

# The cpecmu document class for L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub>

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2021/06/30

## Abstract

This document class modifies the standard report class to conform with the requirements of the Department of Computer Engineering at Chiang Mai University for the layout of senior project reports. It is a modified version of Cornell University's cornell thesis class.

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This file has version number v0.2.0 dated 2021/06/30.

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# 1 Introduction

This document describes the  $\text{\LaTeX}$  2<sub>ε</sub> document class `cpecmu`, suitable<sup>1</sup> for the production of reports at the Department of Computer Engineering, Chiang Mai University. The latest version of this document class should be available at

<https://cpe.eng.cmu.ac.th/2013/download.php>

## 1.1 Usage

To use this document class, write

```
\documentclass{cpecmu}
```

at the beginning of your  $\text{\LaTeX}$  source file.

This document class can be used with `xelatex`.

## 1.2 Options and packages

<code>cpe</code>	The author can specify whether the document is to be typeset as a report for a CPE project
<code>isne</code>	with the <code>cpe</code> option, or a report for an ISNE project with the <code>isne</code> option. The default is <code>cpe</code> .
<code>project</code>	The author can then specify whether the document is to be typeset as a final project
<code>survey</code>	report with the <code>project</code> option, or a project survey report with the <code>survey</code> option. The default is <code>project</code> .
<code>draft</code>	Formally, all style options supported by the report document class are also supported
<code>twoside</code>	by the <code>cpecmu</code> class, although support for some options, like <code>twocolumn</code> , may be incom-
<code>11pt</code>	plete. The <code>draft</code> option causes the text to be formatted with “single” spacing instead of the
<code>12pt</code>	required 1.5-spacing. This may be of use in drafting, or for formatting private copies. For
	such purposes, the <code>twoside</code> option may also be of use, as well as <code>11pt</code> or <code>12pt</code> (when <code>draft</code>
	is used, the <code>10pt</code> is the default).
<code>final</code>	The final style option (which is the default) will produce the 1.5-spacing <code>12pt</code> document
<code>semifinal</code>	as required for the production of the archival copies of the report. The <code>10pt</code> and <code>11pt</code>

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<sup>1</sup>In the authors’ opinion, but with no guarantee that other users will agree. The authors shall not be liable for any consequence, good or bad, of other people’s use of this software.

options specify font sizes that are too small and will be overridden (and a warning will be issued to inform you of this) if used in conjunction with the final option. The semifinal is identical to final, except that it highlights all horizontal overflows with a black solid rule.

`\ifdraft`      The `\ifdraft` and `\iffinal` macros (which will always be the opposites of one another) may be used to check whether the draft/semifinal option or the final one is in effect.

`\iffinal`  
`\tocprelim`      The `\tocprelim` option causes the preliminary sections to be listed in the table of contents, and the `\notocprelim` prevents the preliminary sections from being listed in the table of contents. By default, preliminary sections are listed in the table of contents.

`\notocprelim`  
`smallerheadings`      A new option (now the default) `smallerheadings` reduces the size of the normally-huge LaTeX headings to something more reasonable. `normalsizeheadings` is used to select the conventional LaTeX chapter and heading sizes.

`normalsizeheadings`  
`glossary`      The `glossary` option enables the glossary pages following the body of the report.  
The options should be specified as optional arguments to the `\documentclass` command.

### 1.3 Sample report

A sample thesis document, named `sampleReport.tex`, is included with the distribution of this document class. This is a good starting point for writing the report.

## 2 Arrangement of contents

A report must contain the following parts, in the order listed. Only parts explicitly designated as optional may be omitted. The current version of this file does not support all of the optional parts.

1. title page (in Thai for CPE, in English for ISNE)
2. title page (in English for CPE, in Thai for ISNE)
3. signature page
4. abstract (in Thai) (full report only)
5. abstract (in English) (full report only)
6. dedication (*optional*)
7. acknowledgments (full report only)
8. table of contents
9. list of figures (or list of illustrations) (full report only)
10. list of tables (full report only)
11. list of abbreviations (*optional*)
12. list of symbols (*optional*)

13. preface (*optional*)
14. text
15. references
16. appendix (or appendices) (full report only)
17. glossary (*optional*)
18. index (*optional*)
19. biographical sketch (full report only)

Some macros and environments are provided to ease the formatting of these parts.

## 2.1 Title pages

`\maketitle` The title pages are produced by the standard L<sup>A</sup>T<sub>E</sub>X macro `\maketitle`, with no arguments.  
`\projectNo` Prior to invoking it, you should declare the project number with the `\projectNo` macro;  
`\titleTH` the title of the document in Thai with the `\titleTH` macro and in English with `\titleEN`  
`\titleEN` macro; your name (exactly as registered with the University) and student identification  
`\author` number with the `\author` macro; and the academic year of the project with the `\acadyear`  
`\acadyear` macro. The syntax of `\author` macro is

`\author{\langle Thai name \rangle}{\langle English name \rangle}{\langle student ID \rangle}`

The syntax of `\acadyear` macro is

`\acadyear{\langle year-in-AD (e.g., 2020) \rangle}`

For projects done by more than one student, simply repeat the `\author` macro with different values.

## 2.2 Signature page

`\makesignature` The signature page is produced by the `\makesignature` macro, with no arguments.  
`\cpeadvisor` Prior to invoking it, you should declare the project advisor with the `\cpeadvisor` macro;  
`\cpecommittee` and the project committee, one member at a time, with the `\cpecommittee` or `\committee`  
`\committee` macro. The syntax of `\cpeadvisor` macro is

`\cpeadvisor{\langle advisor's first name in English, all lowercase \rangle}`

The syntax of `\cpecommittee` macro is

`\cpecommittee{\langle committee member's first name in English, all lowercase \rangle}`

The syntax of `\acadyear` macro, used for external committee members, is

`\committee{\langle Thai name \rangle}{\langle English name \rangle}`

The order of the committee members is the order of names given in the document.

## 2.3 Abstract page(s)

`abstractTH`    The `abstractTH` and `abstract` environments are to be filled with the abstract of the project, in Thai and in English.

## 2.4 Dedication

`dedication`    The format of the dedication is essentially free, but you may want to use the `dedication` environment for this purpose. This environment will center the text of your dedication vertically on the page. The dedication is optional.

