

# 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

The class has a custom option to define what colours should be used for links. This option defines **sotonlinks** to use UoS palette colours. Colour Code taken from <http://edshare.soton.ac.uk/10481>

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 \RequirePackage{xcolor}
13 \colorlet{linkBlue}{blue}
14 \colorlet{custGray}{gray}
15 \DeclareOption{sotonlinks}{

```

```

16 \definecolor{sotonMarineBlue}{RGB}{1,67,89} % Soton marine blue (P 7469C)
17 \definecolor{sotonGrey}{RGB}{153,153,166} % Soton grey (P 443C)
18 \colorlet{linkBlue}{sotonMarineBlue}
19 \colorlet{custGray}{sotonGrey}
20 }
21 \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.

```

22 \def\@checkoptions#1#2{
23   \edef\@curroptions{\@optionlist{\@currname.\@current}}
24   \@tempswafalse
25   \@tfor\@this:=#2\do{
26     \expandtwoargs\in@{\@this,}{\@curroptions,}
27     \ifin@ \@tempswatrue \break@tfor \fi
28   \let\@this\empty
29   \if@tempswa \else \PassOptionsToClass{#1}{\baseclass}\fi
30 }

```

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

```

31 <thesis | minithesis | progress | report | article | gdp | gdpsummary>
32 \@checkoptions{11pt}{10pt}{11pt}{12pt}
33 </thesis | minithesis | progress | report | article | gdp | gdpsummary>
34 <*project>
35 \@checkoptions{12pt}{10pt}{11pt}{12pt}
36 </project>
37 \PassOptionsToClass{a4paper}{\baseclass}
38 \ProcessOptions\relax

```

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

```

39 \LoadClass{\baseclass}

```

## 4.1 Banner

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

```

40 \newcommand\bhrule{\typeout{-----}}
41 \newcommand\btypeout[1]{\bhrule\typeout{\space #1}\bhrule}

```

## 4.2 Date

`\today` This macro uses the  $\text{\TeX}$  primitives `\month`, `\day` and `\year` to provide the date of the  $\text{\LaTeX}$ -run in a suitable format.

```

42 <*thesis>
43 \def\today{\ifcase\month\or
44   January\or February\or March\or April\or May\or June\or
45   July\or August\or September\or October\or November\or December\fi
46   \space \number\year}
47 </thesis>

```

## 5 Document Layout

### 5.1 Font

```

48 %% \usepackage[T1]{fontspec}
49 %   Set font for copyright statement body text
50 \usepackage[defaultsans]{droidsans}
51 %   Set a particular style of font for the thesis. A font that has smallcaps
52 \usepackage{mathpazo}
53 %%\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.

```

54 \usepackage{setspace}
55 <thesis | minithesis | progress | project | report | gdp | gdpsummary>\onehalfspacing
56 <article>\singlespacing
57 \setlength{\parindent}{0pt}
58 \setlength{\parskip}{2.0ex plus0.5ex minus0.2ex}

```

### 5.3 Margins

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

```

59 \usepackage{vmargin}
60 <*thesis | minithesis | progress | project | report | gdp | gdpsummary>
61 \setmarginsrb          { 1.5in} % left margin
62                      { 0.6in} % top margin
63                      { 1.0in} % right margin
64                      { 0.8in} % bottom margin
65                      { 20pt}  % head height
66                      {0.25in} % head sep
67                      { 9pt}   % foot height
68                      { 0.3in} % foot sep
69 </thesis | minithesis | progress | project | report | gdp | gdpsummary>
70 <*article>
71 \setmarginsrb          { 0.8in} % left margin
72                      { 0.6in} % top margin
73                      { 0.8in} % right margin
74                      { 0.8in} % bottom margin
75                      { 20pt}  % head height
76                      {0.25in} % head sep
77                      { 9pt}   % foot height
78                      { 0.3in} % foot sep
79 </article>

```

## 5.4 Breaks

Control how pages and lines are broken.

```
80 \raggedbottom
81 \setlength{\topskip}{1\topskip \@plus 5\p@}
82 \doublehyphendemerits=10000      % No consecutive line hyphens.
83 \brokenpenalty=10000             % No broken words across columns/pages.
84 \widowpenalty=9999               % Almost no widows at bottom of page.
85 \clubpenalty=9999                % Almost no orphans at top of page.
86 \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.

```
87 \usepackage{fancyhdr}
88 % Help from https://texblog.org/2007/11/07/headerfooter-in-latex-with-fancyhdr/#comment-4783
89 \fancyhead[LE]{\textrm\thepage}
90 \fancyhead[LO]{\fancyplain{}{\textsl{\rightmark}}}}
91 \fancyhead[RE]{\fancyplain{}{\textsl{\leftmark}}}}
92 \fancyhead[RO]{\textrm\thepage}
93 \chead{}\lfoot{}\rfoot{}\cfoot{}
94 \pagestyle{fancy}
95 \fancypagestyle{plain}{
96   \fancyhf{}
97   \fancyhead[OR]{\thepage}
98   \renewcommand{\headrulewidth}{0pt}
99 }
```

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

```
100 (*thesis | minithesis | progress | project | report | gdp)
101 \renewcommand{\chaptermark}[1]{\btypeout{thechapter.\space #1}\markboth{\chaptername\ thechapter}{\thepage}}
102 \renewcommand{\sectionmark}[1]{\markright{thesection.\hspace{1em}#1}}
103 \renewcommand{\subsectionmark}[1]{}
104 \end{thesis} | minithesis | progress | project | report | gdp)
105 (*article)
106 \renewcommand{\sectionmark}[1]{\btypeout{thesection\hspace{1em}}\markboth{}{thesection.\hspace{1em}#1}}
107 \renewcommand{\subsectionmark}[1]{}
108 \renewcommand{\subsubsectionmark}[1]{}
109 \end{article}
110 \gdpsummary\markboth{GDP Summary Report}{GDP Summary Report}
```

<code>\cleardoublepage</code>	Redefine <code>cleardoublepage</code> to remove headers from blank pages in twosided documents.
-------------------------------	---

```
111 \def\cleardoublepage{\clearpage\if@twoside \ifodd\c@page\else
112 \hbox{}
113 \thispagestyle{empty}
114 \newpage
115 \if@twocolumn\hbox{}\newpage\fi\fi\fi}
```

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

```
116 \def\cleartoeven{\clearpage\if@twoside \ifodd\c@page
117 \hbox{}
118 \thispagestyle{empty}
119 \newpage
120 \if@twocolumn\hbox{}\newpage\fi\fi\fi}
```

## 5.6 Mathematics

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

```
121 %% ----- Figure/Table/Eq/Listing Styling -----
122 %% Set the styling for non text elements of the document
123 \usepackage{amsmath,amsfonts,amssymb,amscd,amsthm,xspace}
124 \theoremstyle{plain}
125 \newtheorem{example}{Example}[chapter]
126 \newtheorem{theorem}{Theorem}[chapter]
127 \newtheorem{lemma}{Lemma}[chapter]
128 \newtheorem{proposition}{Proposition}[chapter]
129 \newtheorem{axiom}{Axiom}[chapter]
130 \newtheorem{definition}{Definition}[chapter]
131 \newtheorem{remark}{Remark}[chapter]
132 \newtheorem{corollary}{Corollary}[chapter]
133 \newtheorem{lemma}{Lemma}[chapter]
134 \newtheorem{proposition}{Proposition}[chapter]
135 \newtheorem{axiom}{Axiom}[chapter]
136 \newtheorem{definition}{Definition}[chapter]
137 \newtheorem{remark}{Remark}[chapter]
138 \newtheorem{corollary}{Corollary}[chapter]
139 \newtheorem{lemma}{Lemma}[chapter]
140 \newtheorem{proposition}{Proposition}[chapter]
```

## 5.7 Captions

`\fref` Load the `caption2` package to improve formatting of captions, and provide short  
`\tref` referencing commands.

```
\fref 141 \usepackage[justification=centerlast,font=small,labelfont=sc]{caption}
\tref 142 \setlength{\captionmargin}{20pt}
\eref 143 \newcommand{\fref}[1]{Figure~\ref{#1}}
\cref 144 \newcommand{\tref}[1]{Table~\ref{#1}}
\sref 145 \newcommand{\eref}[1]{Equation~\ref{#1}}
\aref 146 \newcommand{\cref}[1]{Chapter~\ref{#1}}
147 \newcommand{\sref}[1]{Section~\ref{#1}}
148 \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  
`\textfraction` 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%.

```
149 \renewcommand{\topfraction}{0.85}
150 \renewcommand{\bottomfraction}{.85}
151 \renewcommand{\textfraction}{0.1}
152 \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%.

```
153 \renewcommand{\floatpagefraction}{0.75}
154 \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.

