

How to Use the Class File for the ICETC 2024

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SUMMARY IEICE (The Institute of Electronics, Information and Communication Engineers) provides a $\LaTeX 2_{\mathcal{E}}$ class file, named `icetc.cls`, for ICETC 2024. This document describes how to use the class file, and also makes some remarks about typesetting a manuscript by using the $\LaTeX 2_{\mathcal{E}}$. The design is based on $\LaTeX 2_{\mathcal{E}}$.

key words: $\LaTeX 2_{\mathcal{E}}$ class file, typesetting, math formulas

1. Introduction

This document describes how to handle the `icetc.cls` for the IEICE (the Institute of Electronics, Information and Communication Engineers) Transactions. Section 2 explains how to typeset according to the template. `template.tex` which is distributed with the `icetc.cls` can be used. Section 3 describes a special feature of `icetc.cls`, which is different from the `article.cls` provided by the standard $\LaTeX 2_{\mathcal{E}}$ and which points may be aware of on writing a manuscript and so on. Section 4 is about typographic notes, which explains how to typeset, how to prevent typographic errors and how to handle long formulas. For information about printing on A4 paper and making pdf file, see Appendix A.

2. Template and How to Typeset a Manuscript

`icetc.cls` should be specified as a document class, not as an option. The layout is influenced with the following formatting request, `twocolumn`, `twoside` and `fleqn`, which are declared inside the class file. There is no need to specify them as an option again and other options changing the layout or all style parameters should not be specified.

2.1 The Class Option

In ICETC 2024, authors use a “paper option.” This option has been set for `template.tex`.

With no optional arguments to `\documentclass`, `icetc.cls` will be formatted in “PAPER” style.

2.2 Template

Here is the template.

```
\documentclass[paper]{ieice}
%\documentclass[invited]{ieice}
```

```

%\documentclass[position]{ieice}
%\documentclass[survey]{ieice}
%\documentclass[invitedsurvey]{ieice}
%\documentclass[review]{ieice}
%\documentclass[tutorial]{ieice}
%\documentclass[letter]{ieice}
%\documentclass[brief]{ieice}
%\usepackage[dvips]{graphicx}
%\usepackage[pdftex]{graphicx,xcolor}
\usepackage[dvipdfmx]{graphicx,xcolor}
\usepackage[fleqn]{amsmath}
\usepackage{newtxtext}
\usepackage[varg]{newtxmath}
\setcounter{page}{1}

%\field{}
\title{How to Use the Class File
for the ICETC 2024}
% \titlenote{This paper was
presented at ...}
\authorlist{%
\authoreentry{Hanako JOHO}{s}{ieice}
\MembershipNumber{}
\authoreentry[name@xx.yy.zz]
{Taro Tsuuso}{m}{abcd}\MembershipNumber{}
\authoreentry{Kai Shingaku}{e}{efgh}
\MembershipNumber{}
}
%\breakauthorline{2}
\affiliate[labelA]
{The author is with the Faculty ...}
\affiliate[labelB]
{The author is with the Faculty ...}
\paffiliate[labelC]
{Presently, the author is with ...}

\begin{document}
\maketitle

\begin{summary}
IEICE (The Institute of Electronics,
Information and Communication Engineers)
provides a \LaTeXe\ class file,
named \ClassFile, for ICETC 2024.
...
\end{summary}

```

[†]The author is with the Faculty ...

^{††}The author is with the Faculty ...

a) E-mail: name@xx.yy.zz

```

\begin{keywords}
\LaTeXe\ class file, typesetting,
math formulas
\end{keywords}
\section{Introduction}
... ..
\section*{Acknowledgments}
... ..
%\bibliographystyle{ieicetr}
%\bibliography{myrefs}
\begin{thebibliography}{9}
\bibitem{}
\end{thebibliography}

\appendix
%\appendix*

\end{document}

```

- The title of a manuscript is assigned in `\title`. You may use `\\` to start a new line in a long title.
- If you need to describe a notation when a manuscript was first reported and by which organization authors were supported, etc., the `\titlenote` command can be used.
- The outputs of authors' names, membership status and marks of affiliates are automatically generated by using the `\authorlist` and `\authorentropy` commands. The `\authorentropy` command must be described as an argument of the `\authorlist` command. The `\authorentropy` command has three arguments.

```

\authorentropy{name}{membership}{label}
\MembershipNumber{membership number}

```

For example, they could be typed as follows.

```

\authorlist{%
\authorentropy{Hanako DENSHI}{m}{labelA}
\MembershipNumber{1111111}
\authorentropy{Taro DENSHI}{n}{labelB}
}

```

- The first argument of `\authorentropy` is filled with an author's name. The family name might be described in uppercase letters. This command automatically capitalizes a word or words after a first space in the first argument. Combine a first name and a middle name with “~” to handle a middle name rightly.
- The second argument is specified by one letter out of five letters (m, n, a, s, h, f, e), each one indicating the membership status of each author shown in Table 1. To specify other letters will not cause errors, but will cause wrong output. No extra spaces may be added between a letter and a brace. `{m}` and `{m_}` are regarded as different. The latter will not generate “Regular Member”.