## 2.5 Acknowledgments

`acknowledgments`    An environment `acknowledgments` is provided for the acknowledgments section.

## 2.6 Table of Contents, List of Figures, List of Tables

`\contentspage`    Use the macros `\contentspage`, `\figurelistpage`, and `\tablelistpage`, in this order, to produce the required table of contents and lists of figures and tables.  
`\figurelistpage`  
`\tablelistpage`

## 2.7 List of Abbreviations, List of Symbols, Preface

`\abbrlist`    These sections are optional. Macros `\abbrlist`, `\symlist`, and `\preface` should be invoked to indicate the beginning of each of these sections. These macros act much like `\chapter*`, which they invoke. The main difference is that if the `tocprelim` option is used, entries will be made into the table of contents.  
`\symlist`  
`\preface`

## 2.8 Text

You should begin the text section of the report (normally divided into chapters) with the following commands:

```
\normalspacing
\setcounter{page}{1}
\pagenumbering{arabic}
\pagestyle{cpecmu}
```

The last of these commands controls the way pages are numbered throughout the text, ensuring that page numbers are placed at the bottom of the page, centered between the margins.

`plan`    In the introduction chapter of your report, you should use the `plan` environment to generate the Gantt chart describing your project plan. For each task in your plan, you should use the `\planitem` macro to generate each row. The syntax of `\planitem` macro is  
`\planitem`

```
\planitem{<start month (1-12)>}{<start year (in AD)>}{<end month (1-12)>}{<end year (in AD)>}{<task description>}
```

## 2.9 Bibliography

`thebibliography` Use the `thebibliography` environment to generate the bibliography. Or have `BIBTEX` do the work for you. The `cpecmu` document class modifies this environment slightly. You probably shouldn't use the `openbib` option for production of the archival copies of your report.

`\bibname` The default name for this section is **References**. You may change it by changing the expansion of `\bibname`, as in

```
\renewcommand{\bibname}{Bibliography}
```

## 2.10 Appendix

`\appendix` As in the report style, use the `\appendix` macro to mark the end of the last ordinary chapter and the start of the appendices. Then use a new `\chapter{<title>}` to start each appendix. Appendices will automatically be “numbered” alphabetically.

## 2.11 Glossary, Index

`\glossarypage` These sections are optional. Macros `\glossarypage` and `\indexpage` should be invoked  
`\indexpage` to indicate the beginning of each of these sections.

## 2.12 Biographical sketch

`biosketch` A special environment `biosketch` is provided for the biographical sketch.

# 3 Configurable parameters

## 3.1 Interline spacing

The report is 1.5-spaced by default. If you want to modify the spacings, use the  
`\changespacing` `\changespacing` macro. For example,

```
\changespacing{\normalspacing}{1}
```

will cause everything to be single spaced, while

```
\changespacing{\singlespacing}{2}
```

will cause everything to be double spaced, even the text within footnotes and bibliography entries which is normally single spaced.

`\singlespacing` The `\singlespacing` macro switches to single interline spacing. This can be useful within long tables that don't otherwise fit on a page. This is not true single spacing, which has six lines per inch (12 points apart) and appears too dense. Rather, it is single spacing as the `LATEX` article class understands it, with lines 14.5 points apart.

`\doublespacing` The `\doublespacing` macro switches to double spacing between lines, with six lines per inch and 24 points between lines. This is not double spacing as `LATEX` typically understands it, but rather as the rest of the world does.

`\normalspacing` The `\normalspacing` macro restores normal interline spacing, whatever that is (`\singlespacingplus` by default).

`\footnotespacing` The `\footnotespacing` macro switches to footnote spacing. This is equivalent to `\singlespacing` by default, but you may want to redefine this with, *e.g.*,

```
\renewcommand{\footnotespacing}{\doublespacing}
```

`\singlespacingplus` Four other macros are provided to set potentially useful line spacings. Ordinarily you should not need to use any of these macros. `\singlespacingplus` sets 1.5-spacing, while `\realsinglespacing` sets real six-lines-per-inch spacing. The `\realdoublespacing` macro has the same effect as the `\doublespacing` macro and is included for backward compatibility with old versions of this document class. `\listspacing` sets the spacing between lines in various list-like sections of the thesis, such as the table of contents and the lists of tables and figures. By default it is the same as `\singlespacing`.

### 3.2 Font sizes

`\titlesize` The `\titlesize` macro lets you change the font size used for the title of your report on the title page, should the default be unsuitable for any reason. For example, you could do

```
\titlesize{\LARGE}
```

`\authorsize` Similarly, the `\authorsize` macro lets you change the size of font used to print the author's name.

## 4 Internals

```
1 <class>\NeedsTeXFormat{LaTeX2e}[2020/02/02]
2 <class>\ProvidesClass{cpecmu}
3 [2021/06/30 v0.2.0
4 <class> Computer Engineering, Chiang Mai University senior report class]
```

### 4.1 Driver for this document

The docstrip program will extract the following driver from this file:

```
5 <*driver>
6 \documentclass{ltxdoc}
7 \usepackage[english]{thaixelatex}
8 \EnableCrossrefs
9 %\DisableCrossrefs % Say \DisableCrossrefs if index is ready
10 \RecordChanges
11 %\OnlyDescription % Comment out for implementation details
12 \CodelineIndex
13 \begin{document}
14 \DocInput{cpecmu.dtx}
15 % \PrintIndex
16 \PrintChanges
17 \end{document}
18 </driver>
```

## 4.2 Option processing

First we set up conditionals to determine whether this is a CPE or ISNE report, and use CPE by default.

```
19 \newif\ifcpe
20 \DeclareOption{cpe}{\cpetrue}
21 \DeclareOption{isne}{\cpefalse}
22 \ExecuteOptions{cpe}
```

Next, we set up conditionals to determine whether this is a full or survey report, and use full report by default.

```
23 \newif\ifproject
24 \DeclareOption{project}{\projecttrue}
25 \DeclareOption{survey}{\projectfalse}
26 \ExecuteOptions{project}
```