```
155 \setcounter{topnumber}{9}
156 \setcounter{bottomnumber}{9}
157 \setcounter{totalnumber}{20}
158 \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>.

```
159 \usepackage{graphicx}
160 \usepackage{epstopdf}
```

## 5.10 Subfigures and subtables

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

```
161 \usepackage[scriptsize]{subfigure}
162 \usepackage{booktabs}
163 \usepackage{rotating}
```

## 5.11 Listings

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

```
164 \usepackage{listings}
165 % \usepackage{lstpatch}
166 \lstset{captionpos=b,
```

```

167     frame=tb,
168     basicstyle=\scriptsize\ttfamily,
169     showstringspaces=false,
170     keepspaces=true}
171 \lstdefinestyle{matlab} {
172     language=Matlab,
173     keywordstyle=\color{blue},
174     commentstyle=\color[rgb]{0.13,0.55,0.13}\em,
175     stringstyle=\color[rgb]{0.7,0,0} }

```

## 5.12 Hyperlinks

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

```

176 \usepackage[pdfpagemode={UseOutlines},bookmarks=true,bookmarksopen=true,
177     bookmarksopenlevel=0,bookmarksnumbered=true,hypertextnames=false,
178     colorlinks,linkcolor={linkBlue},citecolor={linkBlue},urlcolor={linkBlue},
179     pdfstartview={FitV},unicode,breaklinks=true]{hyperref}
180 \pdfstringdefDisableCommands{
181     \let\\\space
182 }

```

## 6 Internal Names

`\supervisor` The various elements of the documents are defined as control sequences to make it easy to customize this style for other parts of the University.

`\examiner`

`\degree` 183 %% ----- Organisational Structure -----

`\authors` 184 \newcommand\*\supervisor}[1]{\def\supname{#1}}

`\addresses` 185 \newcommand\*\examiner}[1]{\def\examname{#1}}

`\university` 186 \newcommand\*\degree}[1]{\def\degreename{#1}}

`\UNIVERSITY` 187 \newcommand\*\authors}[1]{\def\authornames{#1}}

`\department` 188 \newcommand\*\qualifications}[1]{\def\qualname{#1}}

`\DEPARTMENT` 189 \newcommand\*\addresses}[1]{\def\addressnames{#1}}

`\group` 190 \newcommand\*\doi}[1]{\def\doicode{#1}}

`\GROUP` 191 \newcommand\*\orcidid}[1]{\def\orcid{#1}}

`\faculty` 192 \newcommand\*\university}[1]{\def\univname{#1}}

`\FACULTY` 193 \newcommand\*\UNIVERSITY}[1]{\def\UNIVNAME{#1}}

`\subject` 194 \newcommand\*\department}[1]{\def\deptname{#1}}

`\keywords` 195 \newcommand\*\DEPARTMENT}[1]{\def\DEPTNAME{#1}}

196 \newcommand\*\group}[1]{\def\groupname{#1}}

197 \newcommand\*\GROUP}[1]{\def\GROUPNAME{#1}}

198 \newcommand\*\faculty}[1]{\def\facname{#1}}

199 \newcommand\*\FACULTY}[1]{\def\FACNAME{#1}}

200 \newcommand\*\subject}[1]{\def\subjectname{#1}}

201 \newcommand\*\keywords}[1]{\def\keywordnames{#1}}

`\supname` The internal names of the elements are set to defaults appropriate to the Department of Electronics and Computer Science.

`\examname` By running these commands at the top of your tex file it will overwrite the defaults.

`\degreename`

`\authornames` 202 %% ----- Organisational Structure -----

`\univname` 203 \doi{}

`\UNIVNAME`

`\deptname` 204 \supervisor {}

`\DEPTNAME`

`\groupname`

`\GROUPNAME`

`\facname`

`\FACNAME`

`\subjectname`

`\keywordnames`



```

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

```

## 7 Special Pages

### 7.1 Title Page

`\maketitle` Setup an appropriate title page and pdf strings if we are using pdf<sup>L</sup>A<sup>T</sup>E<sup>X</sup>.

The itltempty has been removed

Possibly the relax statement also needs to be removed

```

229 {*thesis | minithesis | progress | project | report | gdp | gdpsummary)}
230 \usepackage{titling}
231 \AtBeginDocument{
232   \hypersetup{pdftitle={\thetitle}}
233   \hypersetup{pdfsubject={\subjectname}}
234   \hypersetup{pdfauthor={\authornames}}
235   \hypersetup{pdfkeywords={\keywordnames}}
236 }
237 \renewcommand\maketitle{
238   \btypeout{Title Page}
239   \thispagestyle{empty}
240   \begin{titlepage}
241     \let\footnotesize\small
242     \let\footnoterule\relax
243     \let \footnote \thanks
244     \setcounter{footnote}{0}
245     \null\vfil
246     \vskip 60\p@
247     \begin{center}
248       \setlength{\parskip}{0pt}
249       {\scshape\LARGE\textbf{\univname}\par}

```

```

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

```

```

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

```

```

358 \let\footnotesize\small
359 \let\footnoterule\relax
360 \let \footnote \thanks
361 \null\vfil
362 \vskip 60\p@
363 \begin{center}
364   {\LARGE \@title \par}
365   \vskip 3em
366   {\large \lineskip .75em
367     \begin{tabular}[t]{c} \authornames \end{tabular}
368   \par}
369   \vskip 1em
370   {\large \lineskip .5em
371     \begin{tabular}[t]{c} \addressnames \end{tabular}
372   \par}
373   \vskip 1.5em
374   {\large \@date \par}
375   \if\keywordnames
376   \else
377     \quotation
378     \vskip 1.5em
379     {\noindent \normalsize
380       \textbf{Keywords:}
381       \textit{\keywordnames}
382     \par}
383     \endquotation
384   \fi
385 \end{center}
386 \par
387 \@thanks
388 \vfil\null
389 \end{titlepage}
390 \setcounter{footnote}{0}
391 \global\let\thanks\relax
392 \global\let\maketitle\relax
393 \global\let\@maketitle\relax
394 \global\let\@thanks\@empty
395 \global\let\@author\@empty
396 \global\let\@date\@empty
397 \global\let\title\relax
398 \global\let\author\relax
399 \global\let\date\relax
400 \global\let\and\relax
401 }
402 \else
403 \renewcommand\maketitle{
404   \btypeout{Title Page}
405   \markboth{\authornames}{\@title}
406   \thispagestyle{empty}
407   \par
408   \begingroup
409     \renewcommand\thefootnote{\@fnsymbol\c@footnote}
410     \def\@makefnmark{
411       \rlap{\@textsuperscript{\normalfont\@thefnmark}}

```

```

412     }
413     \long\def\@makefntext##1{
414         \parindent 1em\noindent \hb@xt@1.8em
415         {\hss\@textsuperscript{\normalfont\@thefnmark}}##1
416     }
417     \if@twocolumn
418         \ifnum \col@number=\@ne
419             \@maketitle
420         \else
421             \twocolumn[\@maketitle]%
422         \fi
423     \else
424         \newpage
425         % Prevent figures from going at top of page.
426         \global\@topnum\z@
427         \@maketitle
428         \fi
429         \thispagestyle{plain}\@thanks
430     \endgroup
431     \setcounter{footnote}{0}%
432     \global\let\thanks\relax
433     \global\let\maketitle\relax
434     \global\let\@maketitle\relax
435     \global\let\@thanks\@empty
436     \global\let\@author\@empty
437     \global\let\@date\@empty
438     \global\let\title\relax
439     \global\let\author\relax
440     \global\let\date\relax
441     \global\let\and\relax
442 }
443 \def\@maketitle{
444     \newpage
445     \null
446     \vskip 2em
447     \begin{center}
448         \let \footnote \thanks
449         {\LARGE \@title \par}
450         \vskip 1.5em
451         {\large \lineskip .5em
452             \begin{tabular}[t]{c} \authornames \end{tabular}
453             \par}
454         \vskip 0.7em
455         {\large \lineskip .5em
456             \begin{tabular}[t]{c} \addressnames \end{tabular}
457             \par}
458         \vskip 1em
459         {\large \@date}
460     \end{center}
461     \par
462     \vskip 1.5em
463 }
464 \fi
465 \end{article}

```

## 7.2 Abstract Page

`\abstract` Setup an appropriate abstract page.

```

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

```

```

517         \bfseries \abstractname
518         \@endparpenalty\@M
519     \end{center}
520     \begin{itshape}
521     \noindent
522 }
523 {
524     \par
525     \end{itshape}
526     \if\keywordnames
527     \else
528         \quote
529         \vskip 1.5em
530         {\noindent \normalsize
531             \textbf{Keywords:}
532             \textit{\keywordnames}
533         \par}
534         \endquote
535     \fi
536     \vfil\null\endtitlepage
537 }
538 \else
539     \renewenvironment{abstract}{
540         \if@twocolumn
541             \section*{\abstractname}
542         \else
543             \small
544             \begin{center}
545                 {\bfseries \abstractname\vspace{-.5em}\vspace{\z@}}
546             \end{center}
547             \quote
548         \fi
549         \begin{itshape}
550     }
551     {
552         \end{itshape}
553         \if\keywordnames
554         \else
555             \vskip 1.5em
556             {\noindent \normalsize
557                 \textbf{Keywords:}
558                 \textit{\keywordnames}
559             \par}
560         \fi
561         \if@twocolumn\else\endquote\fi
562     }
563 \fi
564 \end{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>Xt.

```
565 <*thesis | minithesis | progress | project | report | gdp | article>
566 \addtocounter{secnumdepth}{1}
567 \setcounter{tocdepth}{6}
568 \newcounter{dummy}
569 \newcommand\addtotoc[1]{
570 \refstepcounter{dummy}
571 <*thesis | minithesis | progress | project | report | gdp>
572 \addcontentsline{toc}{chapter}{#1}}
573 </thesis | minithesis | progress | project | report | gdp>
574 <*article>
575 \addcontentsline{toc}{section}{#1}}
576 </article>
```

### 7.3.2 Table of Contents

`\tableofcontents` Adjust line and paragraph spacing.

