

# L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> Document Styles for the University of Southampton File version v2.0, dated 2018/12/20

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## 1 Quickstart

This guide assumes you have installed MiKTeX or TeX live distributions. It also requires having the program "make" for producing the templates again.

The folder labelled tex-mf should be installed in your local tex files source or whatever your tex distro uses.

The Templates have been built for the Department of Electronics and Computer Science in the Faculty of Engineering and Physical Science at the University Of Southampton.

The basic settings for University, Faculty and School are explained in Section ??

If a user only wishes to change the file for their thesis it is probably easier to navigate to the class file labeled ecsthesis and change the department and faculty naming there. This will be located in the subdirectory where you unzipped the files under tex/latex/ecsdocs/

## 2 Description

These L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> document classes are designed to produce thesis, mini-thesis, progress, project, report, GDP report and GDP summary report documents which conformed to the University of Southampton guidelines of April 2001. They were updated in Jan 2019 to conform to changes in those guidelines. Specifically copy-right and authorship declaration changes. They are based on the document class `book`, but modify some of its layout decisions. An article class is also provided which is based on the document class `article`.

## 3 The DOCSTRIP modules

The following modules are used in the implementation to direct DOCSTRIP when generating the external files:

thesis	produce the <b>ecsthesis</b> document class
minithesis	produce the <b>ecsminithesis</b> document class
progress	produce the <b>ecsprogress</b> document class
project	produce the <b>ecsproject</b> document class
report	produce the <b>ecsreport</b> document class
article	produce the <b>ecsarticle</b> document class
gdp	produce the <b>ecsgdp</b> document class
gdpsummary	produce the <b>ecsgdpsummary</b> document class
testthesis	produce an example thesis
testminithesis	produce an example minithesis
testprogress	produce an example progress
testproject	produce an example project
testreport	produce an example report
testarticle	produce an example article
testgdp	produce an example GDP report
testgdpsummary	produce an example GDP summary report
introduction	produce an example introduction chapter
conclusions	produce an example conclusions chapter
appendix	produce an example appendix chapter
figure	produce an example figure file
definitions	produce an example definitions file
references	produce an example references file
bst	produce a bibliography style file
driver	produce a documentation driver file

## 4 Implementation

The checksum is to determine if there has been a truncation in the file during transmission over a network

All options are passed on to the **book** or **article** class.

```
1 <{*thesis | minithesis | progress | project | report | article | gdp | gdpsummary}>
```

```
\baseclass
```

```
2 %% ----- Class/Formating Adjustment -----
3 %% Adjust the book class to match the requirements
4 %% Set spacing, line and paragraph options
5 %% Set LaTeX builder options (work break penalties etc.)
6 <{*thesis | minithesis | progress | project | report | gdp | gdpsummary}>
7 \def\baseclass{book}
8 </thesis | minithesis | progress | project | report | gdp | gdpsummary>
9 <{*article}>
10 \def\baseclass{article}
11 </article>

12 \DeclareOption*{\PassOptionsToClass{\CurrentOption}{\baseclass}}
```

**\@checkoptions** Before we can process the options we must deal with a small problem. That is, we want to change the default options of the **book** or **article** class to **a4paper** and **11pt** or **12pt** but the macro **\ProcessOptions** used by the **book** or **article** class processes the options in the order specified in the file. Because **a4paper** is the first of the paper sizing options it will be overridden by any user defined option.

But the same is not true of the font size option 11pt or 12pt. To remedy this we define a macro `\checkoptions{⟨default⟩}{⟨option-list⟩}` which checks to see if any options in `⟨option-list⟩` have been specified and if not adds `⟨default⟩` to the option list.

```

13 \def\@checkoptions#1#2{
14   \edef\@curroptions{\@optionlist{\@currname.\@currentx}}
15   \@tempswafalse
16   \@tfor\@this:=#2\do{
17     \@expandtwoargs\in@{,\@this,}{,\@curroptions,}
18     \ifin@ \@tempswatrue \break@tfor \fi
19   }
20   \if@tempswa \else \PassOptionsToClass{#1}{\baseclass}\fi
21 }
```

With this macro at our disposal we can continue to process the options

```

22 <*thesis | minithesis | progress | report | article | gdp | gdpsummary>
23 \@checkoptions{11pt}{{10pt}{11pt}{12pt}}
24 </thesis | minithesis | progress | report | article | gdp | gdpsummary>
25 <*project>
26 \@checkoptions{12pt}{{10pt}{11pt}{12pt}}
27 </project>
28 \PassOptionsToClass{a4paper}{\baseclass}
29 \ProcessOptions\relax
```

and load the book or article document class with A4 as the default paper size.

```
30 \LoadClass{\baseclass}
```

## 4.1 Banner

`\bhrule` Provide a function to produce a banner on the output making the location of the current section simpler.

```

31 \newcommand\bhrule{\typeout{-----}}
32 \newcommand\btypeout[1]{\bhrule\typeout{\space #1}\bhrule}
```

## 4.2 Date

`\today` This macro uses the TeX primitives `\month`, `\day` and `\year` to provide the date of the L<sup>A</sup>T<sub>E</sub>X-run in a suitable format.

```

33 <*thesis>
34 \def\today{\ifcase\month\or
35   January\or February\or March\or April\or May\or June\or
36   July\or August\or September\or October\or November\or December\fi
37   \space \number\year}
38 </thesis>
```

# 5 Document Layout

## 5.1 Font

```
39 %% \usepackage[T1]{fontspec}
```

```

40 % Set font for copyright statement body text
41 \usepackage[defaultsans]{droidsans}
42 % Set a particular style of font for the thesis. A font that has smallcaps
43 \usepackage{mathpazo}
44 %%\usepackage[T1]{fontenc} %This may not be necessary for english only text

```

## 5.2 Spacing

Load the `setspace` package so that spacing can easily be set. The text in all three styles is set to one and a half spacing, paragraphs not indented, and a newline between paragraphs.

```

45 \usepackage{setspace}
46 \thesis | minithesis | progress | project | report | gdp | gdpsummary \onehalfspacing
47 \article \singlespacing
48 \setlength{\parindent}{0pt}
49 \setlength{\parskip}{2.0ex plus0.5ex minus0.2ex}

```

## 5.3 Margins

Load the `vmargin` package to setup the page dimensions.

```

50 \usepackage{vmargin}
51 \thesis | minithesis | progress | project | report | gdp | gdpsummary
52 \setmarginsrb { 1.5in} % left margin
53 { 0.6in} % top margin
54 { 1.0in} % right margin
55 { 0.8in} % bottom margin
56 { 20pt} % head height
57 {0.25in} % head sep
58 { 9pt} % foot height
59 { 0.3in} % foot sep
60 \thesis | minithesis | progress | project | report | gdp | gdpsummary
61 \article
62 \setmarginsrb { 0.8in} % left margin
63 { 0.6in} % top margin
64 { 0.8in} % right margin
65 { 0.8in} % bottom margin
66 { 20pt} % head height
67 {0.25in} % head sep
68 { 9pt} % foot height
69 { 0.3in} % foot sep
70 \article

```

## 5.4 Breaks

Control how pages and lines are broken.

```

71 \raggedbottom
72 \setlength{\topskip}{1\topskip \@plus 5\p@}
73 \doublehyphendemerits=10000 % No consecutive line hyphens.
74 \brokenpenalty=10000 % No broken words across columns/pages.
75 \widowpenalty=9999 % Almost no widows at bottom of page.
76 \clubpenalty=9999 % Almost no orphans at top of page.
77 \interfootnotelinepenalty=9999 % Almost never break footnotes.

```

## 5.5 Fancy Page Headers

Setup the the default fancy page headers with an underlined header containing chapter, name and page number.

```
78 \usepackage{fancyhdr}
79 % Help from https://texblog.org/2007/11/07/headerfooter-in-latex-with-fancyhdr/#comment-4783
80 \fancyhead[LE]{\textrm\thepage}
81 \fancyhead[LO]{\fancyplain{}{\textsl{\rightmark}}}}
82 \fancyhead[RE]{\fancyplain{}{\textsl{\leftmark}}}}
83 \fancyhead[RO]{\textrm\thepage}
84 \chead{}\lfoot{}\rfoot{}\cfoot{}
85 \pagestyle{fancy}
86 \fancypagestyle{plain}{
87   \fancyhf{}
88   \fancyhead[OR]{\thepage}
89   \renewcommand{\headrulewidth}{0pt}
90 }
```

`\chaptermark`    Redefine `chaptermark` and `sectionmark` to set up the correct header name and  
`\sectionmark`    produce a banner on the output making the location of messages simpler.  
`\subsectionmark`    The `\btypeout` command is for console logging where chapters start  
                       `\chapapp` expands to "Chapter" or "Appendix"

```
91 <thesis | minithesis | progress | project | report | gdp>
92 \renewcommand{\chaptermark}[1]{\btypeout{\thechapter.\space #1}\markboth{\chaptername\ \thechapter}{\thechapter}}
93 \renewcommand{\sectionmark}[1]{\markright{\thesection.\hspace{1em}#1}}
94 \renewcommand{\subsectionmark}[1]{\btypeout{\thesection.\hspace{1em}#1}}
95 </thesis | minithesis | progress | project | report | gdp>
96 <article>
97 \renewcommand{\sectionmark}[1]{\btypeout{\thesection.\hspace{1em}#1}\markboth{\thesection.\hspace{1em}#1}}
98 \renewcommand{\subsectionmark}[1]{\btypeout{\thesection.\hspace{1em}#1}}
99 \renewcommand{\subsubsectionmark}[1]{\btypeout{\thesection.\hspace{1em}#1}}
100 </article>
101 \gdpsummary\markboth{GDP Summary Report}{GDP Summary Report}
```

`\cleardoublepage`    Redefine `cleardoublepage` to remove headers from blank pages in twosided documents.

```
102 \def\cleardoublepage{\clearpage\if@twoside \ifodd\c@page\else
103 \hbox{}
104 \thispagestyle{empty}
105 \newpage
106 \if@twocolumn\hbox{}\newpage\fi\fi}
```

`\cleartoeven`    Define `cleartoeven` to remove headers from blank pages and force to even page for appendix or index.

```
107 \def\cleartoeven{\clearpage\if@twoside \ifodd\c@page
108 \hbox{}
109 \thispagestyle{empty}
110 \newpage
111 \if@twocolumn\hbox{}\newpage\fi\fi}
```

## 5.6 Mathematics

Load the `amsmath` packages, so we can do some serious math, and setup the theorem environments.

```

112 %% ----- Figure/Table/Eq/Listing Styling -----
113 %% Set the styling for non text elements of the document
114 \usepackage{amsmath,amsfonts,amssymb,amscd,amsthm,xspace}
115 \theoremstyle{plain}
116 <*thesis | minithesis | progress | project | report | gdp>
117 \newtheorem{example}{Example}[chapter]
118 \newtheorem{theorem}{Theorem}[chapter]
119 </thesis | minithesis | progress | project | report | gdp>
120 <*article | gdpsummary>
121 \newtheorem{example}{Example}[section]
122 \newtheorem{theorem}{Theorem}[section]
123 </article | gdpsummary>
124 \newtheorem{corollary}[theorem]{Corollary}
125 \newtheorem{lemma}[theorem]{Lemma}
126 \newtheorem{proposition}[theorem]{Proposition}
127 \newtheorem{axiom}[theorem]{Axiom}
128 \theoremstyle{definition}
129 \newtheorem{definition}[theorem]{Definition}
130 \theoremstyle{remark}
131 \newtheorem{remark}[theorem]{Remark}

```

## 5.7 Captions

```

\href Load the caption2 package to improve formatting of captions, and provide short
\tref referencing commands.
\eref
\ceref 132 \usepackage[justification=centerlast,font=small,labelfont=sc]{caption}
133 \setlength{\captionmargin}{20pt}
\seref 134 \newcommand{\href}[1]{Figure~\ref{#1}}
\aref 135 \newcommand{\tref}[1]{Table~\ref{#1}}
136 \newcommand{\eref}[1]{Equation~\ref{#1}}
137 \newcommand{\ceref}[1]{Chapter~\ref{#1}}
138 \newcommand{\sref}[1]{Section~\ref{#1}}
139 \newcommand{\aref}[1]{Appendix~\ref{#1}}