Next, we set up conditionals to determine whether this is an English or Thai report, and use Thai report by default unless it is an ISNE report.

```
27 \newif\ifenglish\englishfalse
28 \DeclareOption{english}{\englishttrue}
29 \ifcpe\relax\else\englishttrue\fi
```

The font size is mandated to be 12pt. If final is set, we override options 10pt and 11pt with a warning.

```
30 \DeclareOption{10pt}{%
31   \iffinal%
32   \OptionNotUsed%
33   \ClassWarningNoLine{cpecmu}{Font size 10pt not allowed; using 12pt}%
34   \else%
35   \PassOptionsToClass{10pt}{report}%
36   \fi%
37 }
38 \DeclareOption{11pt}{%
39   \iffinal%
40   \OptionNotUsed%
41   \ClassWarningNoLine{cpecmu}{Font size 11pt not allowed; using 12pt}%
42   \else%
43   \PassOptionsToClass{11pt}{report}%
44   \fi
45 }
```

We add options to include and exclude the preliminary sections in the table of contents. These are the options `tocprelim` and `notocprelim`. By default, the preliminary sections are included.

`\prelim@contents` Internally, macro `\prelim@contents` is called with the title of the section as an argument to generate the table of contents entry. By default, this macro invokes `\addcontentsline`; with the `notocprelim` option it is changed to do nothing. Preliminary sections are treated as sections, not chapters, for the table of contents.



```

46 \newcommand{\prelim@contents}[2][section]{\addcontentsline{toc}{#1}{#2}}
47 \DeclareOption{tocprelim}{%
48   % included for backwards compatibility only.
49 }
50 \DeclareOption{notocprelim}{%
51   \renewcommand{\prelim@contents}[1]{%
52 }
53 \providecommand\phantomsection{}

```

Define the draft, semifinal and final options that create the `\iffinal` and `\ifdraft` macros.

```

54 \DeclareOption{draft}{%
55   \let\ifdraft\iftrue%
56   \let\iffinal\iffalse%
57 }
58 \DeclareOption{final}{%
59   \let\ifdraft\iffalse%
60   \let\iffinal\iftrue%
61 }
62 \DeclareOption{semifinal}{%
63   \let\ifdraft\iftrue%
64   \let\iffinal\iffalse%
65   \PassOptionsToClass{draft}{report}%
66 }

```

Define the glossary option to enable glossary.

```

67 \newif\ifglossary\glossaryfalse
68 \DeclareOption{glossary}{\glossarytrue}

```

Define the idx option to enable index.

```

69 \newif\ifindex\indexfalse
70 \DeclareOption{idx}{\indextrue}

```

We pass all remaining options to the standard report class.

```

71 \DeclareOption*{%
72   \PassOptionsToClass{\CurrentOption}{report}%
73 }

```

All options must be processed now, so that we can load the report class right away.

```

74 \ExecuteOptions{final}
75 \ProcessOptions

```

### 4.3 Report class

We now load the report class, forcing the 12pt option as noted above. We then set A4 as the paper size.

```

76 \iffinal%
77   \PassOptionsToClass{12pt}{report}%
78 \fi
79 \PassOptionsToClass{a4paper}{report}%
80 \LoadClass{report}[2019/12/20]%

```

We now apply our modifications to the standard report class.

## 4.4 Chapter headings

`\@makechapterhead` We modify the commands which output the chapter headings.

```
\@makeschapterhead
81 \def\@makechapterhead#1{%
82   \begin{center}%
83     \singlespacing
84     \@titlesize\bfseries
85     \@chapapp\space \thechapter \
86     #1
87   \end{center}%
88   \par\nobreak
89 }
90 \def\@makeschapterhead#1{%
91   \begin{center}%
92     \@titlesize\bfseries #1
93   \end{center}%
94   \par\nobreak
95 }
```

For CPE Thai reports, set appendix number to be the Thai characters.

```
96 \ifenglish\else
97   \renewcommand\appendix{\par
98     \cleardoublepage
99     \thispagestyle{empty}
100    \vspace*{\fill}
101    \begin{center}
102      \huge\bf\appendixname
103      \vspace*{1in}
104    \end{center}
105    \vspace*{\fill}
106    \cleardoublepage
107    \setcounter{chapter}{0}%
108    \setcounter{section}{0}%
109    \gdef\@chapapp{\appendixname}%
110    \gdef\thechapter{\@thaiAlph\c@chapter}}
111 \fi
```

## 4.5 Footnotes

Footnotes should be the same size as the main text.

```
112 \renewcommand{\footnotesize}{\normalsize}
```

They can be single spaced.

`\@makefnintext` We redefine the standard macro `\@makefnintext` to use `\footnotespacing` (defined below as `\singlespacing`, but modifiable by the user) and to restore `\normalspacing` afterwards.

```

113 \renewcommand{\@makefnmark}[1]{%
114   \parindent 1em%
115   \noindent
116   \footnotespacing
117   \hbox to 1.8em{\hss\@makefnmark}\#1
118   \par\normalspacing
119 }

```

## 4.6 Subscripts

Subscripts should be made larger than the default, just to be on the safe side.

```

120 \renewcommand{\defaultscriptratio}{.75}
121 \renewcommand{\defaultscriptscriptratio}{.6}

```

## 4.7 Page layout

The interior margin must be increased to at least 1.5 inches. Various other page layout parameters are reset here.

This part of the code may not be very robust when twocolumn is used. (No attempt has yet been made to get the margins right in that case.) But then, reports really shouldn't use twocolumn.

```

122 \setlength\headsep{25\p@}
123 \if@twocolumn
124 \else
125   \setlength\topmargin{-0.4in}
126   \setlength\headheight{0.16667in}
127   \setlength\headsep{0.33333in}
128   \setlength\textheight{9.4in}
129   \setlength\footskip{0.5in}
130   \setlength\oddsidemargin{.5in}
131   \setlength\evensidemargin{0in}
132   \setlength\textwidth{5.8in}
133   \setlength\marginparsep{0.1in}
134   \setlength\marginparwidth{1.3in}
135 \fi

```

## 4.8 Page styles

\ps@cpecmu We define a cpecmu page style. This has page numbers centered at the bottom of each page.

```

136 \newcommand{\ps@cpecmu}{%
137 \def\@oddhead{}
138 \def\@oddfoot{\hfil\thepage\hfil}%
139 \def\@evenhead{}%
140 \def\@evenfoot{\@oddfoot}%
141 \def\chaptermark##1{}%
142 \def\sectionmark##1{}%
143 }

```

We prefer predictable interline spacing over fixed page length. Thus:

```
144 \raggedbottom
```

Individual users are free to override this by using `\flushbottom` in the preamble.

