cleardoublepage%
599   \tableofcontents
600   #1 \mainmatter%
601 }

Define some macros to create lists of environments. Also redefine the caption
to better stand out from the regular text.

602
603 %%%%%%%%%%%
604 %%      Other      %%
605 %%%%%%%%%%%
606

\tableofcontents
607 \DeclareRobustCommand*\tableofcontents{%
608   \chapter*{\contentsname\markboth{\contentsname}{\contentsname}}%
609   \@starttoc{toc}%
610 }

\listoffigures
611 \DeclareRobustCommand*\listoffigures{%
612   \section*{\listfigurename}%

```

```

613 \starttoc{lof}%
614 }

\listoftables

615 \DeclareRobustCommand*\listoftables{%
616 \section*\listtablename}%
617 \starttoc{lot}%
618 }

619
620 \renewcommand{\@makecaption}[2]{%
621 \vspace{\abovecaptionskip}
622 \begin{small}
623 \sbox{\@tempboxa}{\textbf{#1.} #2}
624 \ifdim \wd\@tempboxa > \hsize
625 \textbf{#1.} #2\par
626 \else
627 \global \minipagefalse
628 \parbox{\hsize}{\centering \usebox{\@tempboxa}\hfil}
629 \fi
630 \end{small}
631 \vspace{\belowcaptionskip}
632 }

Footnotes looks better if the footnote rule is a little wider.

633
634 \renewcommand{\footnoterule}{\vspace*{-3\p@}
635 \noindent\rule{.5\textwidth}{.5\p@}\vspace*{2.6\p@}
636 }
637 \end{class}

```

### 3.2 Definition file

Below follows the definition file for ISY. The structure of the file is really simple, so do not hesitate to make your own definition file to suit your needs. And if you do, please submit your new definition to me, and I might just include them in later releases of this class.

The first two lines of a definition file must be the following two. The first line tells L<sup>A</sup>T<sub>E</sub>X what file it is reading. The second command tells liuthesis that it has encountered a definition file. It does also define the address to print on the library page.

```

638 \isys
639 \ProvidesFile{isy.ldt}[2004/11/12 liuthesis defintion for ISY]
640 \liuthesisDefinition{ISY}{Department of Electrical Engineering\\%
641 Linköpings universitet\\%
642 S-581~83 Linköping, Sweden}

```

Define how the front page. A definition file must define the macro \makeFrontPage, *i.e.*, the look of the front page.

```

643
644 %%%%%%%%%%%%%%%
645 %      Front page      %
646 %%%%%%%%%%%%%%%
647

```

\makeFrontPage

```

648 \newcommand{\makeFrontPage}{%
649   \begin{group}\normalfont%
650   \clearpage%
651   %
652   \thispagestyle{empty}%
653   \vspace*{-15mm}\hspace*{-22mm}%
654   \raisebox{\z@}{\z@}{\z@}{%
655     \begin{minipage}[t][230mm]{161.5mm}%
656       \centering%
657       {\Huge Institutionen för systemteknik}\%
658       {\LARGE Department of Electrical Engineering}\%[\stretch{2 }]%
659       {\large\bfseries Examensarbete}\%
660       \vspace*{\stretch{3 }}%
661       {\parbox{13cm}{\centering\Large\bfseries%
662         \ifLanguageInUse{swedish}{\swe@title}{\@title}}}\%[\stretch{3 }]%
663         Examensarbete utfört i \thesis@subject\%
664         vid Tekniska högskolan i Linköping\%
665         av\%[\baselineskip]%
666         {\bfseries \@author}\%[\baselineskip]%
667         \thesis@No\%[\.5\baselineskip]%
668         {\small Linköping \thesis@year}\%[\baselineskip]%
669         \vspace*{\stretch{2 }}%
670         \parbox[b][115mm]{145mm}{\centering%
671           \setlength{\fboxrule}{2mm}%
672           \fbox{\parbox{138mm}{\centering%
673             \vspace*{15mm}\strut\%
674             \includegraphics[width=75mm]{LiTH_staende_sv}\%
675             \vspace*{15mm}%
676             }}\%[\.5\baselineskip]%
677             Department of Electrical Engineering \hfill Linköpings tekniska högskola\%
678             Linköpings universitet \hfill Linköpings universitet\%
679             SE-581~83 Linköping, Sweden \hfill 581~83 Linköping%
680             }\medskip%
681           \end{minipage}%
682   }%
683   \end{group} \clearpage%
684 }
```

Define how the title page. A definition file must define the macro \makeTitlePage, *i.e.*, the look of the title page.

