



Papers Accompanying the 14th ICS Conference—Style Instructions

Mirko Janc

INFORMS, 5521 Research Park Drive, Catonsville, Maryland 21228, USA,
mirko.janc@informs.org

Second User, Third Author

Computer Science Department, University of Anystate, Someville, Anystate 02005, USA,
{second.user@anystate.edu, third.author@anystate.edu}

Abstract The text here should be your abstract. If at all possible, avoid having more than one paragraph. Formulas are not forbidden but should be avoided because the abstract will be also “out there” in Internet environments that are not “math-friendly.” References from the abstract should also be avoided. If a reference is absolutely necessary, it should be shown in full. Under the abstract are the keywords. They should be listed in their natural case, as a semicolon-separated list. The text that follows gives additional explanations of how to use the style for producing papers for the proceedings, to published open access.

Keywords ICS 2015; operations research publications; paper preprints; LaTeX templates; LaTeX styles

1. Introduction

We give a brief overview of some elements that appear in the INFORMS Computing Society Conference Proceedings style. The style is based on standard fonts that come with TeX for free. It is assumed that you run LaTeX2e (not the obsolete LaTeX 2.09). Your system should use PostScript Type1 Computer Modern fonts (that are truly scalable!), not the bitmapped fonts. Type1 fonts come with any of currently available popular TeX systems—free systems (MiKTeX, TeTeX, OzTeX, etc.), or commercial TeX implementations (PCTeX, YYPeX, Textures, etc.).

For versatility of handling mathematics, `amsmath` and `amssymb` packages are preloaded by the style—you do not have to declare them via `\usepackage`. For inclusion of graphics, `graphicx` package is also automatically preloaded by the style. Because of the everywhere present Web addresses, package `url` is also preloaded. For LaTeX related questions that are not a part of “how to use this style?”, please refer to any of LaTeX textbooks or references.

One often neglected element of style is the treatment of upper- and lowercase in a sentence or a fragment. Our style does not allow all uppercase titles/heads. The other two possibilities and their usage in the INFORMS Computing Society Conference Proceedings style are shown in Table 1.

1.1. Section Numbering

Sections are numbered in the usual way. Generally, the style allows for numbering down to level 5, which is the standard LaTeX term for the sequence of headings `\section`,

TABLE 1. *Title style vs. sentence style: overview of the usage.*

Case style	Example	Usage
Title style	Example Bibliography	Chapter title; section, subsection, subsubsection, paragraph, and subparagraph titles; running heads; heads of all theorem-like environments; book, journal, dissertation, etc. titles in references
Sentence style	Example bibliography	Figure and table captions; figure and table notes; table column heads; words and sentence fragments as table body entries; article titles in references

`\subsection`, `\subsubsection`, `\paragraph`, and `\subparagraph`. Depending on the structural complexity of your chapter, use the command `\setcounter{secnumdepth}{<depth>}` to set an appropriate level of numbering.

Excessive numbering reduces the clarity of exposition. Heads should be numbered only as deep as it is necessary. Typically, values `...{secnumdepth}{3}` or `...{secnumdepth}{2}` are good choices. The style default is “3”. Do not change it unless you have good reasons to do so.

1.2. Equation, Theorem, Figure, and Table Numbering

As a rule of thumb, each heading you use should fit into one of the sectioning categories (numbered or not) or into one of the theorem-like environments (theorems, lemmas, propositions, corollaries, claims, definitions, remarks, proofs, etc.).

Other than section numbering, two other major groups of counting sequences are equations and theorem-like environments (enunciations). The way they are numbered is determined by the style. If you have a side comment with any of the theorem-like environments’ titles, declare it in the optional argument

```
\begin{lemma}[Farkas, see \cite{bookwebDynamic}]
Text of the Farkas lemma.
\end{lemma}
```

which gives

Lemma 1 (Farkas, see [12]). *Text of the Farkas lemma.*

You will notice that some theorem-like environments are set in italic and separated from the surrounding text by some space, whereas the others are all-roman and have no extra space above and below. The style takes care of all such issues. Do not manually space out any of the enunciations.

For INFORMS Computing Society Conference Proceedings chapters our style prefers (and enforces) simple numbering of figures and tables. Both figures and tables will be numbered as 1, 2, Captions will start with FIGURE 1, FIGURE 2, TABLE 1, TABLE 5, etc.

2. Figures and Tables

For handling figures and tables, we provide macros `\FIGURE` and `\TABLE` to capture the content of a floating element (figure or table), its caption, and possible notes. Captions should be kept simple, typically as a sentence fragment. Any additional information, including table footnotes, should be set as the third argument to `\FIGURE` or `\TABLE`.