```

## 5.8 Float Placement

`\topfraction` Preventing figures from appearing on a page by themselves.  $\text{\LaTeX}$ 's figure placement algorithm is quite biased in favour of putting figures on a page by themselves, instead of on the top of a page with some text below it. Fortunately, the parameters of the algorithm can be changed. The main problem is that  $\text{\LaTeX}$  per default only allows a part of the top of a text-page (70%) to contain figures, and requires at least 20% of a page to be text when text and figures share a page. These parameters should be set to more reasonable values, for example 85% and 10%.

```

140 \renewcommand{\topfraction}{0.85}
141 \renewcommand{\bottomfraction}{.85}
142 \renewcommand{\textfraction}{0.1}
143 \renewcommand{\dbltopfraction}{.85}

```

`\floatpagefraction` This helps, but sometimes L<sup>A</sup>T<sub>E</sub>X puts a figure on a page by itself, although it would fit perfectly well on the top of a page. This happens when the figure will not fit on the page where it was defined. L<sup>A</sup>T<sub>E</sub>X then attempts to put it on a figures-only page before it attempts to put it at the top of the next page. A page may contain figures alone if the figure(s) use at least half the page. To prevent half-empty pages this limit should probably be increased to around 75%.

```
144 \renewcommand{\floatpagefraction}{0.75}
145 \renewcommand{\dblfloatpagefraction}{.75}
```

Be careful not to make `floatpagefraction` larger than `topfraction`, then you risk to produce a figure that can neither go on the top of a text page, nor on a page by itself. If that happens, the figure and all later figures will be postponed until next time a `clearpage` is executed (typically at the end of a chapter or the end of the document). This will also happen if a figure is too large to fit on a page.

```
146 \setcounter{topnumber}{9}
147 \setcounter{bottomnumber}{9}
148 \setcounter{totalnumber}{20}
149 \setcounter{dbltopnumber}{9}
```

## 5.9 Graphics

Load the `graphicx` package, so we can include pictures easily. Load the `epstopdf`, so that eps files are automatically converted to pdf when pdfL<sup>A</sup>T<sub>E</sub>X is used. This requires a version of *epstopdf* to be installed on you system. You can find a windows version at

<http://www.ctan.org/tex-archive/support/epstopdf/epstopdf.exe>.

```
150 \usepackage{graphicx}
151 \usepackage{epstopdf}
```

## 5.10 Subfigures and subtables

Load the `subfigure` package, so we can include subfigures easily.

```
152 \usepackage[scriptsize]{subfigure}
153 \usepackage{booktabs}
154 \usepackage{rotating}
```

## 5.11 Listings

Load the `listings` package, so we can include listings easily.

```
155 \usepackage{listings}
156 % \usepackage{lstpatch}
157 \lstset{captionpos=b,
158         frame=tb,
159         basicstyle=\scriptsize\ttfamily,
160         showstringspaces=false,
161         keepspaces=true}
162 \lstdefinestyle{matlab} {
163     language=Matlab,
164     keywordstyle=\color{blue},
165     commentstyle=\color[rgb]{0.13,0.55,0.13}\em,
166     stringstyle=\color[rgb]{0.7,0,0} }
```

## 5.12 Hyperlinks

Load the `hyperref` package to provide hyperlinks in pdf and dvi documents.

```

167 \usepackage{xcolor}
168 \definecolor{SotRed}{rgb}{0.67,0.07,0.06}
169 \definecolor{SotBlue}{rgb}{0,0.26,0.35}
170 \definecolor{SotGray}{rgb}{0.6,0.6,0.65}
171 \usepackage[pdfpagemode={UseOutlines},bookmarks=true,bookmarksopen=true,
172   bookmarksopenlevel=0,bookmarksnumbered=true,hypertextnames=false,
173   colorlinks,linkcolor={SotBlue},citecolor={SotBlue},urlcolor={SotBlue},
174   pdfstartview={FitV},unicode,breaklinks=true]{hyperref}
175 \pdfstringdefDisableCommands{
176   \let\\\space
177 }

```

## 6 Internal Names

<code>\supervisor</code>	The various elements of the documents are defined as control sequences to make
<code>\examiner</code>	it easy to customize this style for other parts of the University.
<code>\degree</code>	
<code>\authors</code>	178 %% ----- Organisational Structure -----
<code>\addresses</code>	179 \newcommand*{\supervisor}[1]{\def\supname{#1}}
<code>\university</code>	180 \newcommand*{\examiner}[1]{\def\examname{#1}}
<code>\UNIVERSITY</code>	181 \newcommand*{\degree}[1]{\def\degreename{#1}}
<code>\department</code>	182 \newcommand*{\authors}[1]{\def\authornames{#1}}
<code>\DEPARTMENT</code>	183 \newcommand*{\qualifications}[1]{\def\quals{#1}}
<code>\group</code>	184 \newcommand*{\addresses}[1]{\def\addressnames{#1}}
<code>\GROUP</code>	185 \newcommand*{\doi}[1]{\def\doicode{#1}}
<code>\faculty</code>	186 \newcommand*{\orcidid}[1]{\def\orcid{#1}}
<code>\FACULTY</code>	187 \newcommand*{\university}[1]{\def\univname{#1}}
<code>\subject</code>	188 \newcommand*{\UNIVERSITY}[1]{\def\UNIVNAME{#1}}
<code>\keywords</code>	189 \newcommand*{\department}[1]{\def\deptname{#1}}
	190 \newcommand*{\DEPARTMENT}[1]{\def\DEPTNAME{#1}}
	191 \newcommand*{\group}[1]{\def\groupname{#1}}
	192 \newcommand*{\GROUP}[1]{\def\GROUPNAME{#1}}
	193 \newcommand*{\faculty}[1]{\def\facname{#1}}
	194 \newcommand*{\FACULTY}[1]{\def\FACNAME{#1}}
	195 \newcommand*{\subject}[1]{\def\subjectname{#1}}
	196 \newcommand*{\keywords}[1]{\def\keywordnames{#1}}

  

<code>\supname</code>	The internal names of the elements are set to defaults appropriate to the Depart-
<code>\examname</code>	ment of Electronics and Computer Science.
<code>\degreename</code>	By running these commands at the top of your tex file it will overwrite the
<code>\authornames</code>	defaults.
<code>\univname</code>	197 %% ----- Organisational Structure -----
<code>\UNIVNAME</code>	198 \doi{}
<code>\deptname</code>	199 \supervisor {}
<code>\DEPTNAME</code>	200 \examiner {}
<code>\groupname</code>	201 \degree {}
<code>\GROUPNAME</code>	202 \authors {}
<code>\facname</code>	203 \qualifications{}
<code>\FACNAME</code>	204 \orcidid{}
<code>\subjectname</code>	205 \university {\texorpdfstring{\href{http://www.soton.ac.uk}}
<code>\keywordnames</code>	



```

206             {University of Southampton}}
207             {University of Southampton}}
208 \UNIVERSITY  {\MakeUppercase{\univname}}
209 \department  {\texorpdfstring{\href{http://www.ecs.soton.ac.uk}
210             {School of Electronics and Computer Science}}
211             {School of Electronics and Computer Science}}
212 \DEPARTMENT  {\MakeUppercase{\deptname}}
213 \group       {\texorpdfstring{\href{http://cps.ecs.soton.ac.uk}
214             {Cyber Physical Systems Group}}
215             {Cyber Physical Systems Group}}
216 \GROUP       {\MakeUppercase{\groupname}}
217 \faculty     {\texorpdfstring{\href{http://www.feps.soton.ac.uk}
218             {Faculty of Engineering and Physical Science}}
219             {Faculty of Engineering and Physical Science}}
220 \FACULTY     {\MakeUppercase{\facname}}
221 \addresses   {}
222 \subject     {}
223 \keywords    {}

```

## 7 Special Pages

### 7.1 Title Page

```

\maketitle Setup an appropriate title page and pdf strings if we are using pdfLATEX.
           The itleempty has been removed
           Possibly the relax statement also needs to be removed

224 <*thesis | minithesis | progress | project | report | gdp | gdpsummary>}
225 \usepackage{titling}
226 \AtBeginDocument{
227   \hypersetup{pdftitle={\thetitle}}
228   \hypersetup{pdfsubject={\subjectname}}
229   \hypersetup{pdfauthor={\authornames}}
230   \hypersetup{pdfkeywords={\keywordnames}}
231 }
232 \renewcommand\maketitle{
233   \btypeout{Title Page}
234   \thispagestyle{empty}
235   \begin{titlepage}
236     \let\footnotesize\small
237     \let\footnoterule\relax
238     \let\footnote\thanks
239     \setcounter{footnote}{0}
240     \null\vfil
241     \vskip 60\p@
242     \begin{center}
243       \setlength{\parskip}{0pt}
244       {\scshape\LARGE\textbf{\univname}\par}
245       %% TODO: Change all the descriptions to italic like the Thesis one
246 <*thesis | minithesis | progress | project | gdp | gdpsummary>
247       \bigskip
248       {\large \facname \par}
249 </thesis | minithesis | progress | project | gdp | gdpsummary>
250 <*thesis | minithesis | progress | project |

```

```

251         {\large \deptname \par}
252 </thesis | minithesis | progress | project>
253         \vfill
254 < *minithesis>
255         {\large A mini-thesis submitted for transfer from}
256         {\large MPhil to PhD \par}
257 </minithesis>
258 < *progress>
259         {\large A progress report submitted for continuation}
260         {\large towards a PhD \par}
261 </progress>
262 < *project>
263         {\large A project report submitted for the}
264         {\large award of \par \degreename \par}
265 </project>
266 < *gdp>
267         {\large A group design project report submitted for}
268         {\large the award of \par \degreename \par}
269 </gdp>
270 < *gdpsummary>
271         {\large A group design project summary report submitted}
272         {\large for the award of \par \degreename \par}
273 </gdpsummary>
274 < *minithesis | progress | project | gdp | gdpsummary>
275         \vfill
276         {\normalsize Supervisor: \supname \par}
277         {\normalsize Examiner: \examname \par}
278         \vfill
279         \hspace{6mm}\parbox[t][51mm][s]{89mm}{
280         \center
281         \vfill
282         {\large \bf \@title \par}
283         \vfill
284         {\normalsize \textit{by} \textbf{authornames \par}
285         \vfill
286         {\normalsize \@date \par}
287         \vfill
288         }
289         \parbox[t][95mm][s]{89mm}{
290 </minithesis | progress | project | gdp | gdpsummary>
291 < *thesis | report>
292         {\huge \bf \@title \par}
293 }
294         \ifthenelse{\equal{\doicode}{}}{
295         {}
296         {\smallskip DOI: \doicode}
297         \vfill
298         {\LARGE \textit{by} \par}
299         \smallskip
300         {\LARGE \textbf{authornames
301         \ifthenelse{\equal{\quals}{}}{
302         {}
303         {\par\LARGE
304         \quals}

```

```

305     \par}
306     \ifthenelse{\equal{\orcid}{}}{
307     {}
308     {\smallskip
309     ORCID: \href{http://orcid.org/\orcid}{\orcid}}
310
311     \vfill
312 (*thesis)
313     {\large \textit{A thesis for the degree of} \par}
314     {\large \textit{Doctor of Philosophy} \par}
315 \thesis)
316 (*report) {\large \textit{Technical Report} \par}
317     \bigskip
318 \bigskip
319     {\large \facname \par}
320     {\large \deptname \par}
321 \report)
322     \bigskip
323     \bigskip
324     \bigskip
325     {\Large \@date \par}
326     \bigskip
327 \thesis | report)
328     \end{center}
329     \par
330     \@thanks
331     \vfil\null
332 \end{titlepage}
333 \setcounter{footnote}{0}%
334 \global\let\thanks\relax
335 \global\let\maketitle\relax
336 \global\let\@thanks\@empty
337 \global\let\@author\@empty
338 \global\let\@date\@empty
339 \global\let\title\relax
340 \global\let\author\relax
341 \global\let\date\relax
342 \global\let\and\relax
343 \cleardoublepage
344 }
345 \thesis | minithesis | progress | project | report | gdp | gdpsummary)
346 (*article)
347 \if@titlepage
348     \renewcommand\maketitle{
349         \btypeout{Title Page}
350         \markboth{\authornames}{\@title}
351         \begin{titlepage}
352             \thispagestyle{empty}
353             \let\footnotesize\small
354             \let\footnoterule\relax
355             \let \footnote \thanks
356             \null\vfil
357             \vskip 60\p@
358             \begin{center}