```

685
686 %%%%%%%%%%%%%%%
687 %%      Title page      %%
688 %%%%%%%%%%%%%%%
689
```

\makeTitlePage

```

690 \newcommand*{\makeTitlePage}{%
691   \clearpage \thispagestyle{empty} \normalfont%
692   \vspace*{-25mm}\hspace*{-24.5mm}\hspace*{3mm}%
693   \raisebox{\z@}{\z@}{\z@}{%
694     \begin{minipage}[t][230mm]{158.5mm}%
695       \centering \vspace*{\stretch{2 }}%

```

```

696      {\parbox{13cm}{\centering\noindent\Large\bfseries%
697        \ifLanguageInUse{swedish}{\swe@title}{\@title}}}\%
698      \vspace*{\stretch{2 }}%
699      {\large Examensarbete utfört i \thesis@subject\\%
700        vid Tekniska högskolan i Linköping\\%
701        av}\[\baselineskip]%
702      {\bfseries \@author}\[\baselineskip]%
703      \thesis@No\[\.5\baselineskip]%
704      \vspace*{\stretch{4 }}%
705      \parbox{10cm}{\raggedright%
706        \rule{10cm}{.4pt}%
707        \begin{tabbing}%
708          \hspace*{25mm}\=\quad\=\kill%
709          Handledare:>\bfseries\@supervisor\[\.5\baselineskip]%
710          Examinator:>\bfseries\@examiner%
711          \end{tabbing}%
712        }\[\.5\baselineskip]%
713        Linköping, \thesis@day\ \monthName{\thesis@month}, \thesis@year%
714      \end{minipage}%
715    } \clearpage%
716  }
717 </isy>

```

## References

- [GMS94] Michel Gossens, Frank Mittlebach, and Alexander Samarin. *The L<sup>A</sup>T<sub>E</sub>X Companion*. Addison-Wesley, 1994. ISBN 0-201-54199-8.
- [MGB+04] Frank Mittelbach, Michel Goossens, Johannes Braams, David Carlisle, and Chris Rowley. *The L<sup>A</sup>T<sub>E</sub>X Companion Professional*. Addison-Wesley, 2 edition, April 22 2004. ISBN 0-201-36299-6.
- [GRM97] Michel Gossens, Sebastian Rahtz, and Frank Mittlebach. *The L<sup>A</sup>T<sub>E</sub>X Graphics Companion*. Addison-Wesley, 1997. ISBN 0-201-85469-4.
- [Lam94] Leslie Lamport. *L<sup>A</sup>T<sub>E</sub>X: a document preparation system*. Addison-Wesley, 2 edition, 1994. ISBN 0-201-52983-1.
- [OPH+04] Tobias Oetiker, Hubert Partl, Irene Hyna, and Elisabeth Schlegl. The not so short introduction to L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> — or L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> in 131 minutes. URL: <http://www.ctan.org/tex-archive/info/lshort/english/lshort.pdf>, Version 4.14, 4 April 2004. Included with complete L<sup>A</sup>T<sub>E</sub>X distributions.

## 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.

### Symbols

\@abstract . . . . .

. 230, 232, 320, 353	\bibname . . . . . 530–532	\hypersetup . . . 202, 216, 223, 224, 229
\@acknowledgements . . . . . . 234, 237, 337	<b>C</b>	<b>I</b>
\@address . . . . . 13, 264	\chaptermark . . . . . 508	\ifLanguageInUse . . 186
\@author . . . . . 201, 316, 433, 666, 702	\ClassError . . . . . 166	\ifliuthesis@hyperref . . . . . 15, 202, 216, 222, 229
\@biblabel . . . 533, 534	\ClassInfo 11, 152, 168	\indexname . . . 562–564
\@empty . . . . . 539	\contentsname . . . . . 608	\InputIfFileExists . 161
\@evenfoot . . . . . 512	\copyright . . . . . 433	
\@evenhead . . . . . 513	\corollaryname . . . . . 27, 42, 445	
\@examiner 240, 241, 710	corollaryname (envi- ronment) . . . 445	<b>K</b>
\@idxitem . . . . . 567	\crop . . . . . 185	\keywords . . . . . 228
\@info . . 61, 90, 115, 184	\CROP@font . . . . . 101	
\@keywords . . . 228, 324	\CROP@index . . . . . 91, 103	<b>L</b>
\@latex@warning . . . 547	\CROP@time . . . . . 103	\l@example . . . . . 469
\@mainmatterfalse . . . . . . 577, 591	\cropdef . . . . . 184	\l@figure . . . . . 469
\@mainmattertrue . . 583	\CurrentOption . . . . . 11, 161, 162	\language . . . . . 190
\@makecaption . . . . . 620		\leftmargin . . . 535, 536