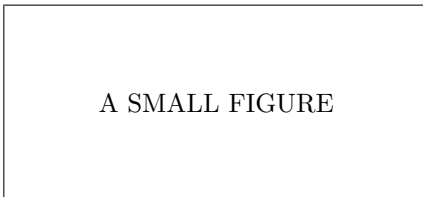
A typical case is Figure 1:

FIGURE 1. A figure spanning the whole width of the text.



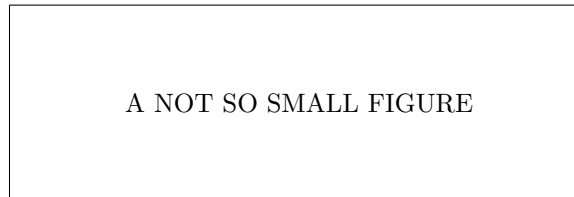
Note. We use type instead of a real figure to reduce the size of this file.

FIGURE 2. A small figure.



Note. See www.asmallfigure.com.

FIGURE 3. A not so small figure.



Note. A figure note here.

```
\begin{figure}[t]
\FIGURE
{A figure spanning the whole width of the text.\label{fig1}}
{\framebox{\hbox to 388bp{\HD{47}{30}\hss\fs.24.30. A\ \ \ W I D E\ \ \ F I G U R E\hss}}}{
{We use type instead of a real figure to reduce the size of this file.}
\end{figure}
```

Note that `\FIGURE` has three arguments: (1) caption with label, (2) included graphics that will be automatically centered in the available `\hsize`, and (3) optional (foot)note. If you do not need the note field just leave it as an empty pair of braces `{}`. For syntax, it must be present even in that (empty) case.

For inclusion of graphics, use the `\includegraphics` syntax from `graphicx`. For example, if the figure name is `fracimage1.eps` and it should span the full width of the text (5.5 in), you would include

```
\includegraphics[width=5.5in]{fracimage1.eps}
```

as the second argument to `\FIGURE`.

Similar macro, `\TABLE`, has three arguments: (1) caption with label, (2) table itself by using the produced by `tabular` or `tabular*` environments, and (3) optional (foot)note. Per style, tables have only three horizontal lines: above the table, between table column heads and the table body, and after the table body. Vertical rules are discouraged.

If the table is too big, it may be necessary to reduce its type size. Such font (and other) adjustments should be done within the second argument of `\TABLE`, just before `\begin{tabular*}`.

TABLE 2. A little caption.

State	Capital
Maryland	Annapolis
Virginia	Richmond
Colorado	Denver

Note. A note?

TABLE 3. A somewhat longer caption just to get into the second line.

State	Capital	State	Capital
Maryland	Annapolis	Pennsylvania	Harrisburg
Virginia	Richmond	Georgia	Atlanta
Colorado	Denver	Illinois	Springfield

To make the table better styled regarding vertical spacing around rules, use macro `\up` in one of the entries after the horizontal lines and `\down` in one of the entries before horizontal lines. The small Table 2 is coded as

```
\TABLE
{A little caption.\label{tab1}}
{\begin{tabular*}{2in}{@{}l@{\extracolsep{\fill}}l@{}}
\hline
\up State& Capital\down\\ \hline
\up Maryland& Annapolis\\
Virginia& Richmond\\
Colorado& Denver\down\\ \hline
\end{tabular*}}
{A note?}
```

3. Math Formulas

This style preloads `amsmath` and `amssymb`. That means you can use both the classic LaTeX formatting tools for equations as `equation` and `eqnarray`, and the variety of `amsmath` supplied tools. Special letters as script and openface (blackboard bold) should be coded as, for example, `\mathcal{R}`, `\mathbb{R}` to get \mathcal{R} , \mathbb{R} . Avoid obsolete and ugly constructions as \mathbb{R} for openface letters.

In the `array` environment in math, entries are by default set in text style (smaller version of sum, product, union, integral, etc. is used, limits of summation set as subscripts and superscripts, not below and above, etc.). Fractions by default set as `\tfrac` (small text fractions), not as `\dfrac` (larger display-style fractions). Occasionally that looks too cramped. To fix the problem, precede those fields by `\DS` (for `\displaystyle`). To improve vertical spacing in such cases, `\mcr` may be used instead of the usual `\\`. Compare