Table 1 Membership Status

m	Member
n	Nonmember
a	Affiliate Member
s	Student Member
h	Fellow, Honorary Member
f	Fellow
e	Senior Member

the left column is letters to be specified. the right column is membership status to be generated.

- The third argument is assigned by the label of the author's affiliate, corresponding to the label of the `\affiliate` command (see below). For example, an abbreviation for a university, institute or company is recommended for the label. In the case of no affiliate, the label `none` must be specified. And in the case of plural affiliates, labels should be specified as a comma separated list.
- Author's membership number of IEICE must be specified by using `\MembershipNumber`. In the case of nonmember, `\MembershipNumber` must be left its argument blank.
- E-mail addresses might be specified. Its description is as follows.

```

\authorentropy[name@xx.yy.zz]
{Hanako DENSHI}{m}{labelA}

```

- If you need to inform a present affiliate, the optional fourth argument of `\authorentropy` can be used as follows.

```

\authorentropy{Hanako DENSHI}{m}{labelA}
[labelB]

```

The fourth argument which is described in brackets is corresponding to the label of the `\paffiliate` command (see below).

- The `\breakauthorline` command is provided, if you would like to break a line of author's lists at any point. `\breakauthorline{num,num,num,...}` `num` must be a positive integer. If “3” is specified, the line-break will be occurred after the third author. If “2,4,6” is specified, line-breaks will be occurred after the second, fourth and sixth authors.
- Author's affiliate is described in the `\affiliate` command as follows.

```

\affiliate[label]{affiliate}

```

The first argument `label` must be the same as the 3rd argument of the `\authorentropy` command. No extra spaces may be added between a letter and a brace. The second argument is filled with the author's affiliate. The entry of `\affiliate` must be put in the same order as labels of `\authorentropy` lists.

If the labels of `\affiliate` are different from those of `\authorentropy`, there will come a warning message on your terminal.

- The author’s present affiliate is described in the `\paffiliate` command as follows.

```
\paffiliate[label]{present affiliate}
```

The first argument must be the same as the fourth argument of `\authoreentry` command.

All those commands should be written in preamble.

The `\maketitle` command should be placed after the `\begin{document}` command. It generates the title.

- The text of the abstract is described in the `summary` environment. It should be about 300 words for a “PAPER”, 50 for a “LETTER” in a single paragraph.
- The text of the keywords is described in the `keywords` environment. The text should be 4–5 words and be given in lowercase letters except abbreviations and proper nouns.
- If you might express your gratitude, the following description is recommended.

```
\section*{Acknowledgments}
```

- The `\appendix` command provided by the standard $\LaTeX 2_{\epsilon}$ is only a declaration that changes the way sectional units are numbered. But `\appendix` and `\appendix*` commands provided by `icetc.cls` are different from it.

Once the `\appendix` command is declared, the following `\section` commands will generate “Appendix A:”, “Appendix B:”, On the other hand, the `\appendix*` command will generate “Appendix:” without sectional numbers. So the latter should be used when the appendix has no more than one section.

Once either of both commands is declared, equation numbers and float numbers are numbered “A·1”, “A·2”,

3. Special Feature of `icetc.cls` and Notes about Some Features of $\LaTeX 2_{\epsilon}$

3.1 Formula

As described in Sect. 2, the `fleqn` option is in effect. A displayed formula is aligned on the left, a fixed distance (7 mm) from the left margin, instead of being centered. A formula number is put on the right side.

Although a width of one column might be felt too narrow to compose displayed formulas, equations should be composed with the proper length, paying attention to the message “Overfull \hbox”. Section 4.2 describes several solutions and hints to handle a long formula.

3.2 Figures and Tables

The font size inside the `figure` and `table` environments is set `\footnotesize` (8 pt) (see Table 2).

The `[h]` option, one of the arguments of floating environment specifying a location where the float may be placed,

Table 2 The font size in the `table` environment is 8 point.