```

```

359     {\LARGE \@title \par}
360     \vskip 3em
361     {\large \lineskip .75em
362       \begin{tabular}[t]{c} \authornames \end{tabular}
363     \par}
364     \vskip 1em
365     {\large \lineskip .5em
366       \begin{tabular}[t]{c} \addressnames \end{tabular}
367     \par}
368     \vskip 1.5em
369     {\large \@date \par}
370     \if\keywordnames
371     \else
372       \quotation
373       \vskip 1.5em
374       {\noindent \normalsize
375         \textbf{Keywords:}
376         \textit{\keywordnames}
377       \par}
378       \endquotation
379     \fi
380   \end{center}
381   \par
382   \@thanks
383   \vfil\null
384   \end{titlepage}
385   \setcounter{footnote}{0}
386   \global\let\thanks\relax
387   \global\let\maketitle\relax
388   \global\let\@maketitle\relax
389   \global\let\@thanks\@empty
390   \global\let\@author\@empty
391   \global\let\@date\@empty
392   \global\let\title\relax
393   \global\let\author\relax
394   \global\let\date\relax
395   \global\let\and\relax
396 }
397 \else
398   \renewcommand\maketitle{
399     \btypeout{Title Page}
400     \markboth{\authornames}{\@title}
401     \thispagestyle{empty}
402     \par
403     \begingroup
404       \renewcommand\thefootnote{\@fnsymbol\c@footnote}
405       \def\@makefnmark{
406         \rlap{\@textsuperscript{\normalfont\@thefnmark}}
407       }
408       \long\def\@makefnmark##1{
409         \parindent 1em\noindent \hb@xt@1.8em
410         {\hss\@textsuperscript{\normalfont\@thefnmark}}##1
411       }
412       \if@twocolumn

```

```

413     \ifnum \col@number=\@ne
414         \@maketitle
415     \else
416         \twocolumn[\@maketitle]%
417     \fi
418 \else
419     \newpage
420     % Prevent figures from going at top of page.
421     \global\@topnum\z@
422     \@maketitle
423 \fi
424 \thispagestyle{plain}\@thanks
425 \endgroup
426 \setcounter{footnote}{0}%
427 \global\let\thanks\relax
428 \global\let\maketitle\relax
429 \global\let\@maketitle\relax
430 \global\let\@thanks\@empty
431 \global\let\@author\@empty
432 \global\let\@date\@empty
433 \global\let\title\relax
434 \global\let\author\relax
435 \global\let\date\relax
436 \global\let\and\relax
437 }
438 \def\@maketitle{
439     \newpage
440     \null
441     \vskip 2em
442     \begin{center}
443         \let \footnote \thanks
444         {\LARGE \@title \par}
445         \vskip 1.5em
446         {\large \lineskip .5em
447           \begin{tabular}[t]{c} \authornames \end{tabular}
448           \par}
449         \vskip 0.7em
450         {\large \lineskip .5em
451           \begin{tabular}[t]{c} \addressnames \end{tabular}
452           \par}
453         \vskip 1em
454         {\large \@date}
455     \end{center}
456     \par
457     \vskip 1.5em
458 }
459 \fi
460 \end{article}

```

## 7.2 Abstract Page

`\abstract` Setup an appropriate abstract page.

```

461 <{*thesis | minithesis | progress | project | report | gdp}

```

```

462 \newenvironment{abstract}
463 {
464   \btypeout{Abstract Page}
465   \thispagestyle{empty}
466   \null\vfil
467   \begin{center}
468     \setlength{\parskip}{0pt}
469     {\textsc\normalsize \univname \par}
470     \bigskip
471     {\underline{Abstract} \par}
472     \bigskip
473     {\textsc\normalsize \facname \par}
474     \langle *thesis | minithesis | progress | project | report \rangle
475     {\textsc\normalsize \deptname \par}
476     \langle /thesis | minithesis | progress | project | report \rangle
477     \bigskip
478     \langle *thesis \rangle
479     {\normalsize \underline{Doctor of Philosophy} \par}
480     \langle /thesis \rangle
481     \langle *minithesis \rangle
482     {\normalsize \underline{A mini-thesis submitted for transfer from MPhil to PhD} \par}
483     \langle /minithesis \rangle
484     \langle *progress \rangle
485     {\normalsize \underline{A progress report submitted for continuation towards a PhD} \par}
486     \langle /progress \rangle
487     \langle *project \rangle
488     {\normalsize \underline{A project report submitted for the award of \degreename} \par}
489     \langle /project \rangle
490     \langle *gdp \rangle
491     {\normalsize \underline{A group design project report submitted for the award of \degreename} \par}
492     \langle /gdp \rangle
493     \bigskip
494     {\normalsize \bf \@title \par}
495     \medskip
496     {\normalsize by \authornames \par}
497     \bigskip
498     \end{center}
499 }
500 {
501   \vfil\vfil\vfil\null
502   \cleardoublepage
503 }
504 \langle /thesis | minithesis | progress | project | report | gdp \rangle
505 \langle *article \rangle
506 \if@titlepage
507   \renewenvironment{abstract}{
508     \titlepage
509     \null\vfil
510     \@beginparpenalty\@lowpenalty
511     \begin{center}
512       \bfseries \abstractname
513       \@endparpenalty\@M
514     \end{center}
515     \begin{itshape}

```

```

516     \noindent
517   }
518   {
519     \par
520     \end{itshape}
521     \if\keywordnames
522     \else
523       \quote
524       \vskip 1.5em
525       {\noindent \normalsize
526         \textbf{Keywords:}
527         \textit{\keywordnames}
528       \par}
529       \endquote
530     \fi
531     \vfil\null\endtitlepage
532   }
533 \else
534   \renewenvironment{abstract}{
535     \if@twocolumn
536     \section*{\abstractname}
537     \else
538       \small
539       \begin{center}
540         {\bfseries \abstractname\vspace{-.5em}\vspace{\z@}}
541       \end{center}
542       \quote
543     \fi
544     \begin{itshape}
545   }
546   {
547     \end{itshape}
548     \if\keywordnames
549     \else
550       \vskip 1.5em
551       {\noindent \normalsize
552         \textbf{Keywords:}
553         \textit{\keywordnames}
554       \par}
555     \fi
556     \if@twocolumn\else\endquote\fi
557   }
558 \fi
559 </article>

```

## 7.3 Contents Pages

### 7.3.1 Add to Table of Contents

Ensures numbering for sub-subsections in the table of contents, and provide for 6 levels to appear in toc. Define `addtotoc` to enable adding elements to the toc at chapter level, using a dummy counter to fix bookmarks in pdfL<sup>A</sup>T<sub>E</sub>X.

```

560 <{*thesis | minithesis | progress | project | report | gdp | article}>
561 \addtocounter{secnumdepth}{1}

```

```

562 \setcounter{tocdepth}{6}
563 \newcounter{dummy}
564 \newcommand\addtotoc[1]{
565 \refstepcounter{dummy}
566 \*thesis | minithesis | progress | project | report | gdp>
567 \addcontentsline{toc}{chapter}{#1}}
568 </thesis | minithesis | progress | project | report | gdp>
569 \*article>
570 \addcontentsline{toc}{section}{#1}}
571 </article>

```

### 7.3.2 Table of Contents

`\tableofcontents` Adjust line and paragraph spacing.

```

572 \renewcommand\tableofcontents{
573 \hypersetup{linkcolor={black}}
574 \btypeout{Table of Contents}
575 \begin{spacing}{1}{
576     \setlength{\parskip}{1pt}
577     \if@twocolumn
578         \@restonecoltrue\onecolumn
579     \else
580         \@restonecolfalse
581     \fi
582 \*thesis | minithesis | progress | project | report | gdp>
583     \chapter*{\contentsname
584 </thesis | minithesis | progress | project | report | gdp>
585 \*article>
586     \section*{\contentsname
587 </article>
588         \@mkboth{
589             \MakeUppercase\contentsname}{\MakeUppercase\contentsname}}
590     \@starttoc{toc}
591     \if@restonecol\twocolumn\fi
592 <thesis | minithesis | progress | project | report | gdp> \cleardoublepage
593 } \end{spacing}
594 }

```

### 7.3.3 List of Figures

`\listoffigures` Adjust line and paragraph spacing.

```

595 \renewcommand\listoffigures{
596 \addtotoc{\listfigurename}
597 \begin{spacing}{1}{
598     \setlength{\parskip}{1pt}
599     \if@twocolumn
600         \@restonecoltrue\onecolumn
601     \else
602         \@restonecolfalse
603     \fi
604 \*thesis | minithesis | progress | project | report | gdp>
605     \chapter*{\listfigurename
606 </thesis | minithesis | progress | project | report | gdp>

```



```

607 <*article>
608     \section*{\listfigurename
609 </article>
610     \@mkboth{\MakeUppercase\listfigurename}
611             {\MakeUppercase\listfigurename}}
612     \@starttoc{lof}
613     \if@restonecol\twocolumn\fi
614 <*thesis | minithesis | progress | project | report | gdp>
615     \cleardoublepage
616 </thesis | minithesis | progress | project | report | gdp>
617 }\end{spacing}
618 }

```

### 7.3.4 List of Tables

`\listoftables` Adjust line and paragraph spacing.

```

619 \renewcommand\listoftables{
620 \addtotoc{\listtablename}
621 \begin{spacing}{1}{
622     \setlength{\parskip}{1pt}
623     \if@twocolumn
624         \@restonecoltrue\onecolumn
625     \else
626         \@restonecolfalse
627     \fi
628 <*thesis | minithesis | progress | project | report | gdp>
629     \chapter*{\listtablename
630 </thesis | minithesis | progress | project | report | gdp>
631 <*article>
632     \section*{\listtablename
633 </article>
634     \@mkboth{
635         \MakeUppercase\listtablename}{\MakeUppercase\listtablename}}
636     \@starttoc{lot}
637     \if@restonecol\twocolumn\fi
638 <*thesis | minithesis | progress | project | report | gdp>
639     \cleardoublepage
640 </thesis | minithesis | progress | project | report | gdp>
641 }\end{spacing}
642 }

```

### 7.4 List of Symbols

`\listofsymbols` Provide a `listofsymbols` command to produce a list of symbols,

```

643 <*thesis | minithesis | progress | report | article>
644 \newcommand\listsymbolname{Nomenclature}
645 </thesis | minithesis | progress | report | article>
646 <*project | gdp>
647 \newcommand\listsymbolname{List of Symbols}
648 </project | gdp>
649 \usepackage{longtable}
650 \newcommand\listofsymbols[2]{
651 \btypeout{\listsymbolname}

```

```

652 \addtotoc{\listsymbolname}
653 (*thesis | minithesis | progress | project | report | gdp)
654 \chapter*{\listsymbolname
655 </thesis | minithesis | progress | project | report | gdp>
656 (*article)
657 \section*{\listsymbolname
658 </article>
659 \mkboth{
660 \MakeUppercase\listsymbolname}{\MakeUppercase\listsymbolname}}
661 \begin{longtable}[c]{#1}#2\end{longtable}\par
662 (*thesis | minithesis | progress | project | report | gdp)
663 \cleardoublepage
664 </thesis | minithesis | progress | project | report | gdp>
665 }
666 </thesis | minithesis | progress | project | report | gdp | article>

```

## 7.5 Declaration of Authorship

`\authorshipdeclaration` Taken from Modified Template by Lovell TODO: Complete reference TODO: Consider a separate dissertation class for non technical? TODO: Provide extra argument for putting the date into the Declaration TODO: make slightly different declarations for theses and projects

This Authorship macro takes one argument for the case of People who have published part of their thesis already (perhaps in a paper).

