

# The `liuthesis` Class\*

Gustaf Hendeby ([hendeby@isy.liu.se](mailto:hendeby@isy.liu.se))

Contributors: Johan Henriksson, Niclas Wiker, Anna Lombardi, Dirk große Osterhues

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## Abstract

The `liuthesis` class provides convenient means to write a master's thesis at Linköpings universitet — Institute of Technology. The class is intended for both beginners and advanced users and hence the `liuthesis` provides many features, in a framework allowing 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.  $\text{\LaTeX}$  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` was born. The `liuthesis` class is built on the solid foundation of the `\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

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

what you are looking for, I recommend reading [OPH+04] for a quick introduction, [Lam94] and [MGB+04] (the second edition of the book is basically a completely new book compared to [GMS94]) for more details, and [GRM97] for tips on how to produce nice looking figures and other advanced graphics.

The `liuthesis` class is used the same way 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. The 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 if older versions are installed strange warnings and errors might be encountered. For the automatic selection of language for abstract *etc.* to work correctly Swedish hyphenation patterns must probably be activated. (This is standard behavior for `tetex`, whereas in MikTeX Swedish language support must be activated using the “MikTeX Options” program.) Furthermore, the class requires  $\text{\LaTeX}$  to have access to some logos in suitable formats (eps/pdf). The Linköpings university logos are all found at: <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 included in the standard release of this class. However, check this page to make sure the logos are up to date. (If they are not up to date, please let me know!)

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 is 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 send to the printer. If you produce a ps-file that you then convert, make sure to use 900 dpi and convert all graphics, both B/w and color, using 600 dpi for best result. (Always make sure the resolution of the original pictures is high enough.) 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, and is suitable for publishing on the Web.

**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 these 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 both are intended to help in the process of checking the layout and proof reading the thesis.

**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 center of the page is located.

**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 are likely to encounter 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`)  
Contributed by Johan Henriksson.

**ikp\_mask** Department of Mechanical Engineering (`ikp_mask.ltd`)  
Contributed by Niclas Wiker.

**ikp\_mek** Department of Mechanical Engineering (`ikp_mek.ltd`)  
Contributed by Niclas Wiker.

**ipe** Department of Production Economics (`ipe.ltd`)  
Contributed by Dirk große Osterhues.

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

**itn** Department of Science and Technology (`itn.ltd`)  
Contributed by Anna Lombardi.

**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 aimed at easing the creative process. These macros can be divided into groups depending on where they are supposed to be used; the front matter, the main matter, or the 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 often is, be aware that this is known to introduce strange errors in some cases. Anyhow, to get links use the macro `\useHyperRef` (without arguments) to initiate the `hyperref` package with suitable arguments. Using the `hyperref` package is a bit tricky, the package must be included in the correct order relative to many other packages. Usually it is a good idea to use `\useHyperRef` as close as possible to `\begin{document}`, but this is not always the right thing to do. Please, read the manuals of the packages you are experiencing problems with. Manuals of packages interfering with `hyperref` often include a section about how to use them with `hyperref` if it is possible at all.

### 2.2.1 Front Matter

The front matter is the part of the report including; front, title and library page, abstract(s), acknowledgments, table of content, *etc.* How these look depends on two things: (1) Which definition file is in use. (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, `\author{John Doe}`. The macro is used throughout the entire document, and trying to format the name here is hence not a good idea.

`\title` 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{Svensk titel}{English 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 return to complete it later! Missing information will generate warnings, but

<code>\thesisDate</code>	the code should be compilable anyhow. (If not, use some phony information for now.) The <code>\thesisDate</code> should be the date when the report is defended. The syntax to use is <code>\thesisDate{D}{M}{YYYY}</code> , for best result leave out leading 0's. Equally important is it to specify the thesis no. ISRN, this is done with <code>\thesisNo</code> which takes one argument — the thesis number — <code>\thesisNo{LiTH-ISY-EX{-}{-}YY/XXXX{-}{-}SE}</code> .
<code>\thesisNo</code>	
<code>\thesisDivision</code>	For the library page the division where the thesis is conducted should be specified, use <code>\thesisDivision{division}</code> . Using <code>\URL</code> it is possible to give one, or two, URL where your report may be accessed from Internet. At least one of these should probably point towards Linköping University Electronic Press. <b>You need to generate a library page at their homepage anyhow, make sure the generated pages matches. If not, please let me know so that liuthesis can be updated to better reflect the current setup.</b> The content of the
<code>\URL</code>	
<code>\keywords</code>	keywords field is specified using <code>\keywords</code> . This macro takes one argument.
<code>\supervisor</code>	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 <code>\supervisor</code> and <code>\examiner</code> ,
<code>\examiner</code>	both taking one argument. Names are listed in both of these arguments separated
<code>\AND</code>	with <code>\AND</code> , <i>e.g.</i> , <code>\supervisor{Jane Doe \AND J. R. Hacker}</code> . 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
<code>\AT</code>	using <code>\AT</code> like this <code>\supervisor{John Doe \AT Company}</code> . The same trick works for the examiner as well. Finally, the title page also state the subject of the
<code>\subject</code>	master's thesis and this should be indicated using <code>\subject</code> taking one argument. Specify the subject in Swedish, <i>e.g.</i> , "Reglerteknik".
<code>\abstract</code>	Three more parts do frequently appear in the front matter; an abstract in English (and one Swedish <i>Sammanfattning</i> if your work is in Swedish), acknowledgments, and a table of content (which of course $\text{\LaTeX}$ automatically generates for you). The abstract, which is also presented on the library page, is generated using <code>\abstract</code> 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 <code>\twoAbstractPage</code> in your preamble. This is useful, <i>e.g.</i> , if your abstracts are too extensive to fit on one page. However, it is this my belief that keeping the abstract to less than a page is a good idea. <code>\acknowledgements</code> takes one argument, the body of the acknowledgments. Once the information is gathered it is time to create the front matter.
<code>\twoAbstractPage</code>	
<code>\acknowledgements</code>	
<code>\makeFrontMatter</code>	<b>Generation.</b> The <code>liuthesis</code> class contains one handy command to generate a complete front matter, <code>\makeFrontMatter</code> . <code>\makeFrontMatter</code> generates the following, each on an individual right-hand page:
<code>\makeFrontPage</code>	1. Front page, can also be generated using <code>\makeFrontPage</code> .
<code>\makeTitlePage</code>	2. Title page, <code>\makeTitlePage</code> .
<code>\makeLibraryPage</code>	3. Library page, <code>\makeLibraryPage</code> .
<code>\makeAbstract</code>	4. Abstract, <code>\makeAbstract</code> .
<code>\makeAcknowledgments</code>	5. Acknowledgments, <code>\makeAcknowledgments</code> .
	6. Table of Contents, <code>\tableofcontents</code> (the standard $\text{\LaTeX}$ 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 numerals, starting with the title page. This is accomplished using `\frontmatter`.