```
577 \renewcommand\tableofcontents{
578 \hypersetup{linkcolor={black}}
579 \btypeout{Table of Contents}
580 \begin{spacing}{1}{
581     \setlength{\parskip}{1pt}
582     \if@twocolumn
583         \@restonecoltrue\onecolumn
584     \else
585         \@restonecolfalse
586     \fi
587 <*thesis | minithesis | progress | project | report | gdp>
588     \chapter*{\contentsname
589 </thesis | minithesis | progress | project | report | gdp>
590 <*article>
591     \section*{\contentsname
592 </article>
593     \@mkboth{
594         \MakeUppercase\contentsname}{\MakeUppercase\contentsname}}
595     \@starttoc{toc}
596     \if@restonecol\twocolumn\fi
597 <thesis | minithesis | progress | project | report | gdp> \cleardoublepage
598 } \end{spacing}
599 }
```

### 7.3.3 List of Figures

`\listoffigures` Adjust line and paragraph spacing.

```
600 \renewcommand\listoffigures{
601 \addtotoc{\listfigurename}
602 \begin{spacing}{1}{
```



```

603 \setlength{\parskip}{1pt}
604 \if@twocolumn
605 \@restonecoltrue\onecolumn
606 \else
607 \@restonecolfalse
608 \fi
609 <*thesis | minithesis | progress | project | report | gdp>
610 \chapter*{\listfigurename
611 </thesis | minithesis | progress | project | report | gdp>
612 <*article>
613 \section*{\listfigurename
614 </article>
615 \@mkboth{\MakeUppercase\listfigurename}
616 {\MakeUppercase\listfigurename}}
617 \@starttoc{lof}
618 \if@restonecol\twocolumn\fi
619 <*thesis | minithesis | progress | project | report | gdp>
620 \cleardoublepage
621 </thesis | minithesis | progress | project | report | gdp>
622 }\end{spacing}
623 }

```

### 7.3.4 List of Tables

`\listoftables` Adjust line and paragraph spacing.

```

624 \renewcommand\listoftables{
625 \addtotoc{\listtablename}
626 \begin{spacing}{1}{
627 \setlength{\parskip}{1pt}
628 \if@twocolumn
629 \@restonecoltrue\onecolumn
630 \else
631 \@restonecolfalse
632 \fi
633 <*thesis | minithesis | progress | project | report | gdp>
634 \chapter*{\listtablename
635 </thesis | minithesis | progress | project | report | gdp>
636 <*article>
637 \section*{\listtablename
638 </article>
639 \@mkboth{
640 \MakeUppercase\listtablename}{\MakeUppercase\listtablename}}
641 \@starttoc{lot}
642 \if@restonecol\twocolumn\fi
643 <*thesis | minithesis | progress | project | report | gdp>
644 \cleardoublepage
645 </thesis | minithesis | progress | project | report | gdp>
646 }\end{spacing}
647 }

```

## 7.4 List of Symbols

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

```

648 <thesis | minithesis | progress | report | article>
649 \newcommand\listsymbolname{Nomenclature}
650 </thesis | minithesis | progress | report | article>
651 <*project | gdp>
652 \newcommand\listsymbolname{List of Symbols}
653 </project | gdp>
654 \usepackage{longtable}
655 \newcommand\listofsymbols[2]{
656 \btypeout{\listsymbolname}
657 \addtotoc{\listsymbolname}
658 <*thesis | minithesis | progress | project | report | gdp>
659 \chapter*{\listsymbolname
660 </thesis | minithesis | progress | project | report | gdp>
661 <*article>
662 \section*{\listsymbolname
663 </article>
664 \@mkboth{
665 \MakeUppercase\listsymbolname}{\MakeUppercase\listsymbolname}}
666 \begin{longtable}[c]{#1}#2\end{longtable}\par
667 <*thesis | minithesis | progress | project | report | gdp>
668 \cleardoublepage
669 </thesis | minithesis | progress | project | report | gdp>
670 }
671 </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

```

672 <*thesis | minithesis | progress | report | article>
673 \usepackage{xifthen}
674 \newcommand\authorshipdeclaration[1]{
675 \btypeout{Declaration of Authorship}
676 \addtotoc{Declaration of Authorship}
677 \thispagestyle{plain}
678 \null\vfil
679 \vskip 60\p@
680 \begin{center}{\Large\bf Declaration of Authorship \par}\end{center}
681 I declare that this thesis and the work presented in it is my own and has
682 been generated by me as the result of my own original research.
683
684 I confirm that:
685
686 \begin{enumerate}
687 \item This work was done wholly or mainly while in candidature for a research degree at this U
688 \item Where any part of this thesis has previously been submitted for a degree or any other q
689 \item Where I have consulted the published work of others, this is always clearly attributed;
690 \item Where I have quoted from the work of others, the source is always given. With the except

```

```

691 \item I have acknowledged all main sources of help;
692 \item Where the thesis is based on work done by myself jointly with others, I have made clear
693
694 \ifthenelse{\isempty{#1}}
695 {\item None of this work has been published before submission}
696 {\item Parts of this work have been published as: #1}
697 \end{enumerate}
698
699 \vspace{15.0mm}
700 \begin{minipage}[t]{0.7\textwidth}
701   Signed:.....
702 \end{minipage}%
703 \begin{minipage}[t]{0.3\textwidth}
704   Date:.....
705 \end{minipage}
706 \vfil\vfil\null
707 \cleardoublepage
708 }
709 </thesis | minithesis | progress | report | article>

```

## 7.6 Copyright Statement

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

```

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

```

```

739 \vspace{0.5cm}
740
741 When referring to this thesis and any accompanying data, full bibliographic
742 details must be given, e.g.
743
744 \vspace{0.5cm}
745
746 Thesis: Author (Year of Submission) "Full thesis title", University of
747 Southampton, name of the University Faculty or School or Department,
748 PhD Thesis, pagination.
749
750 \vspace{0.5cm}
751
752 Data: Author (Year) Title. URI [dataset]]
753 \end{minipage}
754 \vfil\vfil\null
755 \cleardoublepage
756 }
757
758 \usepackage{lastpage} % counts the full number of pages
759
760 </thesis>

```

## 7.7 Acknowledgements

`\acknowledgements` Thank someone!

```

761 \newcommand\acknowledgements[1]{
762 \btypeout{Acknowledgements}
763 \addtotoc{Acknowledgements}
764 <{*thesis | minithesis | progress | project | report | gdp}
765 \thispagestyle{plain}
766 \null\vfil
767 \vskip 60\p@
768 \begin{center}{\Large\bf Acknowledgements \par}\end{center}
769 {\normalsize #1}
770 \vfil\vfil\null
771 \cleardoublepage
772 </thesis | minithesis | progress | project | report | gdp}
773 <{*article}
774 \section*{Acknowledgements}
775 {\normalsize #1}
776 </article}
777 }

```

## 7.8 Dedicatory

`\dedicatory` Dedicate the document to someone!

```

778 \newcommand\dedicatory[1]{
779 \btypeout{Dedicatory}
780 <{*thesis | minithesis | progress | project | report | gdp}
781 \thispagestyle{plain}
782 \null\vfil
783 \vskip 60\p@

```

```

784 \begin{center}{\Large \sl #1}\end{center}
785 \vfil\null
786 \cleardoublepage
787 </thesis | minithesis | progress | project | report | gdp>
788 }

```

## 8 Parts

`\frontmatter` Modify frontmatter.

```

789 <*article>
790 \newcommand\frontmatter{ }
791 </article>

```

`\mainmatter` Modify mainmatter.

```

792 <*article>
793 \newcommand\mainmatter{ }
794 </article>

```

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

```

795 <*thesis | minithesis | progress | project | report | gdp>
796 \renewcommand\backmatter{
797   \if@openright
798     \cleardoublepage
799   \else
800     \clearpage
801   \fi
802   \addtotoc{\bibname}
803   \btypeout{\bibname}
804   \@mainmatterfalse}
805 </thesis | minithesis | progress | project | report | gdp>
806 <*article>
807 \newcommand\bibname{References}
808 \newcommand\backmatter{
809   \addtotoc{\bibname}
810   \btypeout{\bibname}
811 }
812 </article>
813 </thesis | minithesis | progress | project | report | article | gdp | gdpsummary>

```

## 9 Example Documents

```

814 <*testthesis>
815 \documentclass[sotonlinks]{ecsthesis}      % Use the Thesis Style with custom link colour
816 </testthesis>
817 <*testminithesis>
818 \documentclass[sotonlinks]{ecsminithesis}  % Use the minithesis Style with custom link colour
819 </testminithesis>
820 <*testprogress>
821 \documentclass[sotonlinks]{ecsprogress}    % Use the progress Style with custom link colour
822 </testprogress>