xifthen else package used for the isempty command

```

667 (*thesis | minithesis | progress | report | article)
668 \usepackage{xifthen}
669 \newcommand\authorshipdeclaration[1]{
670 \btypeout{Declaration of Authorship}
671 \addtotoc{Declaration of Authorship}
672 \thispagestyle{plain}
673 \null\vfil
674 \vskip 60\p@
675 \begin{center}{\Large\bf Declaration of Authorship \par}\end{center}
676 I declare that this thesis and the work presented in it is my own and has
677 been generated by me as the result of my own original research.
678
679 I confirm that:
680
681 \begin{enumerate}
682 \item This work was done wholly or mainly while in candidature for a research degree at this U
683 \item Where any part of this thesis has previously been submitted for a degree or any other q
684 \item Where I have consulted the published work of others, this is always clearly attributed;
685 \item Where I have quoted from the work of others, the source is always given. With the except
686 \item I have acknowledged all main sources of help;
687 \item Where the thesis is based on work done by myself jointly with others, I have made clear
688
689 \ifthenelse{\isempty{#1}}
690 {\item None of this work has been published before submission}
691 {\item Parts of this work have been published as: #1}
692 \end{enumerate}
693
694 \vspace{15.0mm}

```

```

695 \begin{minipage}[t]{0.7\textwidth}
696   Signed:.....
697 \end{minipage}%
698 \begin{minipage}[t]{0.3\textwidth}
699   Date:.....
700 \end{minipage}
701 \vfil\vfil\null
702 \cleardoublepage
703 }
704 </thesis | minithesis | progress | report | article>

```

## 7.6 Copyright Statement

```

\copyrightDeclaration This standard Copyright statement is to be included for a theis submission to
University of Southampton Digital Repository

705 (*thesis)
706 \usepackage[export]{adjustbox} % for Soton logo alignment
707 \newcommand\copyrightDeclaration[1]{
708
709 \btypeout{Copyright declaration}
710 \thispagestyle{plain}
711
712 \hspace{-1.5in}\hspace{2.5cm}\begin{minipage}{17cm}
713 \null\vfil
714 \includegraphics[width=6cm,right]{ecsUoSLogo.png}
715
716 \vskip 60\p@
717 \begin{center}{\selectfont\huge
718 \textcolor{SotGray}{University of~Southampton~Research~Repository}\par}
719 \end{center}
720 \vspace{1cm}
721
722 {\fontfamily{fds}\selectfont
723
724 \noindent Copyright \textcopyright~ and Moral Rights for this thesis and, where
725 applicable, any accompanying data are retained by the author and/or other
726 copyright owners. A copy can be downloaded for personal non-commercial research
727 or study, without prior permission or charge. This thesis and the accompanying
728 data cannot be reproduced or quoted extensively from without first obtaining
729 permission in writing from the copyright holder/s. The content of the thesis
730 and accompanying research data (where applicable) must not be changed in any
731 way or sold commercially in any format or medium without the formal permission
732 of the copyright holder/s.
733
734 \vspace{0.5cm}
735
736 When referring to this thesis and any accompanying data, full bibliographic
737 details must be given, e.g.
738
739 \vspace{0.5cm}
740
741 Thesis: Author (Year of Submission) "Full thesis title", University of
742 Southampton, name of the University Faculty or School or Department,

```

```

743 PhD Thesis, pagination.
744
745 \vspace{0.5cm}
746
747 Data: Author (Year) Title. URI [dataset]}
748 \end{minipage}
749 \vfil\vfil\null
750 \cleardoublepage
751 }
752
753 \usepackage{lastpage} % counts the full number of pages
754
755 </thesis>

```

## 7.7 Acknowledgements

`\acknowledgements` Thank someone!

```

756 \newcommand\acknowledgements[1]{
757 \btypeout{Acknowledgements}
758 \addtotoc{Acknowledgements}
759 <{*thesis | minithesis | progress | project | report | gdp}
760 \thispagestyle{plain}
761 \null\vfil
762 \vskip 60\p@
763 \begin{center}{\Large\bf Acknowledgements \par}\end{center}
764 {\normalsize #1}
765 \vfil\vfil\null
766 \cleardoublepage
767 </thesis | minithesis | progress | project | report | gdp}
768 <{*article}
769 \section*{Acknowledgements}
770 {\normalsize #1}
771 </article}
772 }

```

## 7.8 Dedicatory

`\dedicatory` Dedicate the document to someone!

```

773 \newcommand\dedicatory[1]{
774 \btypeout{Dedicatory}
775 <{*thesis | minithesis | progress | project | report | gdp}
776 \thispagestyle{plain}
777 \null\vfil
778 \vskip 60\p@
779 \begin{center}{\Large \sl #1}\end{center}
780 \vfil\null
781 \cleardoublepage
782 </thesis | minithesis | progress | project | report | gdp}
783 }

```

## 8 Parts

`\frontmatter` Modify frontmatter.

```
784 \begin{article}
785 \newcommand\frontmatter{ }
786 \end{article}
```

`\mainmatter` Modify mainmatter.

```
787 \begin{article}
788 \newcommand\mainmatter{ }
789 \end{article}
```

`\backmatter` Modify backmatter to add the bibliography to the table of contents.

```
790 \begin{thesis | minithesis | progress | project | report | gdp}
791 \renewcommand\backmatter{
792   \if@openright
793     \cleardoublepage
794   \else
795     \clearpage
796   \fi
797   \addtotoc{\bibname}
798   \btypeout{\bibname}
799   \@mainmatterfalse}
800 \end{thesis | minithesis | progress | project | report | gdp}
801 \begin{article}
802 \newcommand\bibname{References}
803 \newcommand\backmatter{
804   \addtotoc{\bibname}
805   \btypeout{\bibname}
806 }
807 \end{article}

808 \begin{thesis | minithesis | progress | project | report | article | gdp | gdpsummary}
```

## 9 Example Documents

```
809 \begin{testthesis}
810 \documentclass{ecsthesis}      % Use the Thesis Style
811 \end{testthesis}
812 \begin{testminithesis}
813 \documentclass{ecsminithesis} % Use the minithesis Style
814 \end{testminithesis}
815 \begin{testprogress}
816 \documentclass{ecsprogress}    % Use the progress Style
817 \end{testprogress}
818 \begin{testproject}
819 \documentclass{ecsproject}     % Use the Project Style
820 \end{testproject}
821 \begin{testreport}
822 \documentclass{ecsreport}      % Use the Report Style
823 \end{testreport}
824 \begin{testarticle}
```

```

825 \documentclass{ecsaarticle}      % Use the Article Style
826 \end{document}
827 \begin{document}
828 \documentclass{ecsgdp}           % Use the GDP Report Style
829 \end{document}
830 \begin{document}
831 \documentclass{ecsgdpsummary}     % Use the GDP Summary Report Style
832 \end{document}
833 \begin{document}
834 \graphicspath{{../Figures/}}     % Location of your graphics files
835 \usepackage{natbib}              % Use Natbib style for the refs.
836 \hypersetup{colorlinks=true}     % Set to false for black/white printing
837 \input{Definitions}              % Include your abbreviations
838 %% -----
839 %% -----THESIS/DOC INFORMATION -----
840 \title{An Investigation into \dots}
841 \author{\texorpdfstring
842 {\href{mailto:S.R.Gunn@ecs.soton.ac.uk}{Steve R. Gunn}}
843 {Steve R. Gunn}}
844 {}
845 \addresses{\groupname\\deptname\\univname}
846 \date{\today}
847 \begin{document}
848 \supervisor{Mr Beavis}
849 \examiner{Dr Butthead}
850 \end{document}
851 \begin{document}
852 \degree{BEng Electronic Engineering}
853 \end{document}
854 \begin{document}
855 \degree{Master of Engineering}
856 \end{document}
857 %% Optional Fields
858 \begin{document}
859 \testthesis
860 \orcidid{0000-0002-1825-0097}
861 \doi{10.1002/0470841559.ch1}
862 \end{document}
863 \subject{}
864 \keywords{}
865
866 \begin{document}
867 %% ----- FRONT MATTER ORGANISATION -----
868 \begin{document}
869 \pagenumbering{gobble} % removes page number
870 \copyrightDeclaration{} % !!! Comment this line when printing the hardcopy !!!
871 \end{document}
872 \frontmatter
873 \maketitle
874 \begin{document}
875 \testthesis
876 \begin{abstract}
877 This work is all about \dots
878 \end{abstract}

```

```

879 <*testthesis | testminithesis | testprogress | testproject | testreport | testgdp>
880 \tableofcontents
881 \listoffigures
882 \listoftables
883 %% The List of listings does not, by default, appear in the ToC, so....
884 \addtotoc{List of Listings}
885 \lstlistoflistings
886 </testthesis | testminithesis | testprogress | testproject | testreport | testgdp>
887 \listofsymbols{ll}{\$w\$ & The weight vector}
888 </testthesis | testminithesis | testprogress | testproject | testreport | testarticle | testgdp>
889 <*testthesis | testminithesis | testproject | testreport | testgdp>
890 %% ----- AUTHORSHIP DECLARATION/ ACKNOW. / DEDICATORY -----
891 %% Either include citations like below (as many as required spaced with commas or 'and').
892 \authorshipdeclaration{\citep{Gunn:2001:pdflatex}, \citep{Lovell:2011:updated} and \citep{Gunn:2011:updated}}
893 %% Or state no citations like below
894 %% \authorshipdeclaration{}
895 %% -----
896 \acknowledgements{Thanks to no one.}
897 \dedicatory{To \dots}
898 </testthesis | testminithesis | testproject | testreport | testgdp>
899 <*testthesis | testminithesis | testprogress | testproject | testreport | testarticle | testgdp | testgdpsummary>
900 \mainmatter
901 %% ----- MAIN MATTER (CONTENT) -----
902 </testthesis | testminithesis | testprogress | testproject | testreport | testarticle | testgdp | testgdpsummary>
903 <*testthesis | testminithesis | testprogress | testproject | testreport | testgdp>
904 \include{Introduction}
905 \include{Conclusions}
906 \begin{lstlisting}[caption=Without a title it doesn't appear in the table]
907 This is a test listing
908
909 It has several lines
910 That
911 say not much at all
912 \end{lstlisting}
913 \appendix
914 \include{AppendixA}
915 \backmatter
916 \bibliographystyle{ecs}
917 \bibliography{ECS}
918 </testthesis | testminithesis | testprogress | testproject | testreport | testgdp>
919 <*testgdpsummary>
920 \section*{Introduction}
921 \section*{Objectives}
922 \section*{Resources}
923 \section*{Constraints}
924 \section*{Approaching the task}
925 \section*{Team Organisation}
926 \section*{Important Results}
927 \section*{Conclusions}
928 \section*{Recommendations}
929 </testgdpsummary>
930 <*introduction>
931 \chapter{Introduction} \label{Chapter:Introduction}
932 </introduction>

```

```

933 <*testarticle>
934 \section{Introduction} \label{Section:Introduction}
935 </testarticle>
936 <*introduction | testarticle>
937 You probably found all the files from \cite{Gunn:2001:pdflatex}.
938 \tref{Table:tabex} illustrates the results of my work.
939 \begin{table}[!htb]
940   \centering
941   \begin{tabular}{cc}
942     \toprule
943     \textbf{Training Error} & \textbf{Testing Error}\\
944     \midrule
945     0 &  $\infty$ 
946     \bottomrule
947   \end{tabular}
948   \caption{The Results}
949   \label{Table:tabex}
950 \end{table}
951
952 \fref{Figure:figex} shows why this is the case.
953 \begin{figure}[!htb]
954   \centering
955   \includegraphics[width=8cm]{figure}
956   \caption{A colourful picture.}
957   \label{Figure:figex}
958 \end{figure}
959
960 This page shows you a subfigure example in \fref{Figure:figsubex}.
961 \begin{figure}[!htb]
962   \centering
963   \subfigure[The left caption]{
964     \includegraphics[width=4.2cm]{figure}
965     \label{Figure:figsubex:left}
966   }
967   \subfigure[The right caption]{
968     \includegraphics[width=4.2cm]{figure}
969     \label{Figure:figsubex:right}
970   }
971   \caption{A doubly colourful picture.}
972   \label{Figure:figsubex}
973 \end{figure}
974 Lorem ipsum dolor sit amet, consectetur adipiscing elit. Donec rutrum sodales ligula, ac aliquam
975
976 Nulla molestie velit sed dui ullamcorper viverra. Fusce placerat vulputate lacus eu consequat.
977
978 Nam egestas felis euismod erat tincidunt ornare. Nulla hendrerit tempor purus ac consequat. Aliquam
979
980 Pellentesque sodales lobortis feugiat. Vivamus volutpat mauris id odio aliquam maximus sed sit
981
982 Donec vitae massa nisi. Praesent sed sollicitudin urna. Suspendisse vitae cursus tortor. In egestas
983 </introduction | testarticle>
984 <*conclusions>
985 \chapter{Conclusions} \label{Chapter: Conclusions}
986 </conclusions>