A	B	C
X	Y	Z

```
\begin{table}[tb]
\caption{An example of table.}
\label{table:1}
\begin{center}
\begin{tabular}{c|c|c}
\hline
A & B & C \\
\hline
X & Y & Z \\
\hline
\end{tabular}
\end{center}
\end{table}
```

is not recommended. Figures and tables should be located at the top or bottom of a page by using `[t]`, `[b]` or `[p]`.

3.2.1 Including Graphics

Although there are many ways to include pictures and figures in \LaTeX , the Encapsulated PostScript format (EPS) or PDF is recommended.

Here is a simple explanation to insert graphics into a manuscript.

The `graphicx` package must be loaded. The option `dvips`, `pdftex` or `dvipdfmx` is one of the device driver’s option, it might be changed according to a device driver you use.

```
%% for eps
\usepackage[dvips]{graphicx}
%% for pdflatex
\usepackage[pdftex]{graphicx,xcolor}
%% for platex or uplax
\usepackage[dvipdfmx]{graphicx,xcolor}
```

A graphics file (for example, EPS file) can be included with the `\includegraphics` command.

```
\begin{figure}[tb]
\begin{center}
\includegraphics{file.eps}
\end{center}
\caption{...}
\label{fig:1}
\end{figure}
```

If the option `scale=0.5` is given, the graphics will be scaled by half.

```
\includegraphics[scale=0.5]{file.eps}
```

You can get the same result as above by using the `\scalebox` command.

```
\scalebox{0.5}{\includegraphics{file.eps}}
```

If the option `width=30mm` is given, the width of graphics will be 30 mm (with the height proportionally scaled).

```
\begin{figure}[tb]
... floating materials ...
\capwidth=50mm
\caption{An example of figure.}
\label{fig:1}
\end{figure}
```

Fig. 1 An example of figure.

```
\includegraphics[width=30mm]{file.eps}
```

The next is another example using `\resizebox`.

```
\resizebox{30mm}{!}{
\includegraphics{file.eps}}
```

Both dimension of width and height can be specified as follows.

```
\includegraphics[width=30mm,height=40mm]
{file.eps}
```

or

```
\resizebox{30mm}{40mm}
{\includegraphics{file.eps}}
```

For further information about the graphics package, see reference book [7], [9].

3.2.2 Captions of Floating Environment

`icetc.cls` sets the width of caption to about 83.5 mm (`\columnwidth`) in the case of single column and about 116 mm (`0.66\textwidth`) in the case of double column.

The width of caption can be set by changing the value of `\capwidth` (see Fig. 1).

3.3 Theorem-like Environment

If you use the `\newtheorem` environment, pay attention to the following points. Additional vertical spaces before and after the environment are `.5\baselineskip`, and the text within the environment does not appear in italics.

An example is given as follows.

```
\newtheorem{theorem}{Theorem}
\begin{theorem}[Fermat]
There are no positive integers such that
 $x^n + y^n = z^n$  for  $n > 2$ .
I've found a remarkable proof of this fact,
but there is not enough space
in the margin [of the book] to write it.
(Fermat's last theorem).
\end{theorem}
```

Theorem 1 (Fermat): There are no positive integers such that $x^n + y^n = z^n$ for $n > 2$. I've found a remarkable proof of this fact, but there is not enough space in the margin [of the book] to write it. (Fermat's last theorem).

3.4 Footnotes

The footnote begins with “†” (see page 6). As the footnote

counter increases, the footnote marks proceed as “†”, “††”, “†††”. The footnote mark is set to reset at each page.

3.5 Bibliography and Citations

The bibliographic reference list should be generated according to the IEICE editing style, e.g., authors' initials, names, title of article, journal abbreviation, volume, number, pages, and publication year, etc. Information about composing such lists can be given in “Information for Authors (Brief Summary)” and the following web site.

<http://www.ieice.org/eng/shiori/index.html>

On the other hand, in case using \LaTeX [5] the bibliography style `ieicetr.bst` (numeric citation order) is recommended, which is distributed with `icetc.cls`.

`icetc.cls` includes the `citesort` package with a slight modification. The `citesort` package collapses a list of three or more consecutive numbers into a range, and sorts the numbers before collapsing them. For instance, while the following example, `\cite{FMi1,FMi2,FMi3,latexbook,texbook,Salomon}`, would produce [5, 9, 10, 7, 1, 8] in the standard style, it is transformed into “[1], [5], [7]–[10]” in this class file.