```

```

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

```

```

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

```

```

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

```



```

985 Pellentesque sodales lobortis feugiat. Vivamus volutpat mauris id odio aliquam maximus sed sit
986
987 Donec vitae massa nisi. Praesent sed sollicitudin urna. Suspendisse vitae cursus tortor. In eg
988 </introduction | testarticle>
989 < *conclusions>
990 \chapter{Conclusions} \label{Chapter: Conclusions}
991 </conclusions>
992 < *testarticle>
993 %% -----
994 \section{Conclusions} \label{Section: Conclusions}
995 </testarticle>
996 < *conclusions | testarticle>
997 It works.
998 </conclusions | testarticle>
999 < *testarticle>
1000 \acknowledgements{Thanks to no one.}
1001 \backmatter
1002 \bibliographystyle{ecs}
1003 \bibliography{ECS}
1004 \appendix
1005 </testarticle>
1006 < *appendix | testarticle>
1007 < *appendix>
1008 \chapter{Stuff} \label{Chapter: Stuff}
1009 </appendix>
1010 < *testarticle>
1011 %% -----
1012 \section{Stuff} \label{Section: Stuff}
1013 </testarticle>
1014 The following gets in the way of the text....
1015 </appendix | testarticle>
1016 < *testthesis | testminithesis | testprogress | testproject | testreport | testarticle | testgdp | testgdpsummary>
1017 \end{document}
1018 %% -----
1019 </testthesis | testminithesis | testprogress | testproject | testreport | testarticle | testgdp | testgdpsummary>

```

## 9.1 Example Figure

```

1020 < *figure>
1021 %%BoundingBox: 0 150 600 650
1022 %%EndComments
1023 0.0 setlinewidth
1024 /length 0.1 def
1025 /width 0.02 def
1026 /hsvcircle {
1027   gsave
1028     /h 0.0 def
1029     0 4 360 {
1030       pop
1031       gsave
1032       0.5 0.0 translate
1033       newpath
1034       0.0 0.0 moveto
1035       length 0.0 lineto
1036       length width lineto

```

```

1037      0.0 width lineto
1038      closepath
1039      h 1.0 1.0 sethsbcolor
1040      fill
1041      grestore
1042      /h h 4 360 div add def
1043      4 rotate
1044      } for
1045 grestore
1046 } def
1047 0.0 setlinewidth
1048 0.0 setgray
1049 300 400 translate
1050 500 500 scale
1051 30 rotate
1052 1.0 0.7 scale
1053 -30 rotate
1054 hsvcircle
1055 0.8 0.8 scale
1056 hsvcircle
1057 0.8 0.8 scale
1058 hsvcircle
1059 0.8 0.8 scale
1060 hsvcircle
1061 0.8 0.8 scale
1062 hsvcircle
1063 0.8 0.8 scale
1064 hsvcircle
1065 0.8 0.8 scale
1066 hsvcircle
1067 showpage
1068 </figure>

```

## 9.2 Definitions File

```

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

```

```

1089
1090 %% Math Sets
1091 \newcommand{\Q}[1]{\ensuremath{\mathbb{#1}}\xspace}
1092 \newcommand{\R}{\Q{R}}
1093
1094 %% Matrix, Vector
1095 \newcommand{\V}[1]{\ensuremath{\boldsymbol{#1}}\xspace}
1096 \newcommand{\M}[1]{\ensuremath{\boldsymbol{#1}}\xspace}
1097 \newcommand{\0}{\V{0}}
1098 \newcommand{\1}{\V{1}}
1099 \newcommand{\I}{\M{I}}
1100
1101 %% Math Functions
1102 \newcommand{\F}[1]{\ensuremath{\mathrm{#1}}\xspace}
1103 \newcommand{\sgn}{\F{sgn}}
1104 \newcommand{\tr}{\F{trace}}
1105 \newcommand{\diag}{\F{diag}}
1106
1107 %% Math Names
1108 \newcommand{\N}[1]{\ensuremath{\mathit{#1}}\xspace}
1109
1110 %% Data
1111 \newcommand{\mc}[1]{\ensuremath{\mathcal{#1}}\xspace}
1112 \newcommand{\Hyp}{\mc{H}}
1113 \newcommand{\D}{\mc{D}}
1114
1115 %% Kernel
1116 \newcommand{\K}{\M{K}}
1117 \newcommand{\eins}{\texorpdfstring{\ensuremath{\epsilon}}{\textepsilon}-insensitive\xspace}
1118 \newcommand{\e}{\ensuremath{\epsilon}\xspace}
1119 \newcommand{\Bxi}{\ensuremath{\boldsymbol{\xi}}\xspace}
1120 \newcommand{\Kanova}{\ensuremath{\mathit{K}_{ANOVA}}\xspace}
1121 \newcommand{\Kspline}{\ensuremath{\mathit{K}_{spline}}\xspace}
1122
1123 %% Bayesian
1124 \newcommand{\MP}{\ensuremath{\mathit{\scriptscriptstyle M}\hspace{-1.5pt}P}\xspace}
1125 \newcommand{\ML}{\ensuremath{\mathit{\scriptscriptstyle M}\hspace{-1.5pt}L}\xspace}
1126 \newcommand{\Qw}{\ensuremath{Q_{\W}(\W)}\xspace}
1127 \newcommand{\Qa}{\ensuremath{Q_{\Ba}(\Ba)}\xspace}
1128 \newcommand{\Qb}{\ensuremath{Q_{\beta}(\beta)}\xspace}
1129 \newcommand{\wMPab}{\ensuremath{w_{\MP|\bar{\Ba},\bar{\beta}}}\xspace}
1130 \newcommand{\wMP}{\ensuremath{w_{\MP}}\xspace}
1131 \newcommand{\yMP}{\ensuremath{y_{\MP}}\xspace}
1132 \newcommand{\BaMP}{\ensuremath{\Ba_{\hspace{1pt}MP}}\xspace}
1133 \newcommand{\aMP}{\ensuremath{\alpha_{\hspace{1pt}MP}}\xspace}
1134 \newcommand{\bMP}{\ensuremath{\beta_{\hspace{1pt}MP}}\xspace}
1135 \newcommand{\Sab}{\ensuremath{M_{\Sigma}_{\bar{\Ba},\bar{\beta}}}\xspace}
1136 \newcommand{\Ba}{\ensuremath{\boldsymbol{\alpha}}\xspace}
1137 \newcommand{\Bb}{\ensuremath{\boldsymbol{\beta}}\xspace}
1138 \newcommand{\Bm}{\ensuremath{\boldsymbol{\mu}}\xspace}
1139 \newcommand{\BL}{\ensuremath{\boldsymbol{\Lambda}}\xspace}
1140 \newcommand{\BPhi}{\ensuremath{\boldsymbol{\Phi}}\xspace}
1141 \newcommand{\SMP}{\ensuremath{M_{\Sigma}_{\MP}}\xspace}
1142

```

```

1143 \newcommand{\Pa}{\ensuremath{P(\alpha|\mathcal{H})}\xspace}
1144 \newcommand{\Pb}{\ensuremath{P(\beta|\mathcal{H})}\xspace}
1145 \newcommand{\Pab}{\ensuremath{P(\alpha,\beta|\mathcal{H})}\xspace}
1146 \newcommand{\Pw}{\ensuremath{P(w|\mathcal{H})}\xspace}
1147 \newcommand{\PD}{\ensuremath{P(D|\mathcal{H})}\xspace}
1148 \newcommand{\PwIa}{\ensuremath{P(w|\alpha,\mathcal{H})}\xspace}
1149 \newcommand{\PDIwb}{\ensuremath{P(D|w,\beta,\mathcal{H})}\xspace}
1150 \newcommand{\PDwab}{\ensuremath{P(D,w,\alpha,\beta|\mathcal{H})}\xspace}
1151 \newcommand{\PDIw}{\ensuremath{P(D|w,\mathcal{H})}\xspace}
1152 \newcommand{\PwID}{\ensuremath{P(w|D,\mathcal{H})}\xspace}
1153 \newcommand{\PwabID}{\ensuremath{P(w,\alpha,\beta|D,\mathcal{H})}\xspace}
1154
1155 \newcommand{\PanH}{\ensuremath{P(\alpha)}\xspace}
1156 \newcommand{\PbnH}{\ensuremath{P(\beta)}\xspace}
1157 \newcommand{\PabnH}{\ensuremath{P(\alpha,\beta)}\xspace}
1158 \newcommand{\PwnH}{\ensuremath{P(w)}\xspace}
1159 \newcommand{\PDnH}{\ensuremath{P(D)}\xspace}
1160 \newcommand{\PwIanH}{\ensuremath{P(w|\alpha)}\xspace}
1161 \newcommand{\PDIwnH}{\ensuremath{P(D|w,\beta)}\xspace}
1162 \newcommand{\PDwabnH}{\ensuremath{P(D,w,Ba,\beta)}\xspace}
1163 \newcommand{\PDIwnH}{\ensuremath{P(D|w)}\xspace}
1164 \newcommand{\PwIDnH}{\ensuremath{P(w|D)}\xspace}
1165 \newcommand{\PwabIDnH}{\ensuremath{P(w,\alpha,\beta|D)}\xspace}
1166
1167 \newcommand{\PDwBab}{\ensuremath{P(D,w,Ba,\beta|\mathcal{H})}\xspace}
1168 \newcommand{\PwIBa}{\ensuremath{P(w|Ba,\mathcal{H})}\xspace}
1169 \newcommand{\PBab}{\ensuremath{P(Ba,\beta|\mathcal{H})}\xspace}
1170 \newcommand{\PwBabID}{\ensuremath{P(w,Ba,\beta|D,\mathcal{H})}\xspace}
1171
1172 \newcommand{\PBanH}{\ensuremath{P(Ba)}\xspace}
1173 \newcommand{\PwIBanH}{\ensuremath{P(w|Ba)}\xspace}
1174
1175 %% Snakes
1176 \newcommand{\Esnake}{\ensuremath{\mathit{E}_{\{snake\}}}\xspace}
1177 \newcommand{\Eimage}{\ensuremath{\mathit{E}_{\{image\}}}\xspace}
1178 \newcommand{\Econt}{\ensuremath{\mathit{E}_{\{cont\}}}\xspace}
1179 \newcommand{\Ecurv}{\ensuremath{\mathit{E}_{\{curv\}}}\xspace}
1180 \newcommand{\Eint}{\ensuremath{\mathit{E}_{\{int\}}}\xspace}
1181 \newcommand{\Eext}{\ensuremath{\mathit{E}_{\{ext\}}}\xspace}
1182 \newcommand{\Eterm}{\ensuremath{\mathit{E}_{\{term\}}}\xspace}
1183 \newcommand{\Eline}{\ensuremath{\mathit{E}_{\{line\}}}\xspace}
1184 \newcommand{\Edge}{\ensuremath{\mathit{E}_{\{edge\}}}\xspace}
1185 \newcommand{\Econ}{\ensuremath{\mathit{E}_{\{con\}}}\xspace}
1186 \newcommand{\Eangle}{\ensuremath{\mathit{E}_{\{angle\}}}\xspace}
1187 \newcommand{\Elshape}{\ensuremath{\mathit{E}_{\{lshape\}}}\xspace}
1188 \newcommand{\Eedgedir}{\ensuremath{\mathit{E}_{\{edgedir\}}}\xspace}
1189 \newcommand{\Emodel}{\ensuremath{\mathit{E}_{\{model\}}}\xspace}
1190 \newcommand{\wte}{\ensuremath{\mathit{w}_{\{term\}}}\xspace}
1191 \newcommand{\wli}{\ensuremath{\mathit{w}_{\{line\}}}\xspace}
1192 \newcommand{\wed}{\ensuremath{\mathit{w}_{\{edge\}}}\xspace}
1193 \newcommand{\wco}{\ensuremath{\mathit{w}_{\{con\}}}\xspace}
1194
1195
1196 %% Environments