## 4.9 Section names

The  $\text{\LaTeX}$  default section names are acceptable, except for the table of contents which must be called “Table of Contents”, not just “Contents”.  $\text{\LaTeX} 2_{\epsilon}$  conveniently provides a macro to configure this.

```
145 \renewcommand{\contentsname}{Table of Contents}
```

$\text{\LaTeX} 2_{\epsilon}$  also provides `\bibname`, `\listtablename`, `\listfigurename`; the default values are adequate for our purposes.

Preliminary sections are handled here.

```
146 \newcommand{\@titlesize}{\fontsize{14}{18}\selectfont}
147 \newcommand{\@subtitlesize}{\fontsize{12}{24}\selectfont}
148 \newcommand{\@authorsize}{\@titlesize}
149 \newcommand{\titlesize}[1]{\renewcommand{\@titlesize}{#1}}
150 \newcommand{\subtitlesize}[1]{\renewcommand{\@subtitlesize}{#1}}
151 \newcommand{\authorsize}[1]{\renewcommand{\@authorsize}{#1}}
152
153 \newcommand{\@projectNo}{??}
154 \newcommand{\projectNo}[1]{\renewcommand{\@projectNo}{#1}}
155
156 \newcommand{\@titleTH}{ชื่อโครงการ}
157 \newcommand{\@titleEN}{Project Name}
158 \newcommand{\titleTH}[1]{\renewcommand{\@titleTH}{#1}}
159 \newcommand{\titleEN}[1]{\renewcommand{\@titleEN}{#1}}
160
161 \newcounter{@numauthors}\setcounter{@numauthors}{0}
162 \renewcommand{\author}[3]{%
163   \stepcounter{@numauthors}%
164   \expandafter\gdef
165     \csname @authorTH@romannumeral\number\value{@numauthors}\endcsname
166     {#1}%
167   \expandafter\gdef
168     \csname @authorEN@romannumeral\number\value{@numauthors}\endcsname
169     {#2}%
170   \expandafter\gdef
171     \csname @studentID@romannumeral\number\value{@numauthors}\endcsname
172     {#3}%
173 }
174 \newif\if@printid\@printidtrue
175 \newcounter{@authorIdx}
176 \def\@listauthors#1#2#3{%
177   \stepcounter{@authorIdx}%
178   \csname @author#1@romannumeral\number\value{@authorIdx}\endcsname%
179   #2%
```

```

180 \if@printid%
181 \csname @studentID@romannumeral\number\value{@authorIdx}\endcsname%
182 \fi
183 \ifnum\value{@authorIdx}<\value{@numauthors}%
184 #3%
185 \@listauthors{#1}{#2}{#3}%
186 \fi
187 }
188 \newcommand{\@authorsTH}[2]{%
189 \setcounter{@authorIdx}{0}%
190 \@listauthors{TH}{#1}{#2}%
191 }
192 \newcommand{\@authorsEN}[2]{%
193 \setcounter{@authorIdx}{0}%
194 \@listauthors{EN}{#1}{#2}%
195 }
196
197 \newcommand{\@acadyearBE}{2563}
198 \newcommand{\@acadyearAD}{2020}
199 \newcounter{@acadyear}
200 \newcommand{\@acadyear}[1]{%
201 \renewcommand{\@acadyearAD}{#1}
202 \setcounter{@acadyear}{#1}
203 \addtocounter{@acadyear}{543}
204 \renewcommand{\@acadyearBE}{\the@acadyear}
205 }
206 \newcommand{\@degreefieldAbbrTH}{\ifcpe วิศวกรรม.\else วิศวกรรม.\fi}
207 \newcommand{\@degreefieldAbbrEN}{\ifcpe CPE\else ISNE\fi}
208 \newcommand{\@degreefieldTH}{%
209 \ifcpe%
210 วิศวกรรมคอมพิวเตอร์%
211 \else%
212 วิศวกรรมระบบสารสนเทศและเครือข่าย%
213 \fi%
214 }
215 \newcommand{\@degreefieldEN}{%
216 \ifcpe%
217 Computer Engineering%
218 \else%
219 Information Systems and Network Engineering%
220 \fi%
221 }

Title page
222 \ifenglish%
223 \PassOptionsToPackage{english}{thaixelatex}
224 \fi
225 \RequirePackage{thaixelatex}
226 \newcommand{\@maketitleTH}{%

```

```

227 \begin{titlepage}%
228 \begin{center}%
229 \hrule height 0.5in width 0pt % force vertical space at top
230 \@titlesize\bf
231 โครงการเลขที่ \@degreefieldAbbrTH~\@projectNo/\@acadyearBE
232 \par\vspace*{0.5in}\par
233 เรื่อง
234 \par\vspace*{0.5in}\par
235 \@titleTH
236 \par\vspace*{0.75in}\par
237 โดย
238 \par\vspace*{0.75in}\par
239 {\@authorsize%
240 \begin{tabular}{@{}c@{}}
241 \@authorsTH{& รหัส~}\{\}\%
242 \end{tabular}%
243 }%
244 \vfill
245 \ifproject%
246 โครงการนี้ \\\
247 เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิศวกรรมศาสตรบัณฑิต \\\
248 \else%
249 รายงานนี้เป็นส่วนหนึ่งของวิชาสำรวจเพื่อโครงการ \\\
250 ตามหลักสูตรปริญญาวิศวกรรมศาสตรบัณฑิต \\\
251 \fi
252 ภาควิชาวิศวกรรมคอมพิวเตอร์ \\\
253 คณะวิศวกรรมศาสตร์ มหาวิทยาลัยเชียงใหม่ \\\
254 ปีการศึกษา~\@acadyearBE
255 \end{center}
256 \vspace{0.25in}
257 \end{titlepage}
258 }
259 \newcommand{\@maketitleEN}{%
260 \begin{titlepage}%
261 \begin{center}%
262 \hrule height 0.5in width 0pt % force vertical space at top
263 \@titlesize\bf
264 PROJECT No. \@degreefieldAbbrEN~\@projectNo/\@acadyearBE
265 \par\vspace*{1in}\par
266 \@titleEN
267 \par\vspace*{1.5in}\par
268 {\@authorsize%
269 \begin{tabular}{@{}c@{}}
270 \@authorsEN{&}\{\}\%
271 \end{tabular}%
272 }%
273 \vfill
274 \ifproject%
275 A Project Submitted in Partial Fulfillment of Requirements \\\