```



```

987 <*testarticle>
988 %% -----
989 \section{Conclusions} \label{Section: Conclusions}
990 </testarticle>
991 <*conclusions | testarticle>
992 It works.
993 </conclusions | testarticle>
994 <*testarticle>
995 \acknowledgements{Thanks to no one.}
996 \backmatter
997 \bibliographystyle{ecs}
998 \bibliography{ECS}
999 \appendix
1000 </testarticle>
1001 <*appendix | testarticle>
1002 <*appendix>
1003 \chapter{Stuff} \label{Chapter:Stuff}
1004 </appendix>
1005 <*testarticle>
1006 %% -----
1007 \section{Stuff} \label{Section:Stuff}
1008 </testarticle>
1009 The following gets in the way of the text....
1010 </appendix | testarticle>
1011 <*testthesis | testminithesis | testprogress | testproject | testreport | testarticle | testgdp | testgdpsummary>
1012 \end{document}
1013 %% -----
1014 </testthesis | testminithesis | testprogress | testproject | testreport | testarticle | testgdp | testgdpsummary>

```

## 9.1 Example Figure

```

1015 <*figure>
1016 %%BoundingBox: 0 150 600 650
1017 %%EndComments
1018 0.0 setlinewidth
1019 /length 0.1 def
1020 /width 0.02 def
1021 /hsvcircle {
1022   gsave
1023     /h 0.0 def
1024     0 4 360 {
1025       pop
1026       gsave
1027         0.5 0.0 translate
1028         newpath
1029         0.0 0.0 moveto
1030         length 0.0 lineto
1031         length width lineto
1032         0.0 width lineto
1033         closepath
1034         h 1.0 1.0 sethsbcolor
1035         fill
1036       grestore
1037       /h h 4 360 div add def
1038       4 rotate

```

```

1039     } for
1040 grestore
1041 } def
1042 0.0 setlinewidth
1043 0.0 setgray
1044 300 400 translate
1045 500 500 scale
1046 30 rotate
1047 1.0 0.7 scale
1048 -30 rotate
1049 hsvcircle
1050 0.8 0.8 scale
1051 hsvcircle
1052 0.8 0.8 scale
1053 hsvcircle
1054 0.8 0.8 scale
1055 hsvcircle
1056 0.8 0.8 scale
1057 hsvcircle
1058 0.8 0.8 scale
1059 hsvcircle
1060 0.8 0.8 scale
1061 hsvcircle
1062 showpage
1063 </figure>

```

## 9.2 Definitions File

```

1064 (*definitions)
1065 \newcommand{\BibTeX}{\rm B\kern-.05em{\sc i\kern-.025em b}\kern-.08em T\kern-.1667em\lower.7
1066
1067 %% People
1068 \newcounter{address}
1069 \setcounter{address}{1}
1070 \renewcommand{\theaddress}{\textsuperscript{\fnsymbol{address}}}
1071 \newcommand{address}[1]{\refstepcounter{address}\theaddress#1\}
1072 \newcommand{Name}[3]{\texorpdfstring{\href{mailto:#3}{#2}#1}{#2}\xspace}
1073 \newcommand{SteveRGunn}[1]{\Name{#1}{Steve R. Gunn}{S.R.Gunn@ecs.soton.ac.uk}}
1074
1075 %% Dingbats
1076 \newcommand{tick}{\ding{51}}
1077 \newcommand{cross}{\ding{55}}
1078
1079 %% Calculus
1080 \newcommand{pd}[2]{\ensuremath{\frac{\partial #1}{\partial #2}}\xspace}
1081 \newcommand{fd}[2]{\ensuremath{\frac{d #1}{d #2}}\xspace}
1082 \newcommand{dint}{\ensuremath{\int\!\!\!\int}\xspace}
1083 \newcommand{tint}{\ensuremath{\int\!\!\!\int\!\!\!\int}\xspace}
1084
1085 %% Math Sets
1086 \newcommand{Q}[1]{\ensuremath{\mathbb{#1}}\xspace}
1087 \newcommand{R}{\mathbb{R}}
1088
1089 %% Matrix, Vector
1090 \newcommand{V}[1]{\ensuremath{\boldsymbol{#1}}\xspace}

```

```

1091 \newcommand{\M}[1]{\ensuremath{\boldsymbol{\#1}}\xspace}
1092 \newcommand{\0}{\V{0}}
1093 \newcommand{\1}{\V{1}}
1094 \newcommand{\I}{\M{I}}
1095
1096 %% Math Functions
1097 \newcommand{\F}[1]{\ensuremath{\mathrm{\#1}}\xspace}
1098 \newcommand{\sgn}{\F{sgn}}
1099 \newcommand{\tr}{\F{trace}}
1100 \newcommand{\diag}{\F{diag}}
1101
1102 %% Math Names
1103 \newcommand{\N}[1]{\ensuremath{\mathit{\#1}}\xspace}
1104
1105 %% Data
1106 \newcommand{\mc}[1]{\ensuremath{\mathcal{\#1}}\xspace}
1107 \newcommand{\Hyp}{\mc{H}}
1108 \newcommand{\D}{\mc{D}}
1109
1110 %% Kernel
1111 \newcommand{\K}{\M{K}}
1112 \newcommand{\eins}{\texorpdfstring{\ensuremath{\epsilon}}{\textepsilon}-insensitive\xspace}
1113 \newcommand{\e}{\ensuremath{\epsilon}\xspace}
1114 \newcommand{\Bxi}{\ensuremath{\boldsymbol{\xi}}\xspace}
1115 \newcommand{\Kanova}{\ensuremath{\mathit{K}_{ANOVA}}\xspace}
1116 \newcommand{\Kspline}{\ensuremath{\mathit{K}_{spline}}\xspace}
1117
1118 %% Bayesian
1119 \newcommand{\MP}{\ensuremath{\mathit{\scriptscriptstyle M}\hspace{-1.5pt}P}\xspace}
1120 \newcommand{\ML}{\ensuremath{\mathit{\scriptscriptstyle M}\hspace{-1.5pt}L}\xspace}
1121 \newcommand{\Qw}{\ensuremath{Q_{\w}(\w)}\xspace}
1122 \newcommand{\Qa}{\ensuremath{Q_{\Ba}(\Ba)}\xspace}
1123 \newcommand{\Qb}{\ensuremath{Q_{\beta}(\beta)}\xspace}
1124 \newcommand{\wMPab}{\ensuremath{w_{\MP|\bar{\Ba},\bar{\beta}}}\xspace}
1125 \newcommand{\wMP}{\ensuremath{w_{\MP}}\xspace}
1126 \newcommand{\yMP}{\ensuremath{y_{\MP}}\xspace}
1127 \newcommand{\BaMP}{\ensuremath{\Ba_{\hspace{1pt}\MP}}\xspace}
1128 \newcommand{\aMP}{\ensuremath{\alpha_{\hspace{1pt}\MP}}\xspace}
1129 \newcommand{\bMP}{\ensuremath{\beta_{\hspace{1pt}\MP}}\xspace}
1130 \newcommand{\Sab}{\ensuremath{M_{\Sigma}_{\bar{\Ba},\bar{\beta}}}\xspace}
1131 \newcommand{\Ba}{\ensuremath{\boldsymbol{\alpha}}\xspace}
1132 \newcommand{\Bb}{\ensuremath{\boldsymbol{\beta}}\xspace}
1133 \newcommand{\Bm}{\ensuremath{\boldsymbol{\mu}}\xspace}
1134 \newcommand{\BL}{\ensuremath{\boldsymbol{\Lambda}}\xspace}
1135 \newcommand{\BPhi}{\ensuremath{\boldsymbol{\Phi}}\xspace}
1136 \newcommand{\SMP}{\ensuremath{M_{\Sigma}_{\MP}}\xspace}
1137
1138 \newcommand{\Pa}{\ensuremath{P(\alpha|\mathcal{H})}\xspace}
1139 \newcommand{\Pb}{\ensuremath{P(\beta|\mathcal{H})}\xspace}
1140 \newcommand{\Pab}{\ensuremath{P(\alpha,\beta|\mathcal{H})}\xspace}
1141 \newcommand{\Pw}{\ensuremath{P(\w|\mathcal{H})}\xspace}
1142 \newcommand{\PD}{\ensuremath{P(\D|\mathcal{H})}\xspace}
1143 \newcommand{\PwIa}{\ensuremath{P(\w|\alpha,\mathcal{H})}\xspace}
1144 \newcommand{\PDIwb}{\ensuremath{P(\D|\w,\beta,\mathcal{H})}\xspace}

```

```

1145 \newcommand{\PDwab}{\ensuremath{P(\mathcal{D},\mathcal{W},\mathcal{A},\mathcal{B})}}\xspace
1146 \newcommand{\PDIw}{\ensuremath{P(\mathcal{D}|\mathcal{W},\mathcal{A})}}\xspace
1147 \newcommand{\PwID}{\ensuremath{P(\mathcal{W}|\mathcal{D},\mathcal{A})}}\xspace
1148 \newcommand{\PwabID}{\ensuremath{P(\mathcal{W},\mathcal{A},\mathcal{B}|\mathcal{D})}}\xspace
1149
1150 \newcommand{\PanH}{\ensuremath{P(\mathcal{A})}}\xspace
1151 \newcommand{\PbnH}{\ensuremath{P(\mathcal{B})}}\xspace
1152 \newcommand{\PabnH}{\ensuremath{P(\mathcal{A},\mathcal{B})}}\xspace
1153 \newcommand{\PwnH}{\ensuremath{P(\mathcal{W})}}\xspace
1154 \newcommand{\PDnH}{\ensuremath{P(\mathcal{D})}}\xspace
1155 \newcommand{\PwIaH}{\ensuremath{P(\mathcal{W}|\mathcal{A})}}\xspace
1156 \newcommand{\PDIwbH}{\ensuremath{P(\mathcal{D}|\mathcal{W},\mathcal{B})}}\xspace
1157 \newcommand{\PDwabnH}{\ensuremath{P(\mathcal{D},\mathcal{W},\mathcal{B},\mathcal{A})}}\xspace
1158 \newcommand{\PDIwnH}{\ensuremath{P(\mathcal{D}|\mathcal{W})}}\xspace
1159 \newcommand{\PwIDnH}{\ensuremath{P(\mathcal{W}|\mathcal{D})}}\xspace
1160 \newcommand{\PwabIDnH}{\ensuremath{P(\mathcal{W},\mathcal{A},\mathcal{B}|\mathcal{D})}}\xspace
1161
1162 \newcommand{\PDwBab}{\ensuremath{P(\mathcal{D},\mathcal{W},\mathcal{B},\mathcal{A}|\mathcal{H})}}\xspace
1163 \newcommand{\PwIBa}{\ensuremath{P(\mathcal{W}|\mathcal{B},\mathcal{A})}}\xspace
1164 \newcommand{\PBab}{\ensuremath{P(\mathcal{B},\mathcal{A}|\mathcal{H})}}\xspace
1165 \newcommand{\PwBabID}{\ensuremath{P(\mathcal{W},\mathcal{B},\mathcal{A}|\mathcal{D},\mathcal{H})}}\xspace
1166
1167 \newcommand{\PBanH}{\ensuremath{P(\mathcal{B})}}\xspace
1168 \newcommand{\PwIBanH}{\ensuremath{P(\mathcal{W}|\mathcal{B})}}\xspace
1169
1170 %% Snakes
1171 \newcommand{\Esnake}{\ensuremath{\mathit{E}_{\text{snake}}}}\xspace
1172 \newcommand{\Eimage}{\ensuremath{\mathit{E}_{\text{image}}}}\xspace
1173 \newcommand{\Econt}{\ensuremath{\mathit{E}_{\text{cont}}}}\xspace
1174 \newcommand{\Ecurv}{\ensuremath{\mathit{E}_{\text{curv}}}}\xspace
1175 \newcommand{\Eint}{\ensuremath{\mathit{E}_{\text{int}}}}\xspace
1176 \newcommand{\Eext}{\ensuremath{\mathit{E}_{\text{ext}}}}\xspace
1177 \newcommand{\Eterm}{\ensuremath{\mathit{E}_{\text{term}}}}\xspace
1178 \newcommand{\Eline}{\ensuremath{\mathit{E}_{\text{line}}}}\xspace
1179 \newcommand{\Edge}{\ensuremath{\mathit{E}_{\text{edge}}}}\xspace
1180 \newcommand{\Econ}{\ensuremath{\mathit{E}_{\text{con}}}}\xspace
1181 \newcommand{\Eangle}{\ensuremath{\mathit{E}_{\text{angle}}}}\xspace
1182 \newcommand{\Elshape}{\ensuremath{\mathit{E}_{\text{lshape}}}}\xspace
1183 \newcommand{\Eedgedir}{\ensuremath{\mathit{E}_{\text{edgedir}}}}\xspace
1184 \newcommand{\Emodel}{\ensuremath{\mathit{E}_{\text{model}}}}\xspace
1185 \newcommand{\wte}{\ensuremath{\mathit{w}_{\text{term}}}}\xspace
1186 \newcommand{\wli}{\ensuremath{\mathit{w}_{\text{line}}}}\xspace
1187 \newcommand{\wed}{\ensuremath{\mathit{w}_{\text{edge}}}}\xspace
1188 \newcommand{\wco}{\ensuremath{\mathit{w}_{\text{con}}}}\xspace
1189
1190
1191 %% Environments
1192 \newcounter{alg}
1193 \newenvironment{algorithm}[1]
1194 {
1195     \stepcounter{alg}
1196     \begin{table}[htb]
1197     \centering
1198     \begin{tabular}[t]{l}