```

```

1197 \newcounter{alg}
1198 \newenvironment{algorithm}[1]
1199 {
1200     \stepcounter{alg}
1201     \begin{table}[htb]
1202     \centering
1203     \begin{tabular}[t]{l}{11}
1204     \hline&\
1205     \multicolumn{2}{l}{\bf Algorithm \arabic{alg}: #1}\&\
1206 } {
1207     &\
1208     \hline
1209     \end{tabular}
1210     \end{table}
1211 }
1212 </definitions>

```

### 9.3 References File

```

1213 <*references>
1214 @MISC{Gunn:2001:pdflatex,
1215   author =      {S.R. Gunn},
1216   title  =      {PDFLaTeX Instructions},
1217   year   =      {2001},
1218   url    =      {http://www.ecs.soton.ac.uk/~srg/softwaretools/document/}
1219 }
1220 @MISC{Lovell:2011:updated,
1221   author =      {C. J. Lovell},
1222   title  =      {Updated templates},
1223   year   =      {2011}
1224 }
1225 @MISC{Gunn:2011:updated2,
1226   author =      {S.R. Gunn and C. J. Lovell},
1227   title  =      {Updated templates reference 2},
1228   year   =      {2011}
1229 }
1230
1231 </references>

```

### 9.4 Bibliography Style File

```

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

```

```

1247 %%
1248 %% Includes field URL for Internet addresses
1249 %%
1250 ENTRY
1251 { address
1252     author
1253     booktitle
1254     chapter
1255     edition
1256     editor
1257     howpublished
1258     institution
1259     isbn
1260     issn
1261     journal
1262     key
1263     month
1264     note
1265     number
1266     organization
1267     pages
1268     publisher
1269     school
1270     series
1271     title
1272     type
1273     url
1274     volume
1275     year
1276 }
1277 {}
1278 { label extra.label sort.label short.list }
1279
1280 INTEGERS { output.state before.all mid.sentence after.sentence after.block }
1281
1282 FUNCTION {init.state.consts}
1283 { #0 'before.all :=
1284   #1 'mid.sentence :=
1285   #2 'after.sentence :=
1286   #3 'after.block :=
1287 }
1288
1289 STRINGS { s t }
1290
1291 FUNCTION {output.nonnull}
1292 { 's :=
1293   output.state mid.sentence =
1294     { ", " * write$ }
1295     { output.state after.block =
1296       { add.period$ write$
1297         newline$
1298         "\newblock " write$
1299       }
1300       { output.state before.all =

```

```

1301         'write$
1302         { add.period$ " " * write$ }
1303     if$
1304 }
1305 if$
1306     mid.sentence 'output.state :=
1307 }
1308 if$
1309 s
1310 }
1311
1312 FUNCTION {output}
1313 { duplicate$ empty$
1314     'pop$
1315     'output.nonnull
1316     if$
1317 }
1318
1319 FUNCTION {output.check}
1320 { 't :=
1321     duplicate$ empty$
1322     { pop$ "empty " t * " in " * cite$ * warning$ }
1323     'output.nonnull
1324     if$
1325 }
1326
1327 FUNCTION {fin.entry}
1328 { add.period$
1329     write$
1330     newline$
1331 }
1332
1333 FUNCTION {new.block}
1334 { output.state before.all =
1335     'skip$
1336     { after.block 'output.state := }
1337     if$
1338 }
1339
1340 FUNCTION {new.sentence}
1341 { output.state after.block =
1342     'skip$
1343     { output.state before.all =
1344         'skip$
1345         { after.sentence 'output.state := }
1346         if$
1347     }
1348     if$
1349 }
1350
1351 FUNCTION {not}
1352 { { #0 }
1353     { #1 }
1354     if$

```

```

1355 }
1356
1357 FUNCTION {and}
1358 {   'skip$
1359     { pop$ #0 }
1360   if$
1361 }
1362
1363 FUNCTION {or}
1364 {   { pop$ #1 }
1365     'skip$
1366   if$
1367 }
1368
1369 FUNCTION {new.block.checka}
1370 { empty$
1371   'skip$
1372   'new.block
1373   if$
1374 }
1375
1376 FUNCTION {new.block.checkb}
1377 { empty$
1378   swap$ empty$
1379   and
1380   'skip$
1381   'new.block
1382   if$
1383 }
1384
1385 FUNCTION {new.sentence.checka}
1386 { empty$
1387   'skip$
1388   'new.sentence
1389   if$
1390 }
1391
1392 FUNCTION {new.sentence.checkb}
1393 { empty$
1394   swap$ empty$
1395   and
1396   'skip$
1397   'new.sentence
1398   if$
1399 }
1400
1401 FUNCTION {field.or.null}
1402 { duplicate$ empty$
1403   { pop$ "" }
1404   'skip$
1405   if$
1406 }
1407
1408 FUNCTION {emphasize}

```



```

1409 { duplicate$ empty$
1410     { pop$ "" }
1411     { "{\em " swap$ * "}" * }
1412     if$
1413 }
1414
1415 INTEGERS { nameptr namesleft numnames }
1416
1417 FUNCTION {format.names}
1418 { 's :=
1419   #1 'nameptr :=
1420   s num.names$ 'numnames :=
1421   numnames 'namesleft :=
1422   { namesleft #0 > }
1423   { s nameptr "{ff~}{vv~}{ll}{, jj}" format.name$ 't :=
1424     nameptr #1 >
1425     { namesleft #1 >
1426       { ", " * t * }
1427       { numnames #2 >
1428         { ", " * }
1429         'skip$
1430         if$
1431         t "others" =
1432           { " et~al." * }
1433           { " and " * t * }
1434         if$
1435       }
1436       if$
1437     }
1438     't
1439     if$
1440     nameptr #1 + 'nameptr :=
1441     namesleft #1 - 'namesleft :=
1442   }
1443   while$
1444 }
1445
1446 FUNCTION {format.key}
1447 { empty$
1448   { key field.or.null }
1449   { "" }
1450   if$
1451 }
1452
1453 FUNCTION {format.authors}
1454 { author empty$
1455   { "" }
1456   { author format.names }
1457   if$
1458 }
1459
1460 FUNCTION {format.editors}
1461 { editor empty$
1462   { "" }

```

```

1463     { editor format.names
1464         editor num.names$ #1 >
1465         { ", editors" * }
1466         { ", editor" * }
1467         if$
1468     }
1469     if$
1470 }
1471
1472 FUNCTION {format.isbn}
1473 { isbn empty$
1474     { "" }
1475     { new.block "ISBN " isbn * }
1476     if$
1477 }
1478
1479 FUNCTION {format.issn}
1480 { issn empty$
1481     { "" }
1482     { new.block "ISSN " issn * }
1483     if$
1484 }
1485
1486 %FUNCTION {format.url}
1487 %{ url empty$
1488 %     { "" }
1489 %     { new.block "URL \url{" url * "}" * }
1490 %     if$
1491 %}
1492 %
1493 %FUNCTION {format.title}
1494 %{ title empty$
1495 %     { "" }
1496 %     { title "t" change.case$ }
1497 %     if$
1498 %}
1499 FUNCTION {format.url}
1500 { ""
1501 }
1502
1503 FUNCTION {format.title}
1504 { title empty$
1505     { "" }
1506     { url empty$
1507         { title "t" change.case$ }
1508         { "\href{" url * "}" * title "t" change.case$ * "}" * }
1509         if$
1510     }
1511     if$
1512 }
1513
1514
1515 FUNCTION {format.full.names}
1516 {'s :=