```

```

276         for the Degree of Bachelor of Engineering \\
277         \else%
278             A Report Submitted in Partial Fulfillment of Project Survey Course \\
279             as Required by the Degree of Bachelor of Engineering \\
280         \fi
281         Department of Computer Engineering \\
282         Faculty of Engineering \\
283         Chiang Mai University \\
284         \@acadyearAD
285     \end{center}
286     \vspace{0.25in}
287 \end{titlepage}
288 }
289 \renewcommand{\maketitle}{%
290     \typeout{Title page}
291     \pagenumbering{roman} % title page is counted but not numbered
292     \pagestyle{empty}
293     \ifcpe%
294         \@maketitleTH
295         \@maketitleEN
296     \else
297         \@maketitleEN
298         \@maketitleTH
299     \fi
300 }
301
302 \renewenvironment{titlepage}{%
303     \singlespacing
304 }{%
305     \normalspacing\clearpage
306 }

Signature page
307 \newcommand\cpefaculty[3]{%
308     \expandafter\gdef\csname @cpefacultyTH@#1\endcsname{#2}%
309     \expandafter\gdef\csname @cpefacultyEN@#1\endcsname{#3}%
310 }
311 \newcommand\deptChair[1]{
312     \ifundefined{@cpefacultyTH@#1}
313     {\ClassWarningNoLine{cpecmu}{Unknown CPE faculty: #1}}{%
314         \gdef\@deptChairTH{\csname @cpefacultyTH@#1\endcsname}%
315         \gdef\@deptChairEN{\csname @cpefacultyEN@#1\endcsname}%
316     }
317 }
318 \RequirePackage{cpecmu-faculty}
319
320 \newcommand{\@advisorTH}{(waiting for an advisor)}
321 \newcommand{\@advisorEN}{(waiting for an advisor)}
322 \newcommand\advisor[2]{%
323     \gdef\@advisorTH{#1}%

```

```

324 \gdef\@advisorEN{#2}%
325 }
326 \newcommand\cpeadvisor[1]{%
327 \ifundefined{@cpefacultyTH@#1}
328 {\ClassWarningNoLine{cpecmu}{Unknown CPE faculty: #1}}
329 {\advisor
330 {\csname @cpefacultyTH@#1\endcsname}
331 {\csname @cpefacultyEN@#1\endcsname}
332 }
333 }
334 \newcounter{@numcommittee}\setcounter{@numcommittee}{0}
335 \newcommand{\committee}[2]{%
336 \stepcounter{@numcommittee}%
337 \expandafter\gdef
338 \csname @committeeTH@romannumeral\number\value{@numcommittee}\endcsname
339 {#1}%
340 \expandafter\gdef
341 \csname @committeeEN@romannumeral\number\value{@numcommittee}\endcsname
342 {#2}%
343 }
344 \newcommand\cpecommittee[1]{%
345 \ifundefined{@cpefacultyTH@#1}
346 {\ClassWarningNoLine{cpecmu}{Unknown CPE faculty: #1}}
347 {\committee
348 {\csname @cpefacultyTH@#1\endcsname}
349 {\csname @cpefacultyEN@#1\endcsname}
350 }
351 }
352 \newcounter{@committeeIdx}
353 \def\@listcommittee#1#2#3{%
354 \stepcounter{@committeeIdx}%
355 #2%
356 \csname @committee#1@romannumeral\number\value{@committeeIdx}\endcsname%
357 #3%
358 \ifnum\value{@committeeIdx}<\value{@numcommittee}%
359 \@listcommittee{#1}{#2}{#3}%
360 \fi
361 }
362
363 \RequirePackage{xltabular}
364 \RequirePackage[normalem]{ulem}
365 \newcommand{\@summaryTH}{%
366 \setlength\parindent{0pt}
367 \begin{tabularx}{\linewidth}{@{}l@{\quad} }X@{}}
368 หัวข้อโครงการ & \@titleTH \\
369 & \@titleEN \\
370 โดย &
371 \begin{tabular}[t]{@{}l@{}}
372 \@authorsTH{& รหัส~}{\\}

```



```

373 \end{tabular}
374 \\
375  ภาควิชา & วิศวกรรมคอมพิวเตอร์ \\
376  อาจารย์ที่ปรึกษา & \@advisorTH \\
377  ปริญญา & วิศวกรรมศาสตรบัณฑิต \\
378  สาขา & \@degreefieldTH \\
379  ปีการศึกษา & \@acadyearBE
380 \end{tabularx}
381 \par\bigskip\par
382 \hrule height 2pt
383 }
384 \newcommand{\@summaryEN}{%
385   \setlength\parindent{0pt}
386   \begin{tabularx}{\linewidth}{@{}l@{\quad: }X@{}}
387     Project Title & \@titleEN \\
388     Name & \\
389     \begin{tabular}[t]{@{}ll@{}}
390       \@authorsEN{& }{\\}
391     \end{tabular}
392     \\
393     Department & Computer Engineering \\
394     Project Advisor & \@advisorEN \\
395     Degree & Bachelor of Engineering \\
396     Program & \@degreefieldEN \\
397     Academic Year & \@acadyearAD
398   \end{tabularx}
399   \par\bigskip\par
400   \hrule height 2pt
401 }
402
403 \newcommand{\makesignature}{%
404   \cleardoublepage
405   \pagenumbering{\ifenglish alph\else thaialph\fi}
406   % make sure all the page numbers in the
407   % PDF document are unique, if PDF page
408   % numbers generated
409   \pagestyle{plain}
410   \setcounter{page}{1}
411   \bgroup
412   \ifcpe\@summaryTH\else\@summaryEN\fi%
413   \par\vspace*{1cm}\par
414   \ifcpe%
415     ภาควิชาวิศวกรรมคอมพิวเตอร์ คณะวิศวกรรมศาสตร์ มหาวิทยาลัยเชียงใหม่
416     ได้อนุมัติให้โครงการนี้เป็นส่วน\~หนึ่งของการศึกษาตามหลักสูตรปริญญาวิศวกรรมศาสตรบัณฑิต
417     (สาขา\@degreefieldTH)
418   \else%
419     The Department of Computer Engineering, Faculty of Engineering,
420     Chiang Mai University has approved this project to be part of the
421     degree of Bachelor of Engineering (\@degreefieldEN)
422   \fi