If `\makeFrontMatter` does not provide the layout you desire, it is always possible to generate the parts separately and put them together in any order 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  $\text{\LaTeX}$  behavior in a few ways to in my opinion, create a better looking result. One of this modifications is that text emphasized using `\em` or `\emph{}` is not put in *italic* but instead in *slanted*. This is for two reasons, I like the slanted text better and it lessens the risk of confusing emphasized text and embedded math.

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

<code>theorem</code>	• <code>theorem</code>
<code>lemma</code>	• <code>lemma</code>
<code>corollary</code>	• <code>corollary</code>
<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. All the environments take an optional argument — a name. Furthermore, the environments are all numbered within the current chapter.

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  $\text{\LaTeX}$  at least twice, or the page numbers could turn out incorrectly. The same goes for the table of contents.

## 2.2.3 Back Matter

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  $\text{\LaTeX}$  command `\appendix` before starting your appendices, hence producing appendices named Appendix followed by a upper case letter instead of a number.

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** Preferred 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  $\mathcal{AMS}$ 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 gsvie.

## 3 Implementation

Now to the implementation of the class. This part of the documentation is only provided for those interested in doing something special in their thesis, and those with a genuine interest in  $\text{\TeX}$ . 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 definition files are constructed. Explaining that code enables others to write new definition files on demand. Only one definition file will be explained, the one for `ISY`.

### 3.1 The Class Code

Here follows the class implementation, starting with some initiations and packages needed immediately.

```
1 (*class)
2 \ProvidesClass{liuthesis}[2007/01/13 liuthesis Class v. 1.3]
3 \NeedsTeXFormat{LaTeX2e}
```

Prepare  $\text{\LaTeX}$  to handle Swedish letters (å, ä, ö) in a straightforward way.

```
4 \RequirePackage{lmodern}
5 \RequirePackage[T1]{fontenc}
6 \RequirePackage[latin1]{inputenc}
7 \RequirePackage[swedish, english]{babel}
```

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

`\liuthesisDefinition`

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

and allows for optional use of hyperref.

```

13 \newif\ifliuthesis@hyperref \liuthesis@hyperreffalse
14 \newcommand*\phantomsection{\relax}
15 \newcommand*\href[2][]{\relax}
16 \newcommand*\pdfbookmark[3][]{\relax}
17

```

Below, definitions are provided to give multilingual support. So far only English and Swedish are provided, it should however not be too difficult to add other languages. (If you do, please, let me know so that I can include the translation in the next release of liuthesis.) All that is needed is to translate a few terms into new the target language. The rest is taken care of by the babel package.

```

18
19 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
20 %%      Language      %%
21 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
22
23 \def\acknowledgementsname{Acknowledgments}%
24 \def\corollaryname{Corollary}
25 \def\definitionname{Definition}
26 \def\examplename{Example}
27 \def\lemmaname{Lemma}
28 \def\listexamplename{List of Examples}
29 \def\theoremname{Theorem}
30 \newcommand*\monthName[1]{\ifcase#1\or
31   January\or February\or March\or
32   April\or May\or June\or
33   July\or August\or September\or
34   October\or November\or December\else Unknown\fi}
35
36 \addto{\captionsenglish}{%
37   \def\acknowledgementsname{Acknowledgments}%
38   \def\corollaryname{Corollary}%
39   \def\definitionname{Definition}%
40   \def\examplename{Example}%
41   \def\lemmaname{Lemma}%
42   \def\listexamplename{List of Examples}%
43   \def\theoremname{Theorem}%
44   \renewcommand*\monthName[1]{\ifcase#1\or%
45     January\or February\or March\or%
46     April\or May\or June\or%
47     July\or August\or September\or%
48     October\or November\or December\else Unknown\fi}%
49 }
50 \addto{\captionsswedish}{%
51   \def\acknowledgementsname{Tack}%
52   \def\corollaryname{Korrolarium}%
53   \def\definitionname{Definition}%
54   \def\examplename{Exempel}%
55   \def\lemmaname{Lemma}%
56   \def\listexamplename{Exempellista}%
57   \def\theoremname{Sats}%
58   \renewcommand*\monthName[1]{\ifcase#1\or%
59     januari\or februari\or mars\or%

```



```

60   april\or maj\or juni\or%
61   juli\or augusti\or september\or%
62   oktober\or november\or december\else Unknown\fi}%
63 }
64 \DeclareOption{english}{%
65   \AtBeginDocument{\selectlanguage{english}}%
66 }
67
68 \DeclareOption{swedish}{%
69   \AtBeginDocument{\selectlanguage{swedish}}%
70 }