```

```

1517 #1 'nameptr :=
1518 s num.names$ 'numnames :=
1519 numnames 'namesleft :=
1520 { namesleft #0 > }
1521 { s nameptr
1522   "{vv~}{ll}" format.name$ 't :=
1523   nameptr #1 >
1524   {
1525     namesleft #1 >
1526     { ", " * t * }
1527     {
1528       numnames #2 >
1529       { ", " * }
1530       'skip$
1531       if$
1532       t "others" =
1533       { " et~al." * }
1534       { " and " * t * }
1535       if$
1536     }
1537     if$
1538   }
1539   't
1540   if$
1541   nameptr #1 + 'nameptr :=
1542   namesleft #1 - 'namesleft :=
1543 }
1544 while$
1545 }
1546
1547 FUNCTION {author.editor.full}
1548 { author empty$
1549   { editor empty$
1550     { "" }
1551     { editor format.full.names }
1552     if$
1553   }
1554   { author format.full.names }
1555   if$
1556 }
1557
1558 FUNCTION {author.full}
1559 { author empty$
1560   { "" }
1561   { author format.full.names }
1562   if$
1563 }
1564
1565 FUNCTION {editor.full}
1566 { editor empty$
1567   { "" }
1568   { editor format.full.names }
1569   if$
1570 }

```

```

1571
1572 FUNCTION {make.full.names}
1573 { type$ "book" =
1574   type$ "inbook" =
1575   or
1576     'author.editor.full
1577     { type$ "proceedings" =
1578       'editor.full
1579       'author.full
1580       if$
1581     }
1582   if$
1583 }
1584
1585 FUNCTION {output.bibitem}
1586 { newline$
1587   "\bibitem[" write$
1588   label write$
1589   ")" make.full.names duplicate$ short.list =
1590     { pop$ }
1591     { * }
1592   if$
1593   "]" * write$
1594   cite$ write$
1595   "]" write$
1596   newline$
1597   ""
1598   before.all 'output.state :=
1599 }
1600
1601 FUNCTION {n.dashify}
1602 { 't :=
1603   ""
1604   { t empty$ not }
1605   { t #1 #1 substring$ "-" =
1606     { t #1 #2 substring$ "--" = not
1607       { "--" *
1608         t #2 global.max$ substring$ 't :=
1609       }
1610       { { t #1 #1 substring$ "-" = }
1611         { "-" *
1612           t #2 global.max$ substring$ 't :=
1613         }
1614       while$
1615     }
1616     if$
1617   }
1618   { t #1 #1 substring$ *
1619     t #2 global.max$ substring$ 't :=
1620   }
1621   if$
1622 }
1623 while$
1624 }

```

```

1625
1626 FUNCTION {format.date}
1627 { year duplicate$ empty$
1628   { "empty year in " cite$ * warning$
1629     pop$ "" }
1630   'skip$
1631   if$
1632   month empty$
1633     'skip$
1634     { month
1635       " " * swap$ *
1636     }
1637   if$
1638   extra.label *
1639 }
1640
1641 FUNCTION {format.btitle}
1642 { title emphasize
1643 }
1644
1645 FUNCTION {tie.or.space.connect}
1646 { duplicate$ text.length$ #3 <
1647   { "~" }
1648   { " " }
1649   if$
1650   swap$ * *
1651 }
1652
1653 FUNCTION {either.or.check}
1654 { empty$
1655   'pop$
1656   { "can't use both " swap$ * " fields in " * cite$ * warning$ }
1657   if$
1658 }
1659
1660 FUNCTION {format.bvolume}
1661 { volume empty$
1662   { "" }
1663   { "volume" volume tie.or.space.connect
1664     series empty$
1665     'skip$
1666     { " of " * series emphasize * }
1667     if$
1668     "volume and number" number either.or.check
1669   }
1670   if$
1671 }
1672
1673 FUNCTION {format.number.series}
1674 { volume empty$
1675   { number empty$
1676     { series field.or.null }
1677     { output.state mid.sentence =
1678       { "number" }

```

```

1679         { "Number" }
1680     if$
1681     number tie.or.space.connect
1682     series empty$
1683     { "there's a number but no series in " cite$ * warning$ }
1684     { " in " * series * }
1685     if$
1686 }
1687 if$
1688 }
1689 { "" }
1690 if$
1691 }
1692
1693 FUNCTION {format.edition}
1694 { edition empty$
1695     { "" }
1696     { output.state mid.sentence =
1697         { edition "l" change.case$ " edition" * }
1698         { edition "t" change.case$ " edition" * }
1699         if$
1700     }
1701     if$
1702 }
1703
1704 INTEGERS { multiresult }
1705
1706 FUNCTION {multi.page.check}
1707 { 't :=
1708     #0 'multiresult :=
1709     { multiresult not
1710         t empty$ not
1711         and
1712     }
1713     { t #1 #1 substring$
1714         duplicate$ "-" =
1715         swap$ duplicate$ "," =
1716         swap$ "+" =
1717         or or
1718         { #1 'multiresult := }
1719         { t #2 global.max$ substring$ 't := }
1720         if$
1721     }
1722     while$
1723     multiresult
1724 }
1725
1726 FUNCTION {format.pages}
1727 { pages empty$
1728     { "" }
1729     { pages multi.page.check
1730         { "pages" pages n.dashify tie.or.space.connect }
1731         { "page" pages tie.or.space.connect }
1732         if$

```

```

1733     }
1734     if$
1735 }
1736
1737 FUNCTION {format.vol.num.pages}
1738 { volume field.or.null
1739   number empty$
1740   'skip$
1741   { "\penalty0 (" number * ")" * *
1742     volume empty$
1743     { "there's a number but no volume in " cite$ * warning$ }
1744     'skip$
1745     if$
1746   }
1747   if$
1748   pages empty$
1749   'skip$
1750   { duplicate$ empty$
1751     { pop$ format.pages }
1752     { ":\penalty0 " * pages n.dashify * }
1753     if$
1754   }
1755   if$
1756 }
1757
1758 FUNCTION {format.chapter.pages}
1759 { chapter empty$
1760   'format.pages
1761   { type empty$
1762     { "chapter" }
1763     { type "1" change.case$ }
1764     if$
1765     chapter tie.or.space.connect
1766     pages empty$
1767     'skip$
1768     { ", " * format.pages * }
1769     if$
1770   }
1771   if$
1772 }
1773
1774 FUNCTION {format.in.ed.booktitle}
1775 { booktitle empty$
1776   { "" }
1777   { editor empty$
1778     { "In " booktitle emphasize * }
1779     { "In " format.editors * ", " * booktitle emphasize * }
1780     if$
1781   }
1782   if$
1783 }
1784
1785 FUNCTION {empty.misc.check}
1786 { author empty$ title empty$ howpublished empty$

```

```

1787 month empty$ year empty$ note empty$
1788 and and and and and
1789 key empty$ not and
1790 { "all relevant fields are empty in " cite$ * warning$ }
1791 'skip$
1792 if$
1793 }
1794
1795 FUNCTION {format.thesis.type}
1796 { type empty$
1797   'skip$
1798   { pop$
1799     type "t" change.case$
1800   }
1801   if$
1802 }
1803
1804 FUNCTION {format.tr.number}
1805 { type empty$
1806   { "Technical Report" }
1807   'type
1808   if$
1809   number empty$
1810   { "t" change.case$ }
1811   { number tie.or.space.connect }
1812   if$
1813 }
1814
1815 FUNCTION {format.article.crossref}
1816 { key empty$
1817   { journal empty$
1818     { "need key or journal for " cite$ * " to crossref " * crossref *
1819       warning$
1820       ""
1821     }
1822     { "In {\em " journal * "\/}" * }
1823     if$
1824   }
1825   { "In " key * }
1826   if$
1827   " \citep{" * crossref * "}" *
1828 }
1829
1830 FUNCTION {format.book.crossref}
1831 { volume empty$
1832   { "empty volume in " cite$ * "'s crossref of " * crossref * warning$
1833     "In "
1834   }
1835   { "Volume" volume tie.or.space.connect
1836     " of " *
1837   }
1838   if$
1839   editor empty$
1840   editor field.or.null author field.or.null =

```



```

1841 or
1842   { key empty$
1843     { series empty$
1844       { "need editor, key, or series for " cite$ * " to crossref " *
1845         crossref * warning$
1846         "" *
1847       }
1848       { "{\em " * series * "\/}" * }
1849     if$
1850   }
1851   { key * }
1852   if$
1853 }
1854 'skip$
1855 if$
1856 ", \citet{" * crossref * "}" *
1857 }
1858
1859 FUNCTION {format.incoll.inproc.crossref}
1860 { editor empty$
1861   editor field.or.null author field.or.null =
1862   or
1863   { key empty$
1864     { booktitle empty$
1865       { "need editor, key, or booktitle for " cite$ * " to crossref " *
1866         crossref * warning$
1867         ""
1868       }
1869       { "In {\em " booktitle * "\/}" * }
1870     if$
1871   }
1872   { "In " key * }
1873   if$
1874 }
1875 { "In " }
1876 if$
1877 " \citet{" * crossref * "}" *
1878 }
1879
1880 FUNCTION {article}
1881 { output.bibitem
1882   format.authors "author" output.check
1883   author format.key output
1884   new.block
1885   format.title "title" output.check
1886   new.block
1887   crossref missing$
1888   { journal emphasize "journal" output.check
1889     format.vol.num.pages output
1890     format.date "year" output.check
1891   }
1892   { format.article.crossref output.nonnull
1893     format.pages output
1894   }