3.6 Verbatim Environment

You can change the values of the parameters in the verbatim environment which is customized in `icetc.cls`. The default settings are:

```
\verbatimleftmargin=0pt
\def\verbatimsize{\normalsize}
\verbatimbaselineskip=\baselineskip
```

For example, those parameters can be changed as follows.

```
\verbatimleftmargin=7mm
\def\verbatimsize{\footnotesize}
\verbatimbaselineskip=3mm
```

3.7 AMS Packages

The $\mathcal{A}\mathcal{M}\mathcal{S}$ - \LaTeX packages are provided to typeset complex equations or other mathematical constructions. If you would like to use them, the `amsmath` package should be loaded with the `fleqn` option.

```
\usepackage[fleqn]{amsmath}
```

While the `amsmath` package presents many functions, the `\boldsymbol` command which is to be used for individual bold math symbols and bold Greek letters is needed, only the `amsbsy` package might be loaded.

```
\usepackage{amsbsy}
```

Once the `amssymb` package is loaded, many extra math symbols of the $\mathcal{A}\mathcal{M}\mathcal{S}$ - \LaTeX fonts will become available.

```
\usepackage{amssymb}
```

Table 3 `\RN` and `\FRAC`.

<code>\RN{2}</code>	<code>\RN{117}</code>	<code>\FRAC{\pi}{2}</code>	<code>\FRAC{1}{4}</code>
II	CXVII	$\pi/2$	$1/4$

For further information about the $\mathcal{AMS-L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ package, see reference book [5].

3.8 Miscellaneous

The following macros are defined in `icetc.cls`.

- `\QED`: Produces “□” in the end of the proof and so on. You would get the same output by using `\hfill \Box`. But if the end of a paragraph goes to the right margin, the character □ is positioned at the start of a line. Using `\QED` will prevent such a case. Notice that the `latexsym` package is required to produce □.
- `\halflineskip` and `\onelineskip`: Produce a vertical space, `0.5\baselineskip`, `1\baselineskip` respectively.
- `\RN` and `\FRAC`: Are shown in Table 3 [1].
- `\ddash`: Produce double “—”. Double “---” sometimes produce thin space between two “—”. `\ddash` will prevent such a case.

4. Typographic Notes

4.1 How to Prevent Typographic Errors

1. “The italic correction will be automatically added by the font commands with arguments but must be inserted manually using `\/` when declarations are used” [5].
2. You should pay attention to a space after a period. “ $\text{T}_{\text{E}}\text{X}$ simply assumes that a period ends a sentence unless it follows an uppercase letter. This works most of the time, but not always—abbreviations like ‘etc.’ being the most common exception. You tell $\text{T}_{\text{E}}\text{X}$ that a period doesn’t end a sentence by using a `_` command (a `\` character followed by a space or the end of a line) to make the space after the period.” “On the rare occasions that a sentence-ending period follows an uppercase letter, you will have to tell $\text{T}_{\text{E}}\text{X}$ that the period ends the sentence. You do this by preceding the period with a `\@` command” [7]. Beans (lima, etc.)\have vitamin B\@.
3. “Line breaking should be prevented at certain interword spaces. ... Trying `~` (a tilde character) produces an ordinary interword space at which $\text{T}_{\text{E}}\text{X}$ will never break a line” [7]. Mr. `~`Jones, Figure`~\ref{fig:1}`, (1)`~`gnats.
4. With respect to Figure, Section, Equation, when these words appear at the beginning of a sentence, they should be spelt out in full, e.g., “Figure 1 shows ...” is used. When they appear in the middle or the last of a sentence, abbreviations, e.g., “in Fig. 1”, “in Sect. 2”, “in Eq. (3)” should be used.

5. There should be no space after opening or before closing parentheses, as in `(_word_)`.
6. There are many cases of an inappropriate application of a `\` or `\newline` command except in the tabular environment etc., such as two `\` commands in succession or `\` command just before a blank line. They will often cause warning messages like `Underfull \hbox ...`, as a result it would often prevent you from finding important warning messages. The use of `\par\noindent` or `\hfil\break` commands is recommended and gives you the same effect without warning messages.
7. There are some cases of an inappropriate application of a `\` in descriptions such as program lists. Use of the `tabbing` environment or `list` environment is recommended.
8. There are three types of dashes that are used. The hyphen (`-`) is used in connecting English-language words such as ‘well-known’, and the en dash (`--`) is used when expressing a range such as ‘pp.298–301’. The em dash (`---`) is even longer—it’s used as punctuation.
9. Notice that $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ recognizes the hyphen and en dash in math mode as the minus sign. Use `\hbox` or `\mbox` if you would like to use the hyphen and en dash in math mode as it is. Some examples are given below.