```

The following macros help define crop marks used to indicate the s5 page on the A4 paper, and some page info, when those options are selected.

```

71
72 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
73 %%% CROP SETTINGS %%%
74 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
75
76 \newcommand*{\@ul}{\relax}\newcommand*{\@ur}{\relax}%
77 \newcommand*{\@ll}{\relax}\newcommand*{\@lr}{\relax}%
78 \newcommand*{\@info}{\relax}%
79 \DeclareOption{crop}{% To get crop marks
80   \renewcommand*{\@ul}{\begin{picture}(0,0)%
81     \unitlength1mm%
82     \thinlines%
83     \put(0,0){\line(-5,0){2}}%
84     \put(0,0){\line(0,5){2}}%
85   \end{picture}}%
86   \renewcommand*{\@ur}{\begin{picture}(0,0)%
87     \unitlength1mm%
88     \thinlines%
89     \put(0,0){\line(5,0){2}}%
90     \put(0,0){\line(0,5){2}}%
91   \end{picture}}%
92   \renewcommand*{\@ll}{\begin{picture}(0,0)%
93     \unitlength1mm%
94     \thinlines%
95     \put(0,0){\line(-5,0){2}}%
96     \put(0,0){\line(0,-5){2}}%
97   \end{picture}}%
98   \renewcommand*{\@lr}{\begin{picture}(0,0)%
99     \unitlength1mm%
100    \thinlines%
101    \put(0,0){\line(5,0){2}}%
102    \put(0,0){\line(0,-5){2}}%
103  \end{picture}}%
104 \PassOptionsToPackage{axes}{crop}
105
106 \DeclareOption{info}{%
107   \renewcommand*{\@info}{%
108     \global\advance\CROP@index\@ne%
109     \def\x{\discretionary{}{}{\hbox{\kern.5em---\kern.5em}}}%
110     \advance\paperwidth-20\p%

```

```

111 \dimen@5mm%
112 \ifx\CROP@pagecolor\@empty%
113 \else%
114 \advance\dimen@\CROP@overlap%
115 \fi%
116 \hb@xt@\z@{%
117 \hss%
118 \vbox to\z@{%
119 \centering%
120 \hsize\paperwidth%
121 \vss%
122 \normalfont%
123 \small%
124 \CROP@font{%
125 \texttt{\jobname}:\~\the\year-\two@digits{\the\month}%
126 -\two@digits{\the\day}\: \%
127 \CROP@time\x\thepage(\the\CROP@index)\strut%
128 }%
129 \vskip\dimen@%
130 }%
131 \hss
132 }%
133 }%
134 }
135
136 \DeclareOption{noCrop}{%
137 \renewcommand*{\@ul}{\relax}\renewcommand*{\@ur}{\relax}%
138 \renewcommand*{\@ll}{\relax}\renewcommand*{\@lr}{\relax}%
139 \renewcommand*{\@info}{\relax}%
140 }
141

```

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

```

142 %%%%%%%%%%%%%%%
143 %%% PAGE LAYOUT %%%
144 %%%%%%%%%%%%%%%

```

\useHyperRef

```

145 \newcommand*\useHyperRef{%
146 \liuthesis@hyperreftrue%
147 \let\pdfbookmark=\undefined%
148 \usepackage[hyperindex, bookmarks,%
149 plainpages=false, naturalnames=true]{hyperref}[2000/09/29]}
150 \PassOptionsToPackage{off, a4, center}{crop} % S5 centered on A4 with crops

151 \DeclareOption{print}{% S5 format
152 \PassOptionsToPackage{off, noaxes, width=165mm, height=240mm}{crop}%
153 \ExecuteOptions{noCrop}%
154 }
155
156 \DeclareOption{pdfRelease}{% Release in pdf format without copyright notice
157 \PassOptionsToPackage{off, noaxes, a4, center}{crop}%
158 \ExecuteOptions{noCrop}%

```

```

159 \renewcommand*{\useHyperRef}{%
160   \liuthesis@hyperreftrue%
161   \let\pdfbookmark=\undefined%
162   \usepackage[hyperindex, bookmarks,%
163               plainpages=false, naturalnames=true]{hyperref}[2000/09/29]}
164 }
165
166 \DeclareOption{ePress}{% S5 centered on A4
167   \AtEndDocument{\clearempydoublepage\makeCopyright}%
168   \ExecuteOptions{pdfRelease}%
169 }
170
171 \DeclareOption{draft}{% S5 centered on A4 DRAFT
172   \PassOptionsToPackage{off, a4, center}{crop} % S5 centered on A4 with crops
173   \ClassInfo{liuthesis}{This is a DRAFT mode and should hence NOT be
174     used for other purposes. Pictures are blank and overful hboxes
175     stand out.}
176 }

```

Adjust the margin paragraph width to match the margin available, this must be done when leaving the class in order for the proper page layout info to be available.

```

177 \AtEndOfClass{%
178   \setlength{\marginparwidth}{\oddsidemargin}%
179   \addtolength{\marginparwidth}{-\marginparsep}%
180   \addtolength{\marginparwidth}{-\p@}%
181 }

```

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.

```

182 \DeclareOption*{\InputIfFileExists{\CurrentOption.ltd}%
183   }{\PassOptionsToClass{\CurrentOption}{book}\OptionNotUsed}%
184 \ProcessOptions\relax
185

```

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

```

186 \ifx\thesis@divTAG\relax
187   \ClassError{liuthesis}{No division definition found.}
188 \else
189   \ClassInfo{liuthesis}{Loading division definition \thesis@divTAG.}
190 \fi
191
192 \LoadClass[twoside]{book}

```

**\clearempydoublepage** A handy macro to get a right-hand side page without a page number on any empty pages that are inserted.

```

193 \newcommand*\clearempydoublepage{\clearpage\if@twoside \ifodd\c@page\else
194   \thispagestyle{empty}\hbox{}\newpage\if@twocolumn\hbox{}\newpage\fi\fi}

```

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

```

195 \DeclareRobustCommand\em%
196   {\@nomath\em \ifdim \fontdimen\@ne\font >\z@
197     \upshape \else \slshape \fi}

```

Include some required packages, to be able to continue.

```

198 \RequirePackage{graphicx}