\@makeschapterhead . . . . . . 351, 359, 562	<b>D</b>	\leftmark . . . . . 516
\@minipagefalse . . . 627	\day . . . . . 102	lemma (environment) . 443
\@noitemerr . . . . . 546	\DeclareRobustCommand . . 172, 465, 508, 509, 607, 611, 615	\lemmaname . 30, 45, 443
\@nomath . . . . . 173	definition (environ- ment) . . . . . 444	\listexamplename . . . . . . . 31, 46, 466
\@oddfoot . . . . . 511	\definitionname . . . . . 28, 43, 444	\listfigurename . . . 612
\@oddhead . . . . . 518		\listofexamples . . . 465
\@openrightfalse . . 592		\listoffigures . . . . 611
\@starttoc . . . . . . . 467, 609, 613, 617	<b>E</b>	\listoftables . . . . . 615
\@supervisor . . . . . . . . . . 238, 239, 709	environments:	\listtablename . . . . 616
\@title 221, 314, 662, 697	corollaryname . . 445	\liuthesisDefinition . . . . . 10, 640
\@ul . . . . . 59, 63, 113, 184	definition . . . . . 444	\LoadClass . . . . . 171
\@ur . . . . . 59, 69, 113, 184	example . . . . . 472	\lt@twoAbstractPages . . . . . 345, 347, 356
	lemma . . . . . 443	
	proof . . . . . 448	<b>M</b>
\_ . . . . 433, 516, 521, 713	thebibliography 529	\mainmatter . . . 579, 600
	theindex . . . . . 554	\makeAbstract . 348, 597
<b>A</b>	theorem . . . . . 442	\makeAcknowledgements . . . . . 334, 598
\abstract . . . . . 230, 231	\examiner . . . . . 240, 241	\makeAcknowledgments . . . . . 334
\acknowledgements . . . . . . 235, 236	example (environment) 472	\makeCopyright 146, 370
\acknowledgementsname . . . . . 26, 41, 336	\examplename . . . . . . . 29, 44, 477, 479	\makeFrontMatter . 593
\addcontentsline . . . . . . . 481, 531, 563	\ExecuteOptions . . . . . 134, 139, 147	\makeFrontPage 594, 648
\AND . . . . . 242		\makeLibraryPage . . . . . . . 249, 596
\AT . . . . . 243	<b>F</b>	\makeTitlePage 595, 690
\AtEndDocument . . . . 146	\footnoterule . . . . . 634	\month . . . . . 102
\AtEndOfClass . . . . . 156	\frenchspacing 361, 379	\monthName . 33, 48, 713
\author . . . . . 201	\frontmatter . . 574, 595	
		<b>N</b>
<b>B</b>	<b>H</b>	\NeedsTeXFormat . . . . 3
\backmatter . . . . . 585	\hsize . . . . . 97, 624, 628	\nonfrenchspacing . . . . . . 361, 406
	\hss . . . . . 94, 107	



<b>O</b>		
\OptionNotUsed	....	162
<b>P</b>		
\pagebreak	...	485, 500
\paperwidth	....	92, 97
\PassOptionsToClass		162
\PassOptionsToPackage	.....	87, 128, 133, 138, 151
\ProcessOptions	...	163
proof (environment)		<u>448</u>
\proofname	...	452, 454
\ProvidesClass	....	2
\ProvidesFile	....	639
\ps@headings	....	510
<b>R</b>		
\RequirePackage	. 5–	9, 175, 176, 181–183
<b>S</b>		
\scriptsize	...	185, 256
\section	..	466, 612, 616
\sectionmark	....	<u>509</u>
\slshape	....	174, 441
\subject	....	214, <u>215</u>
\supervisor	...	238, <u>239</u>
\swe@abstract	....	.... 233, 354, 361
\swe@title	.....	.. 220, 314, 662, 697
<b>T</b>		
\tableofcontents	..	..... 599, <u>607</u>
\textwidth	...	482, 498, 514, 519, 635
thebibliography (environment)	...	<u>529</u>
\theExample	.....	.. 471, 477, 479, 481
theindex (environment)	.....	<u>554</u>
theorem (environment)		<u>442</u>
\theorembodyfont	..	441
\theoremname	32, 47, 442	
\thesis@day	.....	.. 203, 207, 271, 713
\thesis@division	..	.... 210, 212, 264
\thesis@divTAG	....	..... 12, 165, 168
\thesis@month	....	.... 206, 270, 713
\thesis@No	...	217, 219, 306, 667, 703
\thesis@subject	...	.. 213, 215, 663, 699
\thesis@year	.....	.. 208, 269, 668, 713
\thesisDate	...	204, <u>205</u>
\thesisDivision	211, <u>212</u>	
\thesisNo	....	218, <u>219</u>
\title	.....	<u>220</u>
\twoAbstractPage	..	<u>346</u>
<b>U</b>		
\URL	.....	225, <u>227</u>
\URL@a	226, 227, 294, 296	
\URL@b	225, 227, 297, 299	
\useHyperRef	.....	.... 123, 125, 140
\usepackage	...	127, 142
<b>Y</b>		
\year	.....	102