```

```

1895 if$
1896 format.issn output
1897 format.url output
1898 new.block
1899 note output
1900 fin.entry
1901 }
1902
1903 FUNCTION {book}
1904 { output.bibitem
1905   author empty$
1906     { format.editors "author and editor" output.check
1907       editor format.key output
1908     }
1909     { format.authors output.nonnull
1910       crossref missing$
1911         { "author and editor" editor either.or.check }
1912         'skip$
1913       if$
1914     }
1915   if$
1916   new.block
1917   format.btitle "title" output.check
1918   crossref missing$
1919     { format.bvolume output
1920       new.block
1921       format.number.series output
1922       new.sentence
1923       publisher "publisher" output.check
1924       address output
1925     }
1926     { new.block
1927       format.book.crossref output.nonnull
1928     }
1929   if$
1930   format.edition output
1931   format.date "year" output.check
1932   format.isbn output
1933   format.url output
1934   new.block
1935   note output
1936   fin.entry
1937 }
1938
1939 FUNCTION {booklet}
1940 { output.bibitem
1941   format.authors output
1942   author format.key output
1943   new.block
1944   format.title "title" output.check
1945   howpublished address new.block.checkb
1946   howpublished output
1947   address output
1948   format.date output

```

```

1949 format.isbn output
1950 format.url output
1951 new.block
1952 note output
1953 fin.entry
1954 }
1955
1956 FUNCTION {inbook}
1957 { output.bibitem
1958   author empty$
1959     { format.editors "author and editor" output.check
1960       editor format.key output
1961     }
1962     { format.authors output.nonnull
1963       crossref missing$
1964         { "author and editor" editor either.or.check }
1965         'skip$
1966       if$
1967     }
1968   if$
1969   new.block
1970   format.btitle "title" output.check
1971   crossref missing$
1972     { format.bvolume output
1973       format.chapter.pages "chapter and pages" output.check
1974       new.block
1975       format.number.series output
1976       new.sentence
1977       publisher "publisher" output.check
1978       address output
1979     }
1980     { format.chapter.pages "chapter and pages" output.check
1981       new.block
1982       format.book.crossref output.nonnull
1983     }
1984   if$
1985   format.edition output
1986   format.date "year" output.check
1987   format.isbn output
1988   format.url output
1989   new.block
1990   note output
1991   fin.entry
1992 }
1993
1994 FUNCTION {incollection}
1995 { output.bibitem
1996   format.authors "author" output.check
1997   author format.key output
1998   new.block
1999   format.title "title" output.check
2000   new.block
2001   crossref missing$
2002     { format.in.ed.booktitle "booktitle" output.check

```

```

2003     format.bvolume output
2004     format.number.series output
2005     format.chapter.pages output
2006     new.sentence
2007     publisher "publisher" output.check
2008     address output
2009     format.edition output
2010     format.date "year" output.check
2011 }
2012 { format.incoll.inproc.crossref output.nonnull
2013     format.chapter.pages output
2014 }
2015 if$
2016     format.isbn output
2017     format.url output
2018     new.block
2019     note output
2020     fin.entry
2021 }
2022
2023 FUNCTION {inproceedings}
2024 { output.bibitem
2025     format.authors "author" output.check
2026     author format.key output
2027     new.block
2028     format.title "title" output.check
2029     new.block
2030     crossref missing$
2031     { format.in.ed.booktitle "booktitle" output.check
2032         format.bvolume output
2033         format.number.series output
2034         format.pages output
2035         address empty$
2036         { organization publisher new.sentence.checkb
2037             organization output
2038             publisher output
2039             format.date "year" output.check
2040         }
2041         { address output.nonnull
2042             format.date "year" output.check
2043             new.sentence
2044             organization output
2045             publisher output
2046         }
2047     } if$
2048 }
2049 { format.incoll.inproc.crossref output.nonnull
2050     format.pages output
2051 }
2052 if$
2053     format.isbn output
2054     format.url output
2055     new.block
2056     note output

```

```

2057     fin.entry
2058 }
2059
2060 FUNCTION {conference} { inproceedings }
2061
2062 FUNCTION {manual}
2063 { output.bibitem
2064   format.authors output
2065   author format.key output
2066   new.block
2067   format.btitle "title" output.check
2068   organization address new.block.checkb
2069   organization output
2070   address output
2071   format.edition output
2072   format.date output
2073   format.url output
2074   new.block
2075   note output
2076   fin.entry
2077 }
2078
2079 FUNCTION {mastersthesis}
2080 { output.bibitem
2081   format.authors "author" output.check
2082   author format.key output
2083   new.block
2084   format.title "title" output.check
2085   new.block
2086   "Master's thesis" format.thesis.type output.nonnull
2087   school "school" output.check
2088   address output
2089   format.date "year" output.check
2090   format.url output
2091   new.block
2092   note output
2093   fin.entry
2094 }
2095
2096 FUNCTION {misc}
2097 { output.bibitem
2098   format.authors output
2099   author format.key output
2100   title howpublished new.block.checkb
2101   format.title output
2102   howpublished new.block.checka
2103   howpublished output
2104   format.date output
2105   format.issn output
2106   format.url output
2107   new.block
2108   note output
2109   fin.entry
2110   empty.misc.check

```

```

2111 }
2112
2113 FUNCTION {phdthesis}
2114 { output.bibitem
2115   format.authors "author" output.check
2116   author format.key output
2117   new.block
2118   format.btitle "title" output.check
2119   new.block
2120   "PhD thesis" format.thesis.type output.nonnull
2121   school "school" output.check
2122   address output
2123   format.date "year" output.check
2124   format.url output
2125   new.block
2126   note output
2127   fin.entry
2128 }
2129
2130 FUNCTION {proceedings}
2131 { output.bibitem
2132   format.editors output
2133   editor format.key output
2134   new.block
2135   format.btitle "title" output.check
2136   format.bvolume output
2137   format.number.series output
2138   address output
2139   format.date "year" output.check
2140   new.sentence
2141   organization output
2142   publisher output
2143   format.isbn output
2144   format.url output
2145   new.block
2146   note output
2147   fin.entry
2148 }
2149
2150 FUNCTION {techreport}
2151 { output.bibitem
2152   format.authors "author" output.check
2153   author format.key output
2154   new.block
2155   format.title "title" output.check
2156   new.block
2157   format.tr.number output.nonnull
2158   institution "institution" output.check
2159   address output
2160   format.date "year" output.check
2161   format.url output
2162   new.block
2163   note output
2164   fin.entry

```

```

2165 }
2166
2167 FUNCTION {unpublished}
2168 { output.bibitem
2169   format.authors "author" output.check
2170   author format.key output
2171   new.block
2172   format.title "title" output.check
2173   format.url output
2174   new.block
2175   note "note" output.check
2176   format.date output
2177   fin.entry
2178 }
2179
2180 FUNCTION {default.type} { misc }
2181
2182
2183 MACRO {jan} {"January"}
2184
2185 MACRO {feb} {"February"}
2186
2187 MACRO {mar} {"March"}
2188
2189 MACRO {apr} {"April"}
2190
2191 MACRO {may} {"May"}
2192
2193 MACRO {jun} {"June"}
2194
2195 MACRO {jul} {"July"}
2196
2197 MACRO {aug} {"August"}
2198
2199 MACRO {sep} {"September"}
2200
2201 MACRO {oct} {"October"}
2202
2203 MACRO {nov} {"November"}
2204
2205 MACRO {dec} {"December"}
2206
2207
2208
2209 MACRO {acmcs} {"ACM Computing Surveys"}
2210
2211 MACRO {acta} {"Acta Informatica"}
2212
2213 MACRO {cacm} {"Communications of the ACM"}
2214
2215 MACRO {ibmjrd} {"IBM Journal of Research and Development"}
2216
2217 MACRO {ibmsj} {"IBM Systems Journal"}
2218