```

```

199 \RequirePackage[dvips=false, pdftex=false, vtex=false,%
200 twoside, papersize={165mm,240mm}, body={125mm,195mm},%
201 bindingoffset=4mm, marginparsep=3mm, portrait,%
202 twocolumn=false, vmarginratio={4:5}]{geometry}[2002/07/08]
203
204 \RequirePackage{crop}[2001/11/16]
205 \RequirePackage[intlimits]{amsmath}
206 \RequirePackage{amsfonts, amssymb}

```

Create some helper functions to create crops.

```

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

```

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

`\ifLanguageInUse`

```

209 \newcommand*{\ifLanguageInUse}[1]{%
210   \expandafter\ifx\csname l@#1\endcsname\relax
211   \expandafter\@secondoftwo
212   \else
213   \bbl@afterfi{\ifnum\csname l@#1\endcsname=\language
214     \expandafter\@firstoftwo
215     \else
216     \expandafter\@secondoftwo
217     \fi}%
218   \fi}

```

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

```

219
220 %%%%%%%%%%%
221 %%          Info          %%
222 %%%%%%%%%%%
223

```

`\author`

```

224 \renewcommand*{\author}[1]{\renewcommand*{\@author}{#1}%
225   \ifliuthesis@hyperref\hypersetup{pdfauthor={#1}}\fi}%
226
227 \newcommand*{\thesis@day}{%
228   \@latex@warning@no@line{No \noexpand\thesisDate given}}%

```

`\thesisDate`

```

228 \newcommand*{\thesisDate}[3]{%
229   \newcommand*{\thesis@month}{#1}%
230   \renewcommand*{\thesis@day}{#2}%
231   \newcommand*{\thesis@year}{#3}%
232 }
233
234 \newcommand*{\thesis@division}{%
235   \@latex@warning@no@line{No \noexpand\thesisDivision given}}%

```

`\thesisDivision`

```

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

```

```

236 \newcommand*{\thesis@subject}{%
237   \@latex@warning@no@line{No \noexpand\subject given}}%

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

240 \newcommand*{\thesis@No}{%
241   \@latex@warning@no@line{No \noexpand\thesisNo given}}%

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

\title
243 \renewcommand*{\title}[2]{\newcommand*{\swe@title}{#1}%
244   \renewcommand*{\@title}{#2}%
245   \ifliuthesis@hyperref%
246     \ifLanguageInUse{english}{\hypersetup{pdftitle={#2}}}%
247     {\hypersetup{pdftitle={#1}}}\fi}%

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

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

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

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

\abstract
256 \newcommand{\abstract}[2]{}%
257   \renewcommand{\@abstract}{\ignorespacesafterend\noindent #2\unskip}%
258   \newcommand{\swe@abstract}{\ignorespacesafterend\noindent #1\unskip}}%

259 \newcommand{\@acknowledgements}{%
260   \@latex@warning@no@line{No \noexpand\acknowledgements given}}%

\acknowledgements
261 \newcommand{\acknowledgements}[1]{%
262   \renewcommand{\@acknowledgements}{%
263     \ignorespacesafterend\noindent#1\unskip}}%

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

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

```

```

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

```

\examiner

```

270 \newcommand*{\examiner}[1]{%
271 \renewcommand{\@examiner}{\ignorespaces#1\ignorespaces}}

272 \newcommand*{\AND}{\>\>\>\bfseries\ignorespaces}%
273 \newcommand*{\AT}{\>\>\>\small\ignorespaces}%

```

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

```

274
275 %%%%%%%%%%%%%%
276 %%      Library page      %%
277 %%%%%%%%%%%%%%
278

```

\makeLibraryPage

```

279 \newcommand{\makeLibraryPage}{%
280 \cleardoublepage \thispagestyle{empty}%
281 \pdfbookmark[1]{Library Page}{LibraryPage}%
282 \enlargethispage*{27mm} {\centering%
283 \vspace*{-11mm}
284 \hspace*{3mm}%
285 \makebox[\z@][l]{%
286 \begin{minipage}[t][212mm]{126mm}%
287 \scriptsize \setlength{\unitlength}{1mm}%
288 \fontsize{7}{8\p@} \selectfont%
289 \begin{picture}(126,212)(0,0)%
290 %% Department and division
291 \put(0,190){\makebox[\z@][l]{\framebox(92,22){}}}%
292 \put(1,191){\includegraphics[width=20mm]{LiTH_sigill_sv}}%
293 \put(25,209){\parbox[t]{5cm}{\textbf{Avdelning, Institution}}\%
294 Division, Department}}%
295 \put(28,197){\parbox[c]{64mm}{\thesis@division\\\@address}}%
296 %% Date
297 \put(93,190){\makebox[\z@][l]{\framebox(33,22){}}}%
298 \put(94,209){\parbox[t]{5cm}{\textbf{Datum}}\%
299 Date}}% % Must be Swedish style
300 \put(95,197){\thesis@year-%
301 \ifnum\thesis@month<10 0\fi\thesis@month-%
302 \ifnum\thesis@day<10 0\fi\thesis@day}%
303 %% Language
304 \put(0,157){\makebox[\z@][t]{\framebox(30,32){}}}%
305 \put(1,186){\parbox[t]{3cm}{\textbf{Språk}}\Language}}%
306 \put(1,178){\Box$ Svenska/Swedish}%
307 \put(1,174){\Box$ Engelska/English}%
308 \put(1,162){\Box$} \put(5,162){\line(1,0){20}}%
309 \ifLanguageInUse{english}{\put(1,174){\boxtimes$}}%
310 \ifLanguageInUse{swedish}{\put(1,178){\boxtimes$}}}%
311 %% Report category
312 \put(31,157){\makebox[\z@][t]{\framebox(30,32){}}}%
313 \put(32,186){\parbox[t]{5cm}{\textbf{Rapporttyp}}\Report category}}%