```

```

1199 \hline&\
1200 \multicolumn{2}{l}{\bf Algorithm \arabic{alg}: #1}\&\
1201 } {
1202 &\
1203 \hline
1204 \end{tabular}
1205 \end{table}
1206 }
1207 </definitions>

```

### 9.3 References File

```

1208 <*references>
1209 @MISC{Gunn:2001:pdflatex,
1210   author = {S.R. Gunn},
1211   title = {PDFLaTeX Instructions},
1212   year = {2001},
1213   url = {http://www.ecs.soton.ac.uk/~srg/softwaretools/document/}
1214 }
1215 @MISC{Lovell:2011:updated,
1216   author = {C. J. Lovell},
1217   title = {Updated templates},
1218   year = {2011}
1219 }
1220 @MISC{Gunn:2011:updated2,
1221   author = {S.R. Gunn and C. J. Lovell},
1222   title = {Updated templates reference 2},
1223   year = {2011}
1224 }
1225
1226 </references>

```

### 9.4 Bibliography Style File

```

1227 <*bst>
1228 %% File: 'ecs.bst'
1229 %% A modification of 'plainnat.bst' for use with natbib package
1230 %%
1231 %% Copyright 1993-1999 Patrick W Daly
1232 %% Max-Planck-Institut f\ur Aeronomie
1233 %% Max-Planck-Str. 2
1234 %% D-37191 Katlenburg-Lindau
1235 %% Germany
1236 %% E-mail: daly@linmpi.mpg.de
1237 %%
1238 %% This program can be redistributed and/or modified under the terms
1239 %% of the LaTeX Project Public License Distributed from CTAN
1240 %% archives in directory macros/latex/base/lppl.txt; either
1241 %% version 1 of the License, or any later version.
1242 %%
1243 %% Includes field URL for Internet addresses
1244 %%
1245 ENTRY
1246 { address
1247   author
1248   booktitle

```

```

1249     chapter
1250     edition
1251     editor
1252     howpublished
1253     institution
1254     isbn
1255     issn
1256     journal
1257     key
1258     month
1259     note
1260     number
1261     organization
1262     pages
1263     publisher
1264     school
1265     series
1266     title
1267     type
1268     url
1269     volume
1270     year
1271 }
1272 {}
1273 { label extra.label sort.label short.list }
1274
1275 INTEGERS { output.state before.all mid.sentence after.sentence after.block }
1276
1277 FUNCTION {init.state.consts}
1278 { #0 'before.all :=
1279   #1 'mid.sentence :=
1280   #2 'after.sentence :=
1281   #3 'after.block :=
1282 }
1283
1284 STRINGS { s t }
1285
1286 FUNCTION {output.nonnull}
1287 { 's :=
1288   output.state mid.sentence =
1289     { ", " * write$ }
1290     { output.state after.block =
1291       { add.period$ write$
1292         newline$
1293         "\newblock " write$
1294       }
1295       { output.state before.all =
1296         'write$
1297         { add.period$ " " * write$ }
1298         if$
1299       }
1300     if$
1301     mid.sentence 'output.state :=
1302 }

```

```

1303   if$
1304   s
1305 }
1306
1307 FUNCTION {output}
1308 { duplicate$ empty$
1309   'pop$
1310   'output.nonnull
1311   if$
1312 }
1313
1314 FUNCTION {output.check}
1315 { 't :=
1316   duplicate$ empty$
1317   { pop$ "empty " t * " in " * cite$ * warning$ }
1318   'output.nonnull
1319   if$
1320 }
1321
1322 FUNCTION {fin.entry}
1323 { add.period$
1324   write$
1325   newline$
1326 }
1327
1328 FUNCTION {new.block}
1329 { output.state before.all =
1330   'skip$
1331   { after.block 'output.state := }
1332   if$
1333 }
1334
1335 FUNCTION {new.sentence}
1336 { output.state after.block =
1337   'skip$
1338   { output.state before.all =
1339     'skip$
1340     { after.sentence 'output.state := }
1341     if$
1342   }
1343   if$
1344 }
1345
1346 FUNCTION {not}
1347 { { #0 }
1348   { #1 }
1349   if$
1350 }
1351
1352 FUNCTION {and}
1353 { 'skip$
1354   { pop$ #0 }
1355   if$
1356 }

```

```

1357
1358 FUNCTION {or}
1359 {   { pop$ #1 }
1360     'skip$
1361   if$
1362 }
1363
1364 FUNCTION {new.block.checka}
1365 { empty$
1366   'skip$
1367   'new.block
1368   if$
1369 }
1370
1371 FUNCTION {new.block.checkb}
1372 { empty$
1373   swap$ empty$
1374   and
1375   'skip$
1376   'new.block
1377   if$
1378 }
1379
1380 FUNCTION {new.sentence.checka}
1381 { empty$
1382   'skip$
1383   'new.sentence
1384   if$
1385 }
1386
1387 FUNCTION {new.sentence.checkb}
1388 { empty$
1389   swap$ empty$
1390   and
1391   'skip$
1392   'new.sentence
1393   if$
1394 }
1395
1396 FUNCTION {field.or.null}
1397 { duplicate$ empty$
1398   { pop$ "" }
1399   'skip$
1400   if$
1401 }
1402
1403 FUNCTION {emphasize}
1404 { duplicate$ empty$
1405   { pop$ "" }
1406   { "{\em " swap$ * "}" * }
1407   if$
1408 }
1409
1410 INTEGERS { nameptr namesleft numnames }

```



```

1411
1412 FUNCTION {format.names}
1413 { 's :=
1414   #1 'nameptr :=
1415   s num.names$ 'numnames :=
1416   numnames 'namesleft :=
1417   { namesleft #0 > }
1418   { s nameptr "{ff~}{vv~}{ll}{, jj}" format.name$ 't :=
1419     nameptr #1 >
1420     { namesleft #1 >
1421       { ", " * t * }
1422       { numnames #2 >
1423         { ", " * }
1424         'skip$
1425         if$
1426         t "others" =
1427         { " et~al." * }
1428         { " and " * t * }
1429         if$
1430       }
1431       if$
1432     }
1433     't
1434     if$
1435     nameptr #1 + 'nameptr :=
1436     namesleft #1 - 'namesleft :=
1437   }
1438   while$
1439 }
1440
1441 FUNCTION {format.key}
1442 { empty$
1443   { key field.or.null }
1444   { "" }
1445   if$
1446 }
1447
1448 FUNCTION {format.authors}
1449 { author empty$
1450   { "" }
1451   { author format.names }
1452   if$
1453 }
1454
1455 FUNCTION {format.editors}
1456 { editor empty$
1457   { "" }
1458   { editor format.names
1459     editor num.names$ #1 >
1460     { ", editors" * }
1461     { ", editor" * }
1462     if$
1463   }
1464   if$

```

```

1465 }
1466
1467 FUNCTION {format.isbn}
1468 { isbn empty$
1469   { "" }
1470   { new.block "ISBN " isbn * }
1471   if$
1472 }
1473
1474 FUNCTION {format.issn}
1475 { issn empty$
1476   { "" }
1477   { new.block "ISSN " issn * }
1478   if$
1479 }
1480
1481 %FUNCTION {format.url}
1482 %{ url empty$
1483 %   { "" }
1484 %   { new.block "URL \url{" url * "}" * }
1485 %   if$
1486 %}
1487 %
1488 %FUNCTION {format.title}
1489 %{ title empty$
1490 %   { "" }
1491 %   { title "t" change.case$ }
1492 %   if$
1493 %}
1494 FUNCTION {format.url}
1495 { ""
1496 }
1497
1498 FUNCTION {format.title}
1499 { title empty$
1500   { "" }
1501   { url empty$
1502     { title "t" change.case$ }
1503     { "\href{" url * "}{ " * title "t" change.case$ * "}" * }
1504     if$
1505   }
1506   if$
1507 }
1508
1509
1510 FUNCTION {format.full.names}
1511 {'s :=
1512   #1 'nameptr :=
1513   s num.names$ 'numnames :=
1514   numnames 'namesleft :=
1515   { namesleft #0 > }
1516   { s nameptr
1517     "{vv~}{ll}" format.name$ 't :=
1518     nameptr #1 >

```

```

1519     {
1520         namesleft #1 >
1521         { ", " * t * }
1522         {
1523             numnames #2 >
1524             { ", " * }
1525             'skip$
1526             if$
1527             t "others" =
1528             { " et~al." * }
1529             { " and " * t * }
1530             if$
1531         }
1532     if$
1533 }
1534 't
1535 if$
1536 nameptr #1 + 'nameptr :=
1537 namesleft #1 - 'namesleft :=
1538 }
1539 while$
1540 }
1541
1542 FUNCTION {author.editor.full}
1543 { author empty$
1544     { editor empty$
1545         { "" }
1546         { editor format.full.names }
1547     if$
1548 }
1549 { author format.full.names }
1550 if$
1551 }
1552
1553 FUNCTION {author.full}
1554 { author empty$
1555     { "" }
1556     { author format.full.names }
1557 if$
1558 }
1559
1560 FUNCTION {editor.full}
1561 { editor empty$
1562     { "" }
1563     { editor format.full.names }
1564 if$
1565 }
1566
1567 FUNCTION {make.full.names}
1568 { type$ "book" =
1569     type$ "inbook" =
1570     or
1571     'author.editor.full
1572     { type$ "proceedings" =

```

```

1573         'editor.full
1574         'author.full
1575     if$
1576 }
1577 if$
1578 }
1579
1580 FUNCTION {output.bibitem}
1581 { newline$
1582   "\bibitem[" write$
1583   label write$
1584   ")" make.full.names duplicate$ short.list =
1585     { pop$ }
1586     { * }
1587     if$
1588   "]" * write$
1589   cite$ write$
1590   "]" write$
1591   newline$
1592   ""
1593   before.all 'output.state :=
1594 }
1595
1596 FUNCTION {n.dashify}
1597 { 't :=
1598   ""
1599   { t empty$ not }
1600   { t #1 #1 substring$ "-" =
1601     { t #1 #2 substring$ "--" = not
1602       { "--" *
1603         t #2 global.max$ substring$ 't :=
1604       }
1605       { { t #1 #1 substring$ "-" = }
1606         { "-" *
1607           t #2 global.max$ substring$ 't :=
1608         }
1609       while$
1610     }
1611     if$
1612   }
1613   { t #1 #1 substring$ *
1614     t #2 global.max$ substring$ 't :=
1615   }
1616   if$
1617 }
1618 while$
1619 }
1620
1621 FUNCTION {format.date}
1622 { year duplicate$ empty$
1623   { "empty year in " cite$ * warning$
1624     pop$ "" }
1625   'skip$
1626   if$