```

```

423 \begin{flushright}
424 \begin{tabular}{@{}cl@{}}
425 \\\[1cm]
426 \makebox[3.5in]{\dotfill} &
427 \ifcpe หัวหน้าภาควิชาวิศวกรรมคอมพิวเตอร์\else Department chair\fi\\
428 (\ifcpe\@deptChairTH\else\@deptChairEN\fi)
429 \end{tabular}
430 \end{flushright}
431 \par\bigskip\par
432 \ifcpe คณะกรรมการสอบโครงการ\else Project examination committee:\fi
433 \begin{flushright}
434 \begin{tabular}{@{}cl@{}}
435 \\\[1cm]
436 \makebox[3.5in]{\dotfill} &
437 \ifcpe ประธานกรรมการ\else Main advisor / Chair\fi \\
438 (\ifcpe\@advisorTH\else\@advisorEN\fi)
439 \setcounter{@committeeIdx}{0}%
440 \@listcommittee{\ifcpe TH\else EN\fi}{\\[1cm]
441 \makebox[3.5in]{\dotfill} & \ifcpe กรรมการ\else Committee member\fi \\
442 ()
443 {})%
444 \end{tabular}
445 \end{flushright}
446 \egroup
447 }

```

#### Abstract page

```

448 \newcommand\@abstract@begin[2]{%
449 \cleardoublepage
450 \typeout{Abstract}
451 {\csname @summary#1\endcsname}%
452 \par\vspace*{5mm}\par
453 \phantomsection
454 \prelim@contents{#2}
455 \begin{center}%
456 \@titlesize\MakeUppercase{\bfseries #2}
457 \end{center}%
458 }
459 \newenvironment{abstractTH}{\@abstract@begin{TH}{บทคัดย่อ}}{\cleardoublepage}
460 \renewenvironment{abstract}{\@abstract@begin{EN}{Abstract}}{\cleardoublepage}

```

#### Dedication

```

461 \newenvironment{dedication}{%
462 \phantomsection
463 \prelim@contents{Dedication}
464 \null\vfill
465 \begin{center}
466 }{
467 \end{center}
468 \vfill\null

```

469 \clearpage

470 }

### Acknowledgments

471 \newcommand\strmnth[1]{%

472 \ifenglish%

473 \ifcase#1%

474 \or Jan% 1

475 \or Feb% 2

476 \or Mar% 3

477 \or Apr% 4

478 \or May% 5

479 \or Jun% 6

480 \or Jul% 7

481 \or Aug% 8

482 \or Sep% 9

483 \or Oct% 10

484 \or Nov% 11

485 \or Dec% 12

486 \fi

487 \else%

488 \ifcase#1%

489 \or ม.ค.% 1

490 \or ก.พ.% 2

491 \or มี.ค.% 3

492 \or เม.ย.% 4

493 \or พ.ค.% 5

494 \or มิ.ย.% 6

495 \or ก.ค.% 7

496 \or ส.ค.% 8

497 \or ก.ย.% 9

498 \or ต.ค.% 10

499 \or พ.ย.% 11

500 \or ธ.ค.% 12

501 \fi

502 \fi

503 }

\strmonth{month} returns month spelled out in Thai

504 \newcommand\strmonth[1]{%

505 \ifenglish%

506 \ifcase#1%

507 \or January% 1

508 \or February% 2

509 \or March% 3

510 \or April% 4

511 \or May% 5

512 \or June% 6

513 \or July% 7

514 \or August% 8

515 \or September% 9

```

516 \or October% 10
517 \or November% 11
518 \or December% 12
519 \fi
520 \else%
521 \ifcase#1%
522 \or มกราคม% 1
523 \or กุมภาพันธ์% 2
524 \or มีนาคม% 3
525 \or เมษายน% 4
526 \or พฤษภาคม% 5
527 \or มิถุนายน% 6
528 \or กรกฎาคม% 7
529 \or สิงหาคม% 8
530 \or กันยายน% 9
531 \or ตุลาคม% 10
532 \or พฤศจิกายน% 11
533 \or ธันวาคม% 12
534 \fi
535 \fi
536 }
537 \newcommand\Day[3]{%
538 \setcounter{@plan@y}{#1}%
539 \ifenglish\else\addtocounter{@plan@y}{543}\fi%
540 #3 \strmonth{#2} \the@plan@y%
541 }
542 \newcommand\acksign[3]{%
543 \@printidfalse%
544 \setcounter{@authorIdx}{0}%
545 \bigskip\par\noindent%
546 \begin{tabularx}{\linewidth}{@{\hspace*{2.5in}}>\centering}X@{}}
547 \@listauthors{\ifenglish EN\else TH\fi}{\{\}}
548 \Day{#1}{#2}{#3}
549 \end{tabularx}
550 \par%
551 \@printidtrue%
552 }
553 \newenvironment{acknowledgments}{%
554 \pagestyle{plain}
555 \chapter*{\ifenglish Acknowledgments\else กิตติกรรมประกาศ\fi}
556 \prelim@contents{\ifenglish Acknowledgments\else กิตติกรรมประกาศ\fi}
557 }{%
558 \clearpage
559 }

```

#### Table of contents, list of figures, list of tables

```

560 \newcommand{\contentspage}{%
561 \cleardoublepage
562 \pagestyle{plain}
563 \listspacing{toc}