```

```

314 \put(32,178){$\Box$ Licentiatavhandling}%
315 \put(32,174){$\Box$ Examensarbete}%
316 \put(32,170){$\Box$ C-uppsats}%
317 \put(32,166){$\Box$ D-uppsats}%
318 \put(32,162){$\Box$ Övrig rapport}%
319 \put(32,158){$\Box$} \put(35,158){\line(1,0){20}}%
320 \put(32,174){$\boxtimes$} % set kind of report
321 %% URL
322 \put(0,143){\makebox[\z@][t]{\framebox(61,13){}}}%
323 \put(1,153){\textbf{URL för elektronisk version}}%
324 \put(3,148){\begin{group}%
325 \sbox{\@tempboxa}{\mbox{\URL@a}}%
326 \fontsize{5}{8p@} \selectfont%
327 \ifdim\wd\@tempboxa > \z@%
328 \parbox[c]{58mm}{\href{\URL@a}{\texttt{\URL@a}}}%
329 \href{\URL@b}{\texttt{\URL@b}}}%
330 \else%
331 \parbox[c]{58mm}{\href{\URL@b}{\texttt{\URL@b}}}%
332 \fi\end{group}}%
333 %% ISBN etc
334 \put(62,143){\makebox[\z@][t]{\framebox(64,46){}}}%
335 \put(63,186){\textbf{ISBN}}%
336 \put(63,181){\line(1,0){62}}\put(69,182){---}%
337 \put(63,178){\textbf{ISRN}}%
338 \put(63,171){\line(1,0){62}} \put(70,174){\thesis@No}%
339 \put(63,168){\parbox[t]{5cm}{\textbf{Serietitel och serienummer}}}%
340 Title of series, numbering}%
341 \put(102,168){\textbf{ISSN}}%
342 \put(102,163){\line(1,0){23}} \put(102,164){---}%
343 %% Title
344 \put(0,108){\makebox[\z@][t]{\framebox(126,34){}}}%
345 \put(1,138){\parbox[t]{5cm}{\textbf{Titel}}\Title}%
346 \put(17,138){\parbox[t]{100mm}{\swe@title\par\smallskip\@title}}%
347 \put(1,117){\parbox[t]{5cm}{\textbf{Författare}}\Author}%
348 \put(17,117){\@author}%
349 %% Abstract
350 \put(0,12){\makebox[\z@][t]{\framebox(126,95){}}}%
351 \put(1,104){\parbox[t]{5cm}{\textbf{Sammanfattning}}\Abstract}%
352 \put(17,96){\parbox[t]{100mm}{%
353 \setlength{\parindent}{1.5em}\@abstract}}%
354 %% Keywords
355 \put(0,0){\makebox[\z@][t]{\framebox(126,11){}}}%
356 \put(1,8){\parbox[t]{5cm}{\textbf{Nyckelord}}\Keywords}%
357 \put(17,5){\parbox[t]{100mm}{\@keywords}}
358 \end{picture}%
359 \end{minipage}%
360 }%
361 \clearemptydoublepage%
362 }

```

Define the acknowledgement page.

```

363
364 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
365 %% Acknowledgements %%

```

366 %%

\makeAcknowledgments

```
367 \newcommand*{\makeAcknowledgements}{%
368   \clearempydoublepage%
369   \pdfbookmark[1]{Acknowledgments}{Acknowledgments}%
370   \chapter*{\acknowledgementsname}%
371   \@acknowledgements%
372   \clearempydoublepage%
373 }
```

Define the abstract page.

```
374
375 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
376 %%      Abstract      %%
377 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
378
379 \newcommand{\lt@twoAbstractPages}{}%
```

\twoAbstractPage To put the Swedish and the English abstract on separate right-hand side pages, separate them with a \clearempydoublepage.

```
380 \newcommand{\twoAbstractPage}{%
381   \renewcommand{\lt@twoAbstractPages}{\clearempydoublepage}}%
```

\makeAbstract

```
382 \newcommand*{\makeAbstract}{%
383   \clearempydoublepage \thispagestyle{plain}%
384   \pdfbookmark[1]{Abstract}{Abstract}%
385   \beginngroup
386     \selectlanguage{english}
387     \vspace*{-3\baselineskip}%
388     \@makeschapterhead{\abstractname} % MIGHT CHANGE!!!
389     \vspace*{-1.5\baselineskip}%
390     \@abstract%
391   \endgroup
392   \vfill \sbox{\@tempboxa}{\mbox{\swe@abstract}}}%
393   \ifdim\wd\@tempboxa > \z@%
394     \lt@twoAbstractPages
395     \beginngroup
396       \selectlanguage{swedish}
397       \thispagestyle{plain}
398       \vspace*{-3\baselineskip}%
399       \@makeschapterhead{\abstractname} %MIGHT CHANGE!!!
400       \vspace*{-1.5\baselineskip}%
401       \swe@abstract%
402     \endgroup
403   \fi%
404   \vfill \clearempydoublepage%
405 }
```

Define the copyright notice, as defined by ePress on August 9, 2005. Do not change this page unless this copyright notice changes.