```

```

1627 month empty$
1628   'skip$
1629   { month
1630     " " * swap$ *
1631   }
1632   if$
1633   extra.label *
1634 }
1635
1636 FUNCTION {format.btitle}
1637 { title emphasize
1638 }
1639
1640 FUNCTION {tie.or.space.connect}
1641 { duplicate$ text.length$ #3 <
1642   { "~" }
1643   { " " }
1644   if$
1645   swap$ * *
1646 }
1647
1648 FUNCTION {either.or.check}
1649 { empty$
1650   'pop$
1651   { "can't use both " swap$ * " fields in " * cite$ * warning$ }
1652   if$
1653 }
1654
1655 FUNCTION {format.bvolume}
1656 { volume empty$
1657   { "" }
1658   { "volume" volume tie.or.space.connect
1659     series empty$
1660     'skip$
1661     { " of " * series emphasize * }
1662     if$
1663     "volume and number" number either.or.check
1664   }
1665   if$
1666 }
1667
1668 FUNCTION {format.number.series}
1669 { volume empty$
1670   { number empty$
1671     { series field.or.null }
1672     { output.state mid.sentence =
1673       { "number" }
1674       { "Number" }
1675       if$
1676       number tie.or.space.connect
1677       series empty$
1678       { "there's a number but no series in " cite$ * warning$ }
1679       { " in " * series * }
1680       if$

```

```

1681     }
1682     if$
1683 }
1684 { "" }
1685 if$
1686 }
1687
1688 FUNCTION {format.edition}
1689 { edition empty$
1690   { "" }
1691   { output.state mid.sentence =
1692     { edition "l" change.case$ " edition" * }
1693     { edition "t" change.case$ " edition" * }
1694     if$
1695   }
1696   if$
1697 }
1698
1699 INTEGERS { multiresult }
1700
1701 FUNCTION {multi.page.check}
1702 { 't :=
1703   #0 'multiresult :=
1704   { multiresult not
1705     t empty$ not
1706     and
1707   }
1708   { t #1 #1 substring$
1709     duplicate$ "-" =
1710     swap$ duplicate$ "," =
1711     swap$ "+" =
1712     or or
1713     { #1 'multiresult := }
1714     { t #2 global.max$ substring$ 't := }
1715     if$
1716   }
1717   while$
1718   multiresult
1719 }
1720
1721 FUNCTION {format.pages}
1722 { pages empty$
1723   { "" }
1724   { pages multi.page.check
1725     { "pages" pages n.dashify tie.or.space.connect }
1726     { "page" pages tie.or.space.connect }
1727     if$
1728   }
1729   if$
1730 }
1731
1732 FUNCTION {format.vol.num.pages}
1733 { volume field.or.null
1734   number empty$

```

```

1735     'skip$
1736     { "\penalty0 (" number * ")" * *
1737         volume empty$
1738         { "there's a number but no volume in " cite$ * warning$ }
1739         'skip$
1740         if$
1741     }
1742     if$
1743     pages empty$
1744     'skip$
1745     { duplicate$ empty$
1746         { pop$ format.pages }
1747         { ":\penalty0 " * pages n.dashify * }
1748         if$
1749     }
1750     if$
1751 }
1752
1753 FUNCTION {format.chapter.pages}
1754 { chapter empty$
1755     'format.pages
1756     { type empty$
1757         { "chapter" }
1758         { type "1" change.case$ }
1759         if$
1760         chapter tie.or.space.connect
1761         pages empty$
1762         'skip$
1763         { ", " * format.pages * }
1764         if$
1765     }
1766     if$
1767 }
1768
1769 FUNCTION {format.in.ed.booktitle}
1770 { booktitle empty$
1771     { "" }
1772     { editor empty$
1773         { "In " booktitle emphasize * }
1774         { "In " format.editors * ", " * booktitle emphasize * }
1775         if$
1776     }
1777     if$
1778 }
1779
1780 FUNCTION {empty.misc.check}
1781 { author empty$ title empty$ howpublished empty$
1782     month empty$ year empty$ note empty$
1783     and and and and and
1784     key empty$ not and
1785     { "all relevant fields are empty in " cite$ * warning$ }
1786     'skip$
1787     if$
1788 }

```

```

1789
1790 FUNCTION {format.thesis.type}
1791 { type empty$
1792   'skip$
1793   { pop$
1794     type "t" change.case$
1795   }
1796   if$
1797 }
1798
1799 FUNCTION {format.tr.number}
1800 { type empty$
1801   { "Technical Report" }
1802   'type
1803   if$
1804   number empty$
1805   { "t" change.case$ }
1806   { number tie.or.space.connect }
1807   if$
1808 }
1809
1810 FUNCTION {format.article.crossref}
1811 { key empty$
1812   { journal empty$
1813     { "need key or journal for " cite$ * " to crossref " * crossref *
1814       warning$
1815       ""
1816     }
1817     { "In {\em " journal * "\/}" * }
1818     if$
1819   }
1820   { "In " key * }
1821   if$
1822   " \citep{" * crossref * "}" *
1823 }
1824
1825 FUNCTION {format.book.crossref}
1826 { volume empty$
1827   { "empty volume in " cite$ * "'s crossref of " * crossref * warning$
1828     "In "
1829   }
1830   { "Volume" volume tie.or.space.connect
1831     " of " *
1832   }
1833   if$
1834   editor empty$
1835   editor field.or.null author field.or.null =
1836   or
1837   { key empty$
1838     { series empty$
1839       { "need editor, key, or series for " cite$ * " to crossref " *
1840         crossref * warning$
1841         "" *
1842       }

```



```

1843         { "{\em " * series * "\/}" * }
1844         if$
1845     }
1846     { key * }
1847     if$
1848 }
1849 'skip$
1850 if$
1851 ", \citet{" * crossref * "}" *
1852 }
1853
1854 FUNCTION {format.incoll.inproc.crossref}
1855 { editor empty$
1856   editor field.or.null author field.or.null =
1857   or
1858   { key empty$
1859     { booktitle empty$
1860       { "need editor, key, or booktitle for " cite$ * " to crossref " *
1861         crossref * warning$
1862         ""
1863       }
1864       { "In {\em " booktitle * "\/}" * }
1865     if$
1866   }
1867   { "In " key * }
1868   if$
1869 }
1870 { "In " }
1871 if$
1872 " \citet{" * crossref * "}" *
1873 }
1874
1875 FUNCTION {article}
1876 { output.bibitem
1877   format.authors "author" output.check
1878   author format.key output
1879   new.block
1880   format.title "title" output.check
1881   new.block
1882   crossref missing$
1883   { journal emphasize "journal" output.check
1884     format.vol.num.pages output
1885     format.date "year" output.check
1886   }
1887   { format.article.crossref output.nonnull
1888     format.pages output
1889   }
1890   if$
1891   format.issn output
1892   format.url output
1893   new.block
1894   note output
1895   fin.entry
1896 }

```

```

1897
1898 FUNCTION {book}
1899 { output.bibitem
1900   author empty$
1901   { format.editors "author and editor" output.check
1902     editor format.key output
1903   }
1904   { format.authors output.nonnull
1905     crossref missing$
1906     { "author and editor" editor either.or.check }
1907     'skip$
1908     if$
1909   }
1910   if$
1911   new.block
1912   format.btitle "title" output.check
1913   crossref missing$
1914   { format.bvolume output
1915     new.block
1916     format.number.series output
1917     new.sentence
1918     publisher "publisher" output.check
1919     address output
1920   }
1921   { new.block
1922     format.book.crossref output.nonnull
1923   }
1924   if$
1925   format.edition output
1926   format.date "year" output.check
1927   format.isbn output
1928   format.url output
1929   new.block
1930   note output
1931   fin.entry
1932 }
1933
1934 FUNCTION {booklet}
1935 { output.bibitem
1936   format.authors output
1937   author format.key output
1938   new.block
1939   format.title "title" output.check
1940   howpublished address new.block.checkb
1941   howpublished output
1942   address output
1943   format.date output
1944   format.isbn output
1945   format.url output
1946   new.block
1947   note output
1948   fin.entry
1949 }
1950

```

```

1951 FUNCTION {inbook}
1952 { output.bibitem
1953   author empty$
1954   { format.editors "author and editor" output.check
1955     editor format.key output
1956   }
1957   { format.authors output.nonnull
1958     crossref missing$
1959     { "author and editor" editor either.or.check }
1960     'skip$
1961     if$
1962   }
1963   if$
1964   new.block
1965   format.btitle "title" output.check
1966   crossref missing$
1967   { format.bvolume output
1968     format.chapter.pages "chapter and pages" output.check
1969     new.block
1970     format.number.series output
1971     new.sentence
1972     publisher "publisher" output.check
1973     address output
1974   }
1975   { format.chapter.pages "chapter and pages" output.check
1976     new.block
1977     format.book.crossref output.nonnull
1978   }
1979   if$
1980   format.edition output
1981   format.date "year" output.check
1982   format.isbn output
1983   format.url output
1984   new.block
1985   note output
1986   fin.entry
1987 }
1988
1989 FUNCTION {incollection}
1990 { output.bibitem
1991   format.authors "author" output.check
1992   author format.key output
1993   new.block
1994   format.title "title" output.check
1995   new.block
1996   crossref missing$
1997   { format.in.ed.booktitle "booktitle" output.check
1998     format.bvolume output
1999     format.number.series output
2000     format.chapter.pages output
2001     new.sentence
2002     publisher "publisher" output.check
2003     address output
2004     format.edition output

```

```

2005     format.date "year" output.check
2006 }
2007 { format.incoll.inproc.crossref output.nonnull
2008     format.chapter.pages output
2009 }
2010 if$
2011 format.isbn output
2012 format.url output
2013 new.block
2014 note output
2015 fin.entry
2016 }
2017
2018 FUNCTION {inproceedings}
2019 { output.bibitem
2020     format.authors "author" output.check
2021     author format.key output
2022     new.block
2023     format.title "title" output.check
2024     new.block
2025     crossref missing$
2026     { format.in.ed.booktitle "booktitle" output.check
2027         format.bvolume output
2028         format.number.series output
2029         format.pages output
2030         address empty$
2031         { organization publisher new.sentence.checkb
2032             organization output
2033             publisher output
2034             format.date "year" output.check
2035         }
2036         { address output.nonnull
2037             format.date "year" output.check
2038             new.sentence
2039             organization output
2040             publisher output
2041         }
2042     } if$
2043 }
2044 { format.incoll.inproc.crossref output.nonnull
2045     format.pages output
2046 }
2047 if$
2048 format.isbn output
2049 format.url output
2050 new.block
2051 note output
2052 fin.entry
2053 }
2054
2055 FUNCTION {conference} { inproceedings }
2056
2057 FUNCTION {manual}
2058 { output.bibitem

```

```

2059 format.authors output
2060 author format.key output
2061 new.block
2062 format.btitle "title" output.check
2063 organization address new.block.checkb
2064 organization output
2065 address output
2066 format.edition output
2067 format.date output
2068 format.url output
2069 new.block
2070 note output
2071 fin.entry
2072 }
2073
2074 FUNCTION {mastersthesis}
2075 { output.bibitem
2076   format.authors "author" output.check
2077   author format.key output
2078   new.block
2079   format.title "title" output.check
2080   new.block
2081   "Master's thesis" format.thesis.type output.nonnull
2082   school "school" output.check
2083   address output
2084   format.date "year" output.check
2085   format.url output
2086   new.block
2087   note output
2088   fin.entry
2089 }
2090
2091 FUNCTION {misc}
2092 { output.bibitem
2093   format.authors output
2094   author format.key output
2095   title howpublished new.block.checkb
2096   format.title output
2097   howpublished new.block.checka
2098   howpublished output
2099   format.date output
2100   format.issn output
2101   format.url output
2102   new.block
2103   note output
2104   fin.entry
2105   empty.misc.check
2106 }
2107
2108 FUNCTION {phdthesis}
2109 { output.bibitem
2110   format.authors "author" output.check
2111   author format.key output
2112   new.block