```

```

564 \phantomsection
565 \prelim@contents{\contentsname}
566 \tableofcontents
567 \normalspacing
568 \clearpage
569 }
570
571 \newcommand{\figurelistpage}{%
572 \pagestyle{plain}
573 \listspacing{fig}
574 \phantomsection
575 \prelim@contents{\listfigurename}
576 \listoffigures
577 \normalspacing
578 \clearpage
579 }
580
581 \newcommand{\tablelistpage}{%
582 \pagestyle{plain}
583 \listspacing{tab}
584 \phantomsection
585 \prelim@contents{\listtablename}
586 \listoftables
587 \normalspacing
588 \clearpage
589 }

```

The following three sections are optional. We define macros to start new chapters, but that is all.

```

590 \newcommand{\abbrlist}{%
591 \pagestyle{plain}
592 \listspacing{abbr}
593 \chapter*{\ifenglish List of Abbreviations\else รายการคำย่อ\fi}
594 \prelim@contents{\ifenglish List of Abbreviations\else รายการคำย่อ\fi}
595 }
596
597 \newcommand{\symlist}{%
598 \pagestyle{plain}
599 \listspacing{sym}
600 \chapter*{\ifenglish List of Symbols\else รายการสัญลักษณ์\fi}
601 \prelim@contents{\ifenglish List of Symbols\else รายการสัญลักษณ์\fi}
602 }
603
604 \newcommand{\preface}{%
605 \pagestyle{plain}
606 \listspacing{pref}
607 \chapter*{\ifenglish Preface\else คำนำ\fi}
608 \prelim@contents{\ifenglish Preface\else คำนำ\fi}
609 }

```

Set up font size for section headings.

```
610 \RequirePackage{titlesec}
611 \titleformat*{\section}{\bfseries}
612 \titleformat*{\subsection}{\bfseries}
613 \titleformat*{\subsubsection}{\bfseries}
```

Command and environment for the work plan table.

```
614 \RequirePackage[final]{graphicx}
615 \RequirePackage[table,x11names]{xcolor}
616 \RequirePackage{rotating}
617
618 \newcounter{@plan@sm}
619 \newcounter{@plan@sy}
620 \newcounter{@plan@em}
621 \newcounter{@plan@ey}
622 \newcounter{@plan@m}
623 \newcounter{@plan@y}
624 \newcounter{@plan@colscount}
625 \newenvironment{plan}[4]{%
626   \setcounter{@plan@sm}{#1}
627   \setcounter{@plan@sy}{#2}
628   \setcounter{@plan@em}{#3}
629   \setcounter{@plan@ey}{#4}
630   \def\@plan@numcols{%
631     \stepcounter{@plan@colscount}
632     \ifnum\value{@plan@y}=\value{@plan@ey}%
633       \ifnum\value{@plan@m}<\value{@plan@em}%
634         \stepcounter{@plan@m}%
635         \@plan@numcols%
636       \fi
637     \else%
638       \stepcounter{@plan@m}%
639       \ifnum\value{@plan@m}=13%
640         \stepcounter{@plan@y}%
641         \setcounter{@plan@m}{1}%
642       \fi
643       \@plan@numcols%
644     \fi
645   }
646   \def\@plan@genheader{%
647     &
648     \begin{sideways}
649       \ifenglish\else\addtocounter{@plan@y}{543}\fi
650       \strmnth{\value{@plan@m}} \the@plan@y\hspace*{1ex}%
651       \ifenglish\else\addtocounter{@plan@y}{-543}\fi
652     \end{sideways}
653     \ifnum\value{@plan@y}=\value{@plan@ey}%
654       \ifnum\value{@plan@m}<\value{@plan@em}%
655         \stepcounter{@plan@m}%
656         \@plan@genheader%
```

```

657     \fi
658   \else%
659     \stepcounter{@plan@m}%
660     \ifnum\value{@plan@m}=13%
661       \stepcounter{@plan@y}%
662       \setcounter{@plan@m}{1}%
663     \fi
664     \@plan@genheader%
665   \fi
666 }
667 \setcounter{@plan@m}{\value{@plan@sm}}
668 \setcounter{@plan@y}{\value{@plan@sy}}
669 \setcounter{@plan@colscout}{0}
670 \@plan@numcols
671 \noindent
672 \xltabular{\linewidth}{|X|*{\the@plan@colscout}{c|}}
673 \hline
674 \bf\ifenglish Task\else ขั้นตอนการดำเนินงาน Task\fi
675 \setcounter{@plan@m}{\value{@plan@sm}}
676 \setcounter{@plan@y}{\value{@plan@sy}}
677 \@plan@genheader
678 \\\hline
679 \endhead
680 }{%
681 \endxltabular
682 }
683 \newcommand\planitem[6][gray]{%
684   \gdef\@plan@paint{%
685     &
686     \ifnum\value{@plan@y}<#3\else%
687       \ifnum#3=\value{@plan@y}%
688         % sy = y
689         \ifnum#5<\value{@plan@y}\else%
690           \ifnum\value{@plan@y}=#5%
691             % sy = y = ey
692             \ifnum\value{@plan@m}<#2\else%
693               \ifnum#4<\value{@plan@m}\else%
694                 % sm <= m <= em
695                 \cellcolor{#1}
696               \fi
697             \fi
698           \else%
699             % sy = y < ey
700             \ifnum\value{@plan@m}<#2\else%
701               % sm <= m
702               \cellcolor{#1}
703             \fi
704           \fi
705         \fi
706       \else

```

```

707 % sy < y
708 \ifnum#5<\value{@plan@y}\else%
709 \ifnum\value{@plan@y}=#5%
710 % sy < y = ey
711 \ifnum#4<\value{@plan@m}\else%
712 % m <= em
713 \cellcolor{#1}
714 \fi
715 \else%
716 % sy < y < ey
717 \cellcolor{#1}
718 \fi
719 \fi
720 \fi
721 \fi
722 \ifnum\value{@plan@y}=\value{@plan@ey}%
723 \ifnum\value{@plan@m}<\value{@plan@em}%
724 \stepcounter{@plan@m}%
725 \@plan@paint%
726 \fi
727 \else%
728 \stepcounter{@plan@m}%
729 \ifnum\value{@plan@m}=13%
730 \stepcounter{@plan@y}%
731 \setcounter{@plan@m}{1}%
732 \fi
733 \@plan@paint%
734 \fi
735 }%
736 #6%
737 \setcounter{@plan@m}{\value{@plan@sm}}
738 \setcounter{@plan@y}{\value{@plan@sy}}
739 \@plan@paint%
740 \\\hline
741 }