```

```

2219 MACRO {ieeese} {"IEEE Transactions on Software Engineering"}
2220
2221 MACRO {ieeetc} {"IEEE Transactions on Computers"}
2222
2223 MACRO {ieeetcad}
2224 {"IEEE Transactions on Computer-Aided Design of Integrated Circuits"}
2225
2226 MACRO {ipl} {"Information Processing Letters"}
2227
2228 MACRO {jacm} {"Journal of the ACM"}
2229
2230 MACRO {jcass} {"Journal of Computer and System Sciences"}
2231
2232 MACRO {scps} {"Science of Computer Programming"}
2233
2234 MACRO {sicomp} {"SIAM Journal on Computing"}
2235
2236 MACRO {tocs} {"ACM Transactions on Computer Systems"}
2237
2238 MACRO {tods} {"ACM Transactions on Database Systems"}
2239
2240 MACRO {tog} {"ACM Transactions on Graphics"}
2241
2242 MACRO {toms} {"ACM Transactions on Mathematical Software"}
2243
2244 MACRO {toois} {"ACM Transactions on Office Information Systems"}
2245
2246 MACRO {toplas} {"ACM Transactions on Programming Languages and Systems"}
2247
2248 MACRO {tcs} {"Theoretical Computer Science"}
2249
2250
2251 READ
2252
2253 FUNCTION {sortify}
2254 {
2255   's :=
2256   "1" change.case$
2257 }
2258
2259 INTEGERS { len }
2260
2261 FUNCTION {chop.word}
2262 {
2263   's :=
2264   'len :=
2265   s #1 len substring$ =
2266   { s len #1 + global.max$ substring$ }
2267   's
2268   if$
2269 }
2270
2271 FUNCTION {format.lab.names}
2272 {
2273   's :=
2274   s #1 "{vv~}{ll}" format.name$
2275   s num.names$ duplicate$

```



```

2273 #2 >
2274 { pop$ " et~al." * }
2275 { #2 <
2276   'skip$
2277   { s #2 "{ff }{vv }{ll}{ jj}" format.name$ "others" =
2278     { " et~al." * }
2279     { " and " * s #2 "{vv~}{ll}" format.name$ * }
2280   if$
2281   }
2282   if$
2283   }
2284 if$
2285 }
2286
2287 FUNCTION {author.key.label}
2288 { author empty$
2289   { key empty$
2290     { cite$ #1 #3 substring$ }
2291     'key
2292     if$
2293   }
2294   { author format.lab.names }
2295   if$
2296 }
2297
2298 FUNCTION {author.editor.key.label}
2299 { author empty$
2300   { editor empty$
2301     { key empty$
2302       { cite$ #1 #3 substring$ }
2303       'key
2304       if$
2305     }
2306     { editor format.lab.names }
2307     if$
2308   }
2309   { author format.lab.names }
2310   if$
2311 }
2312
2313 FUNCTION {author.key.organization.label}
2314 { author empty$
2315   { key empty$
2316     { organization empty$
2317       { cite$ #1 #3 substring$ }
2318       { "The " #4 organization chop.word #3 text.prefix$ }
2319       if$
2320     }
2321     'key
2322     if$
2323   }
2324   { author format.lab.names }
2325   if$
2326 }

```

```

2327
2328 FUNCTION {editor.key.organization.label}
2329 { editor empty$
2330   { key empty$
2331     { organization empty$
2332       { cite$ #1 #3 substring$ }
2333       { "The " #4 organization chop.word #3 text.prefix$ }
2334       if$
2335     }
2336     'key
2337     if$
2338   }
2339   { editor format.lab.names }
2340   if$
2341 }
2342
2343 FUNCTION {calc.short.authors}
2344 { type$ "book" =
2345   type$ "inbook" =
2346   or
2347   'author.editor.key.label
2348   { type$ "proceedings" =
2349     'editor.key.organization.label
2350     { type$ "manual" =
2351       'author.key.organization.label
2352       'author.key.label
2353       if$
2354     }
2355     if$
2356   }
2357   if$
2358   'short.list :=
2359 }
2360
2361 FUNCTION {calc.label}
2362 { calc.short.authors
2363   short.list
2364   "("
2365   *
2366   year duplicate$ empty$
2367   short.list key field.or.null = or
2368     { pop$ "" }
2369     'skip$
2370   if$
2371   *
2372   'label :=
2373 }
2374
2375 FUNCTION {sort.format.names}
2376 { 's :=
2377   #1 'nameptr :=
2378   ""
2379   s num.names$ 'numnames :=
2380   numnames 'namesleft :=

```

```

2381 { namesleft #0 > }
2382 { nameptr #1 >
2383   { " " * }
2384   'skip$
2385   if$
2386   s nameptr "{vv{ } }{ll{ }}{ ff{ }}{ jj{ }}" format.name$ 't :=
2387   nameptr numnames = t "others" = and
2388   { "et al" * }
2389   { t sortify * }
2390   if$
2391   nameptr #1 + 'nameptr :=
2392   namesleft #1 - 'namesleft :=
2393 }
2394 while$
2395 }
2396
2397 FUNCTION {sort.format.title}
2398 { 't :=
2399   "A " #2
2400   "An " #3
2401   "The " #4 t chop.word
2402   chop.word
2403   chop.word
2404   sortify
2405   #1 global.max$ substring$
2406 }
2407
2408 FUNCTION {author.sort}
2409 { author empty$
2410   { key empty$
2411     { "to sort, need author or key in " cite$ * warning$
2412       ""
2413     }
2414     { key sortify }
2415     if$
2416   }
2417   { author sort.format.names }
2418   if$
2419 }
2420
2421 FUNCTION {author.editor.sort}
2422 { author empty$
2423   { editor empty$
2424     { key empty$
2425       { "to sort, need author, editor, or key in " cite$ * warning$
2426         ""
2427       }
2428       { key sortify }
2429       if$
2430     }
2431     { editor sort.format.names }
2432     if$
2433   }
2434   { author sort.format.names }

```

```

2435 if$
2436 }
2437
2438 FUNCTION {author.organization.sort}
2439 { author empty$
2440   { organization empty$
2441     { key empty$
2442       { "to sort, need author, organization, or key in " cite$ * warning$
2443         ""
2444       }
2445       { key sortify }
2446     if$
2447   }
2448   { "The " #4 organization chop.word sortify }
2449   if$
2450 }
2451 { author sort.format.names }
2452 if$
2453 }
2454
2455 FUNCTION {editor.organization.sort}
2456 { editor empty$
2457   { organization empty$
2458     { key empty$
2459       { "to sort, need editor, organization, or key in " cite$ * warning$
2460         ""
2461       }
2462       { key sortify }
2463     if$
2464   }
2465   { "The " #4 organization chop.word sortify }
2466   if$
2467 }
2468 { editor sort.format.names }
2469 if$
2470 }
2471
2472 FUNCTION {presort}
2473 { calc.label
2474   label sortify
2475   " "
2476   *
2477   type$ "book" =
2478   type$ "inbook" =
2479   or
2480   'author.editor.sort
2481   { type$ "proceedings" =
2482     'editor.organization.sort
2483     { type$ "manual" =
2484       'author.organization.sort
2485       'author.sort
2486     if$
2487   }
2488   if$

```

```

2489     }
2490     if$
2491     "      "
2492     *
2493     year field.or.null sortify
2494     *
2495     "      "
2496     *
2497     title field.or.null
2498     sort.format.title
2499     *
2500     #1 entry.max$ substring$
2501     'sort.label :=
2502     sort.label *
2503     #1 entry.max$ substring$
2504     'sort.key$ :=
2505 }
2506
2507 ITERATE {presort}
2508
2509 SORT
2510
2511 STRINGS { longest.label last.label next.extra }
2512
2513 INTEGERS { longest.label.width last.extra.num number.label }
2514
2515 FUNCTION {initialize.longest.label}
2516 { "" 'longest.label :=
2517   #0 int.to.chr$ 'last.label :=
2518   "" 'next.extra :=
2519   #0 'longest.label.width :=
2520   #0 'last.extra.num :=
2521   #0 'number.label :=
2522 }
2523
2524 FUNCTION {forward.pass}
2525 { last.label label =
2526   { last.extra.num #1 + 'last.extra.num :=
2527     last.extra.num int.to.chr$ 'extra.label :=
2528   }
2529   { "a" chr.to.int$ 'last.extra.num :=
2530     "" 'extra.label :=
2531     label 'last.label :=
2532   }
2533   if$
2534   number.label #1 + 'number.label :=
2535 }
2536
2537 FUNCTION {reverse.pass}
2538 { next.extra "b" =
2539   { "a" 'extra.label := }
2540   'skip$
2541   if$
2542   extra.label 'next.extra :=

```

```

2543 extra.label
2544 duplicate$ empty$
2545 'skip$
2546 { "{\natexlab{" swap$ * "}}" * }
2547 if$
2548 'extra.label :=
2549 label extra.label * 'label :=
2550 }
2551
2552 EXECUTE {initialize.longest.label}
2553
2554 ITERATE {forward.pass}
2555
2556 REVERSE {reverse.pass}
2557
2558 FUNCTION {bib.sort.order}
2559 { sort.label 'sort.key$ :=
2560 }
2561
2562 ITERATE {bib.sort.order}
2563
2564 SORT
2565
2566 FUNCTION {begin.bib}
2567 { preamble$ empty$
2568 'skip$
2569 { preamble$ write$ newline$ }
2570 if$
2571 "\begin{thebibliography}" number.label int.to.str$ * "}" *
2572 write$ newline$
2573 "\expandafter\ifx\csname natexlab\endcsname\relax\def\natexlab#1{#1}\fi"
2574 write$ newline$
2575 "\expandafter\ifx\csname url\endcsname\relax" write$ newline$
2576 " \def\url#1{{\tt #1}}\fi" write$ newline$
2577 }
2578
2579 EXECUTE {begin.bib}
2580
2581 EXECUTE {init.state.consts}
2582
2583 ITERATE {call.type$}
2584
2585 FUNCTION {end.bib}
2586 { newline$
2587 "\end{thebibliography}" write$ newline$
2588 }
2589
2590 EXECUTE {end.bib}
2591 </bst>

```