$$\left\{ \begin{array}{ll} x \sin \frac{1}{x}, & x \neq 0 \\ 0, & x = 0 \end{array} \right. \quad \text{or} \quad \left\{ \begin{array}{ll} x \sin \frac{1}{x}, & x \neq 0 \\ 0, & x = 0 \end{array} \right. \quad \text{with} \quad \left\{ \begin{array}{ll} x \sin \frac{1}{x}, & x \neq 0 \\ 0, & x = 0 \end{array} \right. \quad (1)$$

```
\left\lbrace \begin{array}{l}\quad\end{array}\quad\right.
x\sin\frac{1}{x},&x\neq0\\ 0,&x=0\end{array} \right.
\quad\text{or}\quad
\left\lbrace \begin{array}{l}\quad\end{array}\quad\right.
\DS x\sin\frac{1}{x},&x\neq0\\ 0,&x=0\end{array} \right.
\quad\text{with}\quad
\left\lbrace \begin{array}{l}\quad\end{array}\quad\right.
\DS x\sin\frac{1}{x},&x\neq0\mcr 0,&x=0\end{array} \right.
```

Another typical problem arises when you need a new math operator, as for example “support,” in $\text{supp}(K)$. Define it as

```
\def\supp{\mathop{\textrm{supp}}\nolimits}
```

If your operator needs limits as in

$$2\pi i \operatorname{Res}_{z=\pi i} f(z), \quad (2)$$

define it as

```
\def\Res{\mathop{\textrm{Res}}}
```

so that the above formula will be typed as $2\pi i \operatorname{Res}_{z=\pi i} f(z)$.

TABLE 4. All the different types of bibliography entries

Type of entry	Comments
article	published [8]; to appear [23]; submitted with journal named [25]; submitted without journal named [24]
book	regular [7]; web, static [3]; web, dynamic [12]
database	with author [2] ; without author [20]
in book	Chapter [10] ... book is in series [4]; in proceedings [16]
proceedings	[22]
manual	with author [1]; without author (also dynamic) [6]; primer [9]
newsletter	format same as article; here is one with added note of online availability and double publication [5]
proceedings	[22]
report	[11, 21]
thesis	Ph.D. [17]; Master's [19]
web site	no author [18]; course [13]; item [14]

Note. This table and accompanying explanations were provided by Harvey Greenberg [15].

4. Example Bibliography

Table 4 illustrates different kinds of documents you could reference in your proceedings paper. If you use BibTeX, you merely specify plain style (but you must still use some of the optional fields and not abbreviate names of journals and proceedings). Otherwise, please note the formats. In particular, all authors begin with their first (and other) initials, followed by their last name.

You might see that some entries have a note after the citation, such as “Available online ...” [1] and “This is a course site ...” [13]. You are free to do an annotated bibliography. If you use BibTeX, the `TutORials.bst` style file supports an `annote` field.

Appendix

If you want an appendix with a title, please fill in the title into the empty braces at the end of `\begin{APPENDIX}{}`. Appendix sections will be numbered by A, B, C, etc.

A. My First Appendix Section

The text goes on. The text goes on. The text goes on. The text goes on. The text goes on. The text goes on. The text goes on. The text goes on. The text goes on. The text goes on. The text goes on. The text goes on. The text goes on.

A.1. First Appendix Subsection

In this subsection, there will be even a theorem and a lemma. Their numbering continues from the main text. The same holds for numbering of equations.

Theorem 1. *If this is a theorem in your appendix, for any real numbers a, b, c the equality*

$$a^3 + b^3 = (a + b)(a^2 - ab + b^2) \quad (3)$$

holds, regardless of the smaller text size in which this statement is presented.

Here is also a lemma.

Lemma 2. *This is an appendix lemma.*

A.1.1. An Example of Appendix Subsubsection. Ignore this text. It is just to fill in a paragraph. Ignore this text. It is just to fill in a paragraph. Ignore this text. It is just to fill in a paragraph. Ignore this text. It is just to fill in a paragraph.

B. Second Appendix Section

Ignore this text too. It is just to fill in a paragraph. Ignore this text too. It is just to fill in a paragraph. Ignore this text too. It is just to fill in a paragraph. Ignore this text too. It is just to fill in a paragraph.

B.1. Second Appendix Section's Subsection

This is the final section shown. After this we finish the appendix by issuing the command `\end{APPENDIX}` and go down to the references.