```

#### Bibliography section

```

742 \addto\captionsenglish{%
743 \renewcommand{\bibname}{References}%
744 }
745 \let\cpecmu@bibliography=\bibliography
746 \def\bibliography#1{%
747 \cleardoublepage
748 \listspacing{bib}
749 \phantomsection
750 \prelim@contents[chapter]{\bibname}
751 \cpecmu@bibliography{#1}
752 }

```

#### Biographical sketch

```

753 \newenvironment{biosketch}{%

```



```

754 \typeout{Vita}
755 \chapter*{\ifenglish Biographical Sketch\else ประวัติผู้เขียน\fi}
756 \prelim@contents[chapter]{\ifenglish Biographical Sketch\else ประวัติผู้เขียน\fi}
757 }{%
758 \clearpage
759 }
760 \AtBeginDocument{%
761 \let\cpecmu@thebibliography=\thebibliography
762 \renewcommand\thebibliography[1]{%
763 \cpecmu@thebibliography{#1}%
764 \setlength{\itemsep}{18pt}%
765 \setlength{\parsep}{0pt}%
766 \setlength{\parskip}{0pt}%
767 }%
768 }

```

The glossary and index sections are optional. Package glossaries is required for generating the glossary. Package makeidx is required for generating the index.

```

769 \ifglossary
770 \RequirePackage[toc,numberline]{glossaries}
771 \makeglossaries
772
773 \newcommand{\glossarypage}{%
774 \pagestyle{plain}
775 \listspacing{glossary}
776 \printglossaries
777 }
778 \else
779 \newcommand\gls[1]{#1}
780 \fi
781
782 \ifindex
783 \RequirePackage{makeidx}
784 \makeindex
785
786 \newcommand{\indexpage}{%
787 \pagestyle{plain}
788 \listspacing{index}
789 \printindex
790 }
791 \else
792 \renewcommand\index[1]{}
793 \fi

```

This sets up the interline spacing for normal text, small text, and footnote text, and defines the various spacing macros. Because the interline spacing for normal text is set to 12 points, the spacing macros can do the straightforward thing, except for \singlespacing, which tries to be backward compatible with article.

```

794 \renewcommand\normalsize{%
795 \@setfontsize\normalsize\@xipt{12}%

```

```

796 \abovedisplayskip 12\p@ \@plus3\p@ \@minus7\p@
797 \abovedisplayshortskip \z@ \@plus3\p@
798 \belowdisplayshortskip 6.5\p@ \@plus3.5\p@ \@minus3\p@
799 \def\@listi{\leftmargin\leftmargini
800         \parsep 5\p@ \@plus2.5\p@ \@minus\p@
801         \topsep 10\p@ \@plus4\p@ \@minus6\p@
802         \itemsep \z@ \@plus2.5\p@ \@minus\p@}%
803 \belowdisplayskip \abovedisplayskip
804 }
805 \renewcommand\small{%
806     \@setfontsize\small\@xipt{11}%
807     \abovedisplayskip 11\p@ \@plus3\p@ \@minus6\p@
808     \abovedisplayshortskip \z@ \@plus3\p@
809     \belowdisplayshortskip 6.5\p@ \@plus3.5\p@ \@minus3\p@
810     \def\@listi{\leftmargin\leftmargini
811         \topsep 9\p@ \@plus3\p@ \@minus5\p@
812         \parsep 4.5\p@ \@plus2\p@ \@minus\p@
813         \itemsep \z@ \@plus2\p@ \@minus\p@}%
814     \belowdisplayskip \abovedisplayskip
815 }
816 \renewcommand\footnotesize{%
817     \@setfontsize\footnotesize\@xpt\@xpt
818     \abovedisplayskip 10\p@ \@plus2\p@ \@minus5\p@
819     \abovedisplayshortskip \z@ \@plus3\p@
820     \belowdisplayshortskip 6\p@ \@plus3\p@ \@minus3\p@
821     \def\@listi{\leftmargin\leftmargini
822         \topsep 6\p@ \@plus2\p@ \@minus2\p@
823         \parsep 3\p@ \@plus2\p@ \@minus\p@
824         \itemsep \parsep}%
825     \belowdisplayskip \abovedisplayskip
826 }
827
828 \newcommand{\realsinglespacing}{%
829     \let\CS=\@currsize\renewcommand{\baselinestretch}{1.0}\CS}
830 \def\singlespacing{%
831     \let\CS=\@currsize\renewcommand{\baselinestretch}{1.208333}\CS}
832 \newcommand{\singlespacingplus}{%
833     \let\CS=\@currsize\renewcommand{\baselinestretch}{1.5}\CS}
834 \def\doublespacing{%
835     \let\CS=\@currsize\renewcommand{\baselinestretch}{2}\CS}
836 \newcommand{\realdoublespacing}{%
837     \let\CS=\@currsize\renewcommand{\baselinestretch}{2}\CS}
838 \newcommand{\normalspacing}{\singlespacingplus}
839 \newcommand{\footnotespacing}{\singlespacing}
840 \newcommand{\listspacing}[1] % extra arg is extensibility hook
841     {\singlespacing}
842 \newcommand{\changespacing}[2]{%
843     \renewcommand{#1}{%
844         \let\CS=\@currsize\renewcommand{\baselinestretch}{#2}\CS}%
845 }

```

```

846 % \ifdraft\changespacing{\normalspacing}{1}\fi
847 \newcommand{\changenormalspacing}[1]{\renewcommand{\normalspacing}{#1}}
848 \normalspacing
849
850 % redefine to do singlespacing
851 \def \@floatboxreset {%
852     \reset@font
853     \normalsize
854     \singlespacing
855     \@setminipage
856 }

```

End (for now)

## Change History

0.1.1	0.2.1
General: Names on title pages are centered by name only; the student IDs are themselves left-justified. . . 13	General: Decoupled cpe/isne option from english. . . . . 13