406



407 %%%  
 408 %% Copyright notice %%  
 409 %%%  
 410

\makeCopyright

411 \newcommand\*{\makeCopyright}{\begingroup%  
 412 \cleardoublepage \thispagestyle{empty}%  
 413 \pdfbookmark[-1]{Copyright}{Copyright}%%  
 414 \selectlanguage{swedish}%  
 415 \vspace\*{-22mm}%  
 416 % Handles the case that the parskip package is in use.  
 417 \setlength\parskip{0\p@ \@plus \p@} \setlength{\parindent}{15\p@}%  
 418 \hfill%  
 419 \includegraphics[height=18mm]{LinkUniv\_staende\_pms}%  
 420 %  
 421 \vspace{3\baselineskip} \selectlanguage{swedish}%  
 422 \par\noindent{\fontsize{12pt}{14pt}\selectfont%  
 423 \normalfont\large\bfseries Upphovsrätt}\[1.5ex]  
 424 \fontsize{10pt}{12pt}\selectfont  
 425 Detta dokument hålls tillgängligt på Internet --- eller dess  
 426 framtida ersättare --- under 25 år från publiceringsdatum under  
 427 förutsättning att inga extraordinära omständigheter uppstår.  
 428 \par  
 429 Tillgång till dokumentet innebär tillstånd för var och en att läsa,  
 430 ladda ner, skriva ut enstaka kopior för enskilt bruk och att använda  
 431 det oförändrat för icke-kommersiell forskning och för undervisning.  
 432 Överföring av upphovsrätten vid en senare tidpunkt kan inte  
 433 upphäva detta tillstånd. All annan användning av dokumentet kräver  
 434 upphovsmannens medgivande. För att garantera äktheten, säkerheten  
 435 och tillgängligheten finns det lösningar av teknisk och  
 436 administrativ art.  
 437 \par  
 438 Upphovsmannens ideella rätt innefattar rätt att bli nämnd som  
 439 upphovsman i den omfattning som god sed kräver vid användning av  
 440 dokumentet på ovan be-skrivna sätt samt skydd mot att dokumentet  
 441 ändras eller presenteras i sådan form eller i sådant sammanhang som  
 442 är kränkande för upphovsmannens litterära eller konstnärliga  
 443 anseende eller egenart.  
 444 \par  
 445 För ytterligare information om Linköping University Electronic Press  
 446 se förlagets hemsida  
 447 \href{http://www.ep.liu.se/}{\texttt{http://www.ep.liu.se/}}  
 448 %  
 449 \vspace\*{4\baselineskip}%  
 450 \selectlanguage{english}%  
 451 \par\noindent{\fontsize{12pt}{14pt}\selectfont%  
 452 \normalfont\large\bfseries Copyright}\[1.5ex]  
 453 \fontsize{10pt}{12pt}\selectfont  
 454 The publishers will keep this document online on the Internet --- or  
 455 its possible replacement --- for a period of 25 years from the date  
 456 of publication barring exceptional circumstances.  
 457 \par  
 458 The online availability of the document implies a permanent permission

```

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470 \par
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473 document integrity, please refer to its www home page:
474 \href{http://www.ep.liu.se/}{\texttt{http://www.ep.liu.se/}} \par
475 {\vspace*{\baselineskip} \flushright \textcopyright\ \@author
476 \clearpage} \endgroup
477 }

```

Define some environments.

```

478
479 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
480 %%      Environments      %%
481 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
482
483 \RequirePackage{theorem}
484 \theorembodyfont{\normalfont\slshape}

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

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

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

corollaryname
488 \newtheorem{corollary}{\corollaryname}[chapter]
489
490 %%% Proof%%

proof
491 \newenvironment{proof}[1] [] {
492   \sbox{\@tempboxa}{\mbox{#1}}%
493   \par\noindent%
494   \ifdim\wd\@tempboxa > \z@%
495     \textbf{\proofname~(1)}%
496   \else%
497     \textbf{\proofname}%
498   \fi%
499   \begingroup\small%

```

```

500 }%
501 {%
502   \endgroup%
503   \hspace*{\stretch{ 1}}$\Box$\par\bigskip%
504   \ignorespacesafterend%
505 }

506
507 %%% Example %%%

```

`\listofexamples`

```

508 \DeclareRobustCommand*\listofexamples{%
509   \section*{\listexamplename}%
510   \@starttoc{xmp}%
511 }

512 \newcommand*\l@example{\l@figure}%
513 \newcounter{Example}[chapter]%
514 \renewcommand*\theExample{\thechapter.\arabic{Example}}%
515 \newlength{\examplelinewidth}
516 \setlength{\examplelinewidth}{.8pt}

```

**example** The `example` and `example*` environments are defined using helper-functions to reuse as much code as possible and to avoid duplicate copies of the same code. One problem here is to keep the separating line at the beginning and end of the example at the same page as the rest of the example text. Any suggestions on how to improve this code are welcome.

```

517 \newenvironment{example}[1][]{%
518   \refstepcounter{Example}%
519   \sbox{\@tempboxa}{\ignorespaces#1\unskip}%
520   \ifdim \wd\@tempboxa>\z@%
521     \sbox{\@tempboxa}{\textbf{%
522       \thinspace\ignorespaces%
523       \examplename\unskip-\theExample:~#1\thinspace}}%
524   \else%
525     \sbox{\@tempboxa}{\textbf{\thinspace\examplename~\theExample\thinspace}}%
526   \fi%
527   \addcontentsline{xmp}{example}{\protect\numberline{\theExample}#1}%
528   \@example%
529 }%
530 {\@endexample}
531
532 \newenvironment{example*}[1][]{%
533   \sbox{\@tempboxa}{\ignorespaces#1\unskip}%
534   \ifdim \wd\@tempboxa>\z@%
535     \sbox{\@tempboxa}{\textbf{%
536       \thinspace\ignorespaces\examplename:~#1\thinspace}}%
537   \else%
538     \sbox{\@tempboxa}{\textbf{\thinspace\examplename\thinspace}}%
539   \fi%
540   \@example%
541 }%
542 {\@endexample}
543