References

- [1] E. D. Andersen. *The MOSEK Optimization Toolbox for MATLAB Version 2.5*, 1999–2002. Available online at <http://www.mosek.com>.
- [2] A-C. Archilles. Bibliographies on mathematics. World Wide Web, <http://liinwww.ira.uka.de/bibliography/Math/>, 1994–2003.
- [3] E. Çınlar and R. J. Vanderbei. *Mathematical Methods of Engineering Analysis*. World Wide Web, <http://www.princeton.edu/~rvdb/>, 2000.
- [4] J. W. Chinneck. Chapter 14: Feasibility and viability. In T. Gal and H. J. Greenberg, editors, *Advances in Sensitivity Analysis and Parametric Programming*, International Series in Operations Research and Management Science. Kluwer Academic Publishers, Norwell, MA, 1997.
- [5] J. W. Chinneck and H. J. Greenberg. Intelligent mathematical programming software: Past, present, and future. *Canadian Operational Research Society Bulletin*, 33(2):14–28, 1999. Available online at <http://www.cors.ca/bulletin/v33n1.pdf>. Also appeared in *INFORMS Computing Society Newsletter* 20:1 (1999), 1–9. (Available at <http://www.und.nodak.edu/dept/csci/twiggen/ics/v20n1.pdf>).
- [6] Compaq Fortran user manual for open VMS Alpha systems. Order Number: AA-QJRW-TE, Compaq Computer Corporation, Houston, TX, 2001.
- [7] R. B. Cooper. *Introduction to Queueing Theory*. North-Holland, Boston, MA, 2nd edition, 1981. Available (no cost) at http://www.cse.fau.edu/~bob/publications/IntroToQueueingTheory_Cooper.pdf.
- [8] G. B. Dantzig. Discrete-variable extremum problems. *Operations Research*, 5(1):266–277, 1957.
- [9] J. Eckstein, W. E. Hart, and C. A. Phillips. *PICO: An Object-Oriented Framework for Parallel Branch and Bound*. Sandia National Laboratories, Albuquerque, NM, 2000.
- [10] A. Fink, S. Voß, and D. Woodruff. Optimization software libraries. In P. P. Pardalos and M. G. C. Resende, editors, *Handbook of Applied Optimization*. Oxford University Press, New York, NY, 2002.
- [11] H. J. Greenberg. A primer for RANDMOD: A system for randomizing modifications to an instance of a linear program. Technical report, Mathematics Department, University of Colorado at Denver, Denver, CO, 1995.
- [12] H. J. Greenberg. *Mathematical Programming Glossary*. World Wide Web, <http://www.cudenver.edu/~hgreenbe/glossary/>, 1996–2005.
- [13] H. J. Greenberg. Math 5610: Computational biology. University of Colorado at Denver, Mathematics Department, World Wide Web, <http://www-math.cudenver.edu/~hgreenbe/courses/CompBioS03/>, 2003.
- [14] H. J. Greenberg. *Sequence Alignment by Dynamic Programming* (note for Math 5610: Computational Biology). University of Colorado at Denver, Mathematics Department, World Wide Web, <http://www-math.cudenver.edu/~hgreenbe/courses/CompBioS03/notes/align.ps>, 2003. Note some formatting added to suppress italics in title parenthetical.
- [15] H. J. Greenberg, editor. *Tutorials on Emerging Methodologies and Applications in Operations Research*. Kluwer Academic Press, Norwell, MA, 2004.
- [16] M. Held and R. M. Karp. A dynamic programming approach to sequencing problems. In *Proceedings of the 1961 16th ACM National Meeting*, pages 71.201–71.204, New York, NY, 1961. ACM Press.
- [17] A. G. Holder. *Sensitivity Analysis and the Analytic Central Path*. PhD thesis, University of Colorado at Denver, Mathematics Department, Denver, CO, 1997.
- [18] INFORMS TutORials Series. World Wide Web, <http://test11.informs.org/tutorials/>.

- [19] J. Kennedy. Minimum support solutions for radiotherapy treatment planning. Master's thesis, University of Colorado at Denver, Mathematics Department, Denver, CO, 2000.
- [20] Kyoto encyclopedia of genes and genomes (KEGG). World Wide Web, <http://www.genome.ad.jp/kegg>, 1995–2005.
- [21] D. McNicol, F. H. Murphy, S. Shaw, and R. Thrasher. An analysis of the economic effects of accelerated deregulation of natural gas prices. Technical Report DOE/EIA-0303, Energy Information Administration U.S. Department of Energy, Washington, D.C., 1981.
- [22] M. Vingron, S. Istrail, P. Pevzner, and M. Waterman, editors. *Proceedings of the Seventh Annual International Conference on Computational Molecular Biology (RECOMB)*, New York, NY, 2003. ACM Press.
- [23] I. M. Waiting2Appear. Queueing analysis of journal articles. *Management Science*, to appear.
- [24] I. M. Waiting2be. Article title, submitted 2005.
- [25] I. M. Waiting2be2. Article title. *Operations Research*, submitted 2005.