```

```

2113 format.btitle "title" output.check
2114 new.block
2115 "PhD thesis" format.thesis.type output.nonnull
2116 school "school" output.check
2117 address output
2118 format.date "year" output.check
2119 format.url output
2120 new.block
2121 note output
2122 fin.entry
2123 }
2124
2125 FUNCTION {proceedings}
2126 { output.bibitem
2127   format.editors output
2128   editor format.key output
2129   new.block
2130   format.btitle "title" output.check
2131   format.bvolume output
2132   format.number.series output
2133   address output
2134   format.date "year" output.check
2135   new.sentence
2136   organization output
2137   publisher output
2138   format.isbn output
2139   format.url output
2140   new.block
2141   note output
2142   fin.entry
2143 }
2144
2145 FUNCTION {techreport}
2146 { output.bibitem
2147   format.authors "author" output.check
2148   author format.key output
2149   new.block
2150   format.title "title" output.check
2151   new.block
2152   format.tr.number output.nonnull
2153   institution "institution" output.check
2154   address output
2155   format.date "year" output.check
2156   format.url output
2157   new.block
2158   note output
2159   fin.entry
2160 }
2161
2162 FUNCTION {unpublished}
2163 { output.bibitem
2164   format.authors "author" output.check
2165   author format.key output
2166   new.block

```

```

2167 format.title "title" output.check
2168 format.url output
2169 new.block
2170 note "note" output.check
2171 format.date output
2172 fin.entry
2173 }
2174
2175 FUNCTION {default.type} { misc }
2176
2177
2178 MACRO {jan} {"January"}
2179
2180 MACRO {feb} {"February"}
2181
2182 MACRO {mar} {"March"}
2183
2184 MACRO {apr} {"April"}
2185
2186 MACRO {may} {"May"}
2187
2188 MACRO {jun} {"June"}
2189
2190 MACRO {jul} {"July"}
2191
2192 MACRO {aug} {"August"}
2193
2194 MACRO {sep} {"September"}
2195
2196 MACRO {oct} {"October"}
2197
2198 MACRO {nov} {"November"}
2199
2200 MACRO {dec} {"December"}
2201
2202
2203
2204 MACRO {acmcs} {"ACM Computing Surveys"}
2205
2206 MACRO {acta} {"Acta Informatica"}
2207
2208 MACRO {cacm} {"Communications of the ACM"}
2209
2210 MACRO {ibmjrd} {"IBM Journal of Research and Development"}
2211
2212 MACRO {ibmsj} {"IBM Systems Journal"}
2213
2214 MACRO {ieeese} {"IEEE Transactions on Software Engineering"}
2215
2216 MACRO {ieeetc} {"IEEE Transactions on Computers"}
2217
2218 MACRO {ieeetcad}
2219 {"IEEE Transactions on Computer-Aided Design of Integrated Circuits"}
2220

```

```

2221 MACRO {ipl} {"Information Processing Letters"}
2222
2223 MACRO {jacm} {"Journal of the ACM"}
2224
2225 MACRO {jcss} {"Journal of Computer and System Sciences"}
2226
2227 MACRO {scp} {"Science of Computer Programming"}
2228
2229 MACRO {sicomp} {"SIAM Journal on Computing"}
2230
2231 MACRO {tocs} {"ACM Transactions on Computer Systems"}
2232
2233 MACRO {tods} {"ACM Transactions on Database Systems"}
2234
2235 MACRO {tog} {"ACM Transactions on Graphics"}
2236
2237 MACRO {toms} {"ACM Transactions on Mathematical Software"}
2238
2239 MACRO {toois} {"ACM Transactions on Office Information Systems"}
2240
2241 MACRO {toplas} {"ACM Transactions on Programming Languages and Systems"}
2242
2243 MACRO {tcs} {"Theoretical Computer Science"}
2244
2245
2246 READ
2247
2248 FUNCTION {sortify}
2249 { purify$
2250   "1" change.case$
2251 }
2252
2253 INTEGERS { len }
2254
2255 FUNCTION {chop.word}
2256 { 's :=
2257   'len :=
2258   s #1 len substring$ =
2259     { s len #1 + global.max$ substring$ }
2260     's
2261   if$
2262 }
2263
2264 FUNCTION {format.lab.names}
2265 { 's :=
2266   s #1 "{vv~}{ll}" format.name$
2267   s num.names$ duplicate$
2268   #2 >
2269     { pop$ " et~al." * }
2270     { #2 <
2271       'skip$
2272       { s #2 "{ff }{vv }{ll}{ jj}" format.name$ "others" =
2273         { " et~al." * }
2274         { " and " * s #2 "{vv~}{ll}" format.name$ * }

```



```

2275         if$
2276     }
2277     if$
2278 }
2279 if$
2280 }
2281
2282 FUNCTION {author.key.label}
2283 { author empty$
2284     { key empty$
2285         { cite$ #1 #3 substring$ }
2286         'key
2287         if$
2288     }
2289     { author format.lab.names }
2290     if$
2291 }
2292
2293 FUNCTION {author.editor.key.label}
2294 { author empty$
2295     { editor empty$
2296         { key empty$
2297             { cite$ #1 #3 substring$ }
2298             'key
2299             if$
2300         }
2301         { editor format.lab.names }
2302         if$
2303     }
2304     { author format.lab.names }
2305     if$
2306 }
2307
2308 FUNCTION {author.key.organization.label}
2309 { author empty$
2310     { key empty$
2311         { organization empty$
2312             { cite$ #1 #3 substring$ }
2313             { "The " #4 organization chop.word #3 text.prefix$ }
2314             if$
2315         }
2316         'key
2317         if$
2318     }
2319     { author format.lab.names }
2320     if$
2321 }
2322
2323 FUNCTION {editor.key.organization.label}
2324 { editor empty$
2325     { key empty$
2326         { organization empty$
2327             { cite$ #1 #3 substring$ }
2328             { "The " #4 organization chop.word #3 text.prefix$ }

```

```

2329         if$
2330     }
2331     'key
2332     if$
2333 }
2334 { editor format.lab.names }
2335 if$
2336 }
2337
2338 FUNCTION {calc.short.authors}
2339 { type$ "book" =
2340   type$ "inbook" =
2341   or
2342     'author.editor.key.label
2343   { type$ "proceedings" =
2344     'editor.key.organization.label
2345     { type$ "manual" =
2346       'author.key.organization.label
2347       'author.key.label
2348     }
2349   }
2350   if$
2351 }
2352 if$
2353 'short.list :=
2354 }
2355
2356 FUNCTION {calc.label}
2357 { calc.short.authors
2358   short.list
2359   "("
2360   *
2361   year duplicate$ empty$
2362   short.list key field.or.null = or
2363     { pop$ "" }
2364     'skip$
2365   if$
2366   *
2367   'label :=
2368 }
2369
2370 FUNCTION {sort.format.names}
2371 { 's :=
2372   #1 'nameptr :=
2373   ""
2374   s num.names$ 'numnames :=
2375   numnames 'namesleft :=
2376     { namesleft #0 > }
2377     { nameptr #1 >
2378       { " " * }
2379       'skip$
2380     }
2381     if$
2382     s nameptr "{vv{ } }{ll{ }}{ ff{ }}{ jj{ }}" format.name$ 't :=
2383     nameptr numnames = t "others" = and

```

```

2383         { "et al" * }
2384         { t sortify * }
2385         if$
2386         nameptr #1 + 'nameptr :=
2387         namesleft #1 - 'namesleft :=
2388     }
2389     while$
2390 }
2391
2392 FUNCTION {sort.format.title}
2393 { 't :=
2394   "A " #2
2395   "An " #3
2396   "The " #4 t chop.word
2397   chop.word
2398   chop.word
2399   sortify
2400   #1 global.max$ substring$
2401 }
2402
2403 FUNCTION {author.sort}
2404 { author empty$
2405   { key empty$
2406     { "to sort, need author or key in " cite$ * warning$
2407       ""
2408     }
2409     { key sortify }
2410   } if$
2411 }
2412 { author sort.format.names }
2413 if$
2414 }
2415
2416 FUNCTION {author.editor.sort}
2417 { author empty$
2418   { editor empty$
2419     { key empty$
2420       { "to sort, need author, editor, or key in " cite$ * warning$
2421         ""
2422       }
2423       { key sortify }
2424     } if$
2425   }
2426   { editor sort.format.names }
2427   if$
2428 }
2429 { author sort.format.names }
2430 if$
2431 }
2432
2433 FUNCTION {author.organization.sort}
2434 { author empty$
2435   { organization empty$
2436     { key empty$

```

```

2437         { "to sort, need author, organization, or key in " cite$ * warning$
2438             ""
2439         }
2440         { key sortify }
2441     if$
2442 }
2443 { "The " #4 organization chop.word sortify }
2444 if$
2445 }
2446 { author sort.format.names }
2447 if$
2448 }
2449
2450 FUNCTION {editor.organization.sort}
2451 { editor empty$
2452     { organization empty$
2453         { key empty$
2454             { "to sort, need editor, organization, or key in " cite$ * warning$
2455                 ""
2456             }
2457             { key sortify }
2458         if$
2459     }
2460     { "The " #4 organization chop.word sortify }
2461     if$
2462 }
2463 { editor sort.format.names }
2464 if$
2465 }
2466
2467 FUNCTION {presort}
2468 { calc.label
2469     label sortify
2470     "    "
2471     *
2472     type$ "book" =
2473     type$ "inbook" =
2474     or
2475     'author.editor.sort
2476     { type$ "proceedings" =
2477         'editor.organization.sort
2478         { type$ "manual" =
2479             'author.organization.sort
2480             'author.sort
2481         if$
2482     }
2483     if$
2484 }
2485 if$
2486 "    "
2487 *
2488 year field.or.null sortify
2489 *
2490 "    "

```

```

2491 *
2492 title field.or.null
2493 sort.format.title
2494 *
2495 #1 entry.max$ substring$
2496 'sort.label :=
2497 sort.label *
2498 #1 entry.max$ substring$
2499 'sort.key$ :=
2500 }
2501
2502 ITERATE {presort}
2503
2504 SORT
2505
2506 STRINGS { longest.label last.label next.extra }
2507
2508 INTEGERS { longest.label.width last.extra.num number.label }
2509
2510 FUNCTION {initialize.longest.label}
2511 { "" 'longest.label :=
2512   #0 int.to.chr$ 'last.label :=
2513   "" 'next.extra :=
2514   #0 'longest.label.width :=
2515   #0 'last.extra.num :=
2516   #0 'number.label :=
2517 }
2518
2519 FUNCTION {forward.pass}
2520 { last.label label =
2521   { last.extra.num #1 + 'last.extra.num :=
2522     last.extra.num int.to.chr$ 'extra.label :=
2523   }
2524   { "a" chr.to.int$ 'last.extra.num :=
2525     "" 'extra.label :=
2526     label 'last.label :=
2527   }
2528   if$
2529   number.label #1 + 'number.label :=
2530 }
2531
2532 FUNCTION {reverse.pass}
2533 { next.extra "b" =
2534   { "a" 'extra.label := }
2535   'skip$
2536   if$
2537   extra.label 'next.extra :=
2538   extra.label
2539   duplicate$ empty$
2540   'skip$
2541   { "{\natexlab{" swap$ * "}}" * }
2542   if$
2543   'extra.label :=
2544   label extra.label * 'label :=

```

```

2545 }
2546
2547 EXECUTE {initialize.longest.label}
2548
2549 ITERATE {forward.pass}
2550
2551 REVERSE {reverse.pass}
2552
2553 FUNCTION {bib.sort.order}
2554 { sort.label 'sort.key$ :=
2555 }
2556
2557 ITERATE {bib.sort.order}
2558
2559 SORT
2560
2561 FUNCTION {begin.bib}
2562 { preamble$ empty$
2563   'skip$
2564   { preamble$ write$ newline$ }
2565   if$
2566   "\begin{thebibliography}{ " number.label int.to.str$ * " }" *
2567   write$ newline$
2568   "\expandafter\ifx\csname natexlab\endcsname\relax\def\natexlab#1{#1}\fi"
2569   write$ newline$
2570   "\expandafter\ifx\csname url\endcsname\relax" write$ newline$
2571   " \def\url#1{{\tt #1}}\fi" write$ newline$
2572 }
2573
2574 EXECUTE {begin.bib}
2575
2576 EXECUTE {init.state.consts}
2577
2578 ITERATE {call.type$}
2579
2580 FUNCTION {end.bib}
2581 { newline$
2582   "\end{thebibliography}" write$ newline$
2583 }
2584
2585 EXECUTE {end.bib}
2586 \bst

```