```

```

544 \newcommand*\example{%
545   \setlength{\@tempskipa}{\linewidth}%
546   \addtolength{\@tempskipa}{-\wd\@tempboxa}%
547   \addtolength{\@tempskipa}{-1em}%
548   \pagebreak[2]%
549   \strut\ [.5\baselineskip]%
550   \hspace*{-\examplelinewidth}\hspace*{-.5em}%
551   \rule[\examplelinewidth]{\examplelinewidth}{1ex}%
552   \rule[1ex]{2em}{\examplelinewidth}%
553   \raisebox{.6ex}{\box\@tempboxa}%
554   \rule[1ex]{\@tempskipa}{\examplelinewidth}%
555   \rule[\examplelinewidth]{\examplelinewidth}{1ex}%
556   \nopagebreak[4]\hspace*{-\examplelinewidth}\hspace*{-.5em}%
557   \vspace*{-1.5ex}%
558   \begin{trivlist}\nopagebreak[4]\item\@afterindentfalse%
559 }
560
561 \newcommand*\endexample{%
562   \nopagebreak[4]\unskip\end{trivlist}\unskip%
563   \nopagebreak[4]\vspace*{-1ex}%
564   \hspace*{-\examplelinewidth}\hspace*{-.5em}%
565   \rule{\examplelinewidth}{1ex}\rule{\linewidth}{\examplelinewidth}%
566   \rule{1em}{\examplelinewidth}\rule{\examplelinewidth}{1ex}%
567   \hspace*{-\examplelinewidth}\hspace*{-.5em}\ [.5\baselineskip]%
568   \pagebreak[2]%
569   \ignorespacesafterend%
570 }

```

Define the headings to be used.

```

571
572 %%%%%%%%%%%
573 %%      Headings      %%
574 %%%%%%%%%%%
575

```

\chaptermark

```

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

```

\sectionmark

```

577 \DeclareRobustCommand*\sectionmark[1]{\markright{\thesection~#1}{}}
578 \renewcommand*\ps@headings{%
579   \renewcommand*\@oddfoot{}%
580   \renewcommand*\@evenfoot{}%
581   \renewcommand*\@evenhead{%
582     \setlength{\@tempskipa}{\textwidth}%
583     \addtolength{\@tempskipa}{-.25em}%
584     \parbox{\@tempskipa}{\bfseries \thepage\hfill\ \ \leftmark%
585       \vspace*{2\p@\hrule}}%
586   \renewcommand*\@oddhead{%
587     \setlength{\@tempskipa}{\textwidth}%
588     \addtolength{\@tempskipa}{-.25em}%
589     \parbox{\@tempskipa}{\bfseries\rightmark\hfill\ \ \thepage
590       \vspace*{2\p@\hrule}}%
591 }}

```

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

```

592
593 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
594 %%      Bibliography      %%
595 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
596

thebibliography

597 \renewenvironment{thebibliography}[1]{%
598   \chapter*{\bibname}%
599   \phantomsection\addcontentsline{toc}{chapter}{\bibname}%
600   \markboth{\bibname}{\bibname}%
601   \list{\@biblabel{\@arabic\c@enumiv}}%
602   {\settowidth{\labelwidth}{\@biblabel{#1}}%
603     \setlength{\leftmargin}{\labelwidth}%
604     \addtolength{\leftmargin}{\labelsep}%
605     \@openbib@code%
606     \usecounter{enumiv}%
607     \let\p@enumiv\@empty%
608     \renewcommand\theenumiv{\@arabic\c@enumiv}}%
609   \sloppy%
610   \clubpenalty4000%
611   \@clubpenalty \clubpenalty%
612   \widowpenalty4000%
613   \sfcode'\. \m}%
614 {\def\@noitemerr%
615   {\@latex@warning{Empty 'thebibliography' environment}}%
616   \endlist}%

```

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

```

617
618 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
619 %%      Index      %%
620 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
621

theindex

622 \renewenvironment{theindex}
623   {\if@twocolumn
624     \@restonecolfalse
625     \else
626       \@restonecoltrue
627       \fi
628     \columnseprule \z@
629     \columnsep 35\p@
630     \twocolumn[\@makeschapterhead{\indexname}]%
631     \phantomsection\addcontentsline{toc}{chapter}{\indexname}%
632     \markboth{\indexname}{\indexname}%
633     \thispagestyle{plain}\setlength{\parindent}{\z@}%
634     \setlength{\parskip}{\z@ \@plus .3\p@}%
635     \let\item\@idxitem}%
636   {\if@restonecol\onecolumn\else\clearpage\fi}

```

Redefine the macros used for sectioning to suit our other definitions. For instance, allow for chapters to start on right pages in the backmatter.

```
637
638 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
639 %%      Sectioning      %%
640 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
641
```

`\frontmatter`

```
642 \renewcommand{\frontmatter}{%
643   \thispagestyle{empty}%
644   \cleardoublepage%
645   \@mainmatterfalse%
646   \pagenumbering{roman}}
```

`\mainmatter`

```
647 \renewcommand{\mainmatter}{%
648   \thispagestyle{empty}%
649   \cleardoublepage%
650   \pagestyle{headings}
651   \@mainmattertrue%
652   \pagenumbering{arabic}}
```

`\backmatter`

```
653 \renewcommand*{\backmatter}{%
654   \if@openright%
655     \clearemptydoublepage%
656   \else%
657     \clearpage%
658   \fi%
659 %   \@mainmatterfalse%
660   \@openrightfalse}
```

`\makeFrontMatter`

```
661 \newcommand{\makeFrontMatter}[1][]{%
662   \makeFrontPage\thispagestyle{empty}\clearemptydoublepage%
663   \frontmatter\makeTitlePage \thispagestyle{empty}\clearemptydoublepage%
664   \makeLibraryPage\thispagestyle{empty}\clearemptydoublepage%
665   \pagestyle{headings}\makeAbstract%
666   \thispagestyle{empty}\clearemptydoublepage%
667   \makeAcknowledgements\thispagestyle{empty}\clearemptydoublepage%
668   \tableofcontents%
669   #1%
670   \clearemptydoublepage\mainmatter%
671 }
```

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

```
672
673 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
674 %%      Other      %%
675 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
676
```

`\tableofcontents`

```
677 \DeclareRobustCommand*\tableofcontents{%
678   \chapter*{\contentsname\markboth{\contentsname}{\contentsname}}%
679   \@starttoc{toc}%
680 }
```

`\listoffigures`

```
681 \DeclareRobustCommand*\listoffigures{%
682   \section*{\listfigurename}%
683   \@starttoc{lof}%
684 }
```

`\listoftables`

```
685 \DeclareRobustCommand*\listoftables{%
686   \section*{\listtablename}%
687   \@starttoc{lot}%
688 }
```

`\chapter` It looks better if empty pages before a new chapter has no head or foot.

```
689
690 \renewcommand\chapter{\if@openright\clearemptydoublepage\else\clearpage\fi
691   \thispagestyle{plain}%
692   \global\@topnum\z@
693   \@afterindentfalse
694   \secdef\@chapter\@schapter}

695
696 \renewcommand{\@makecaption}[2]{%
697   \vspace{\abovecaptionskip}
698   \begin{small}
699     \sbox{\@tempboxa}{\textbf{#1.} #2}
700     \ifdim \wd\@tempboxa > \hsize
701       \textbf{#1.} #2\par
702     \else
703       \global \@minipagefalse
704       \parbox{\hsize}{\centering \usebox{\@tempboxa}\hfil}
705     \fi
706   \end{small}
707   \vspace{\belowcaptionskip}
708 }
```

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

`\footnoterule`

```
709
710 \renewcommand{\footnoterule}{\vspace*{-3\p@}
711   \noindent\rule{.5\textwidth}{.5\p@}\vspace*{2.6\p@}
712 }
```

This makes the bookmarks look somewhat better in pdf-files.

```
713 \AtBeginDocument{\pdfbookmark[0]{Preface}{Preface}}
```

Create the front page and the title page.

`\makeFrontPage`

```

714 \newcommand*\makeFrontPage{%
715   \setcounter{page}{-1}%
716   \begingroup\normalfont%
717   \cleardoublepage%
718   \pdfbookmark[1]{Front Page}{FrontPage}%
719   \thispagestyle{empty}%
720   \vspace*{-17mm}\hspace*{-13mm}%
721   \raisebox{\z@}{\z@}{\z@}{%
722     \begin{minipage}[t][230mm]{145mm}%
723       \makeFrontPage
724     \end{minipage}}%
725   \endgroup\clearempydoublepage%
726 }
```

`\makeTitlePage`

```

727 \newcommand*\makeTitlePage{%
728   \cleardoublepage \thispagestyle{empty} \normalfont%
729   \pdfbookmark[1]{Title Page}{TitlePage}%
730   \vspace*{-17mm}\hspace*{-13mm}%
731   \raisebox{\z@}{\z@}{\z@}{%
732     \begin{minipage}[t][220mm]{145mm}%
733       \makeTitlePage%
734     \end{minipage}}%
735   \clearempydoublepage%
736 }
```

`</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.

```

737 (*isy)
738 \ProvidesFile{isy.ltd}[2004/11/12 liuthesis defintion for ISY]
739 \liuthesisDefinition{ISY}{Department of Electrical Engineering}\%
740   Linköpings universitet\%
741   SE-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. This macro is automatically included at an empty page when the `\makeFrontPage` is executed.

```

742
743 %%%%%%%%%%%%%%%
744 %      Front page      %
745 %%%%%%%%%%%%%%%
746
```



\@makeFrontPage

```

747 \newcommand{\@makeFrontPage}{%
748   \centering%
749   {\Huge Institutionen för systemteknik}\\%
750   {\LARGE Department of Electrical Engineering}\\[\stretch{2 }]%
751   {\large\bfseries Examensarbete}\\%
752   \vspace*{\stretch{3 }}%
753   {\parbox{13cm}{\centering\Large\bfseries%
754     \ifLanguageInUse{english}{\@title}{\swe@title}}\\[\stretch{3 }]%
755     Examensarbete utfört i \thesis@subject\\%
756     vid Tekniska högskolan i Linköping\\%
757     av\\[\baselineskip]%
758     {\bfseries \@author}\\[\baselineskip]%
759     \thesis@No\\[.5\baselineskip]%
760     {\small Linköping \thesis@year}\\[\baselineskip]%
761     \vspace*{\stretch{2 }}%
762     \parbox[b][115mm]{145mm}{\centering%
763       \setlength{\fboxrule}{2mm}%
764       \fbox{\parbox{138mm}{\centering%
765         \vspace*{15mm}\strut\\%
766         \includegraphics[width=75mm]{LiTH_staende_sv}\\%
767         \vspace*{15mm}%
768       }}\\[.5\baselineskip]%
769       Department of Electrical Engineering \hfill%
770       Linköpings tekniska högskola\\%
771       Linköpings universitet \hfill Linköpings universitet\\%
772       SE-581-83 Linköping, Sweden \hfill 581-83 Linköping%
773     }%
774 }

```

Define how the title page. A definition file must define the macro \@makeTitlePage, *i.e.*, the look of the title page. This works just like with the front page.

```

775
776 %%%%%%%%%%%%%%
777 %      Title page      %
778 %%%%%%%%%%%%%%
779

```

\@makeTitlePage

```

780 \newcommand*{\@makeTitlePage}{%
781   \centering \vspace*{\stretch{2 }}%
782   {\parbox{13cm}{\centering\noindent\Large\bfseries%
783     \ifLanguageInUse{english}{\@title}{\swe@title}}\\%
784     \vspace*{\stretch{2 }}%
785     {\large Examensarbete utfört i \thesis@subject\\%
786       vid Tekniska högskolan i Linköping\\%
787       av\\[\baselineskip]%
788       {\bfseries \@author}\\[\baselineskip]%
789       \thesis@No\\[.5\baselineskip]%
790       \vspace*{\stretch{4 }}%
791       \parbox{10cm}{\raggedright%
792         \rule{10cm}{\z@}%
793         \begin{tabbing}%
794           \hspace*{25mm}\=\quad\=\kill%

```

```

795      Handedare:\>\bfseries\@supervisor\[[.5\baselineskip]%
796      Examiner:\>\bfseries\@examiner%
797      \end{tabbing}%
798  }\\[.5\baselineskip]%
799  Linköping, \thesis@day\ \monthName{\thesis@month}, \thesis@year%
800 }
801 </isy>

```

## References

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