`\A^{b-c}`

$A^{b-c} \Rightarrow$ minus sign

`\A^{\mathrm{b}}\mbox{\scriptsize -}`
`\mathrm{c}`

$A^{b-c} \Rightarrow$ hyphen

`\A^{\mathrm{b}}\mbox{\scriptsize --}`
`\mathrm{c}`

$A^{b-c} \Rightarrow$ en dash

`\A^{\mathrm{b-c}}`

$A^{b-c} \Rightarrow$ minus sign

10. The less-than sign “`<`” (`<`, a relation) should not be confused with “`<`” (`\angle`, a delimiter). The same is true for the greater-than sign “`>`” and “`>`”.
11. A unary operator and a binary operator: “A + or – that begins a formula (or certain subformulas) is assumed to be a unary operator, so typing `-x` produces $-x$ and typing `$$\sum -x_i$` produces $\sum -x_i$, with no space between the “`-`” and “`x`”. If the formula is part of a larger one that is being split across lines, $\text{T}_{\text{E}}\text{X}$ must be told that the + or – is a binary operator. This is done by starting the formula with an invisible first term, produced by an `\mbox` command with a null argument” [7].

`\begin{eqnarray}`

`y &= & a + b + c + \dots + e \\`

`& & \mbox{} + f + \dots`

`\end{eqnarray}`

12. `\allowbreak` may be used within long math formulas in paragraphs since $\text{T}_{\text{E}}\text{X}$ is reluctant to break lines there. It allow a line or page break where one could not ordinary occur. On the other hand, `\`, `\hfil\break` an `\linebreak` force $\text{T}_{\text{E}}\text{X}$ to break a line at the point.

Compare Eqs. (7) and (8).

Example 6: When you use `pmatrix` `vmatrix` environment etc., same method as Example 5 can be used ([C]).

```
\begin{equation}
\arraycolsep=3pt
A = \begin{pmatrix}
a_{11} & a_{12} & \dots & a_{1n} \\
a_{21} & a_{22} & \dots & a_{2n} \\
\vdots & \vdots & \ddots & \vdots \\
a_{m1} & a_{m2} & \dots & a_{mn}
\end{pmatrix}
\end{equation}
```

$$A = \begin{pmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m1} & a_{m2} & \dots & a_{mn} \end{pmatrix} \quad (9)$$

If any of the above explanations could not resolve the problem, there might be the following method, surrounding a display environment with `small` or `footnotesize`, scaling a part or all of a formula by using `\scalebox`, inserting a display environment into a float environment.

References

- [1] D.E. Knuth, The \TeX book, Addison-Wesley, 1989.
- [2] V. Eijkhout, \TeX by Topic, Addison-Wesley, 1991.
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- [7] L. Lamport, \LaTeX : A Document Preparation System, Second Edition, Addison-Wesley, 1994.
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- [9] M. Goossens, S. Rahts, and F. Mittelbach, The \LaTeX Graphics Companion, Addison-Wesley, 1997.
- [10] M. Goossens, and S. Rahts, The \LaTeX Web Companion, Addison-Wesley, 1999.
- [11] B.S. Lipkin, \LaTeX for Linux, Springer-Verlag, New York, 1999.

Appendix A: Printing on A4 paper and making pdf file

- If you print a manuscript on A4 paper by using `dvips` printer driver, the following parameter might be set.

```
dvips -Pprinter -t a4 -O 0mm,8mm file.dvi
```

`printer` is a name of a printer. “-t a4” option might be omitted.

- There are three ways to make a pdf file.
 1. You can directly make a pdf file by using `pdflatex` as a compiler. You must specify `pdftex` as an option of `graphicx` package instead of `dvips` etc., and convert from `Figure1.eps` to `Figure1.pdf` by using some tools (for example `epstopdf` etc.).

2. You can convert from a dvi file to a pdf file by using `dvipdfmx`. You must specify `dvipdfmx` as an option of `graphicx` package.

```
dvipdfmx -p 210mm,280mm -x 1in -y 1in
-o file.pdf file.dvi
```

“-x 1in -y 1in” option might be omitted.

3. You might first convert from a dvi file to a ps file, and then convert from a ps file to pdf file by using Acrobat Distiller. The size of a generating ps file is a4, as there are no definitions of “210mm × 280mm” paper size in `config.ps`.

```
dvips -Pprinter -t a4 -O 0mm,8mm
-o file.ps file.dvi
```

“-t a4” option might be omitted.

Appendix B: Omitted Commands

Some commands which is not required by `icetc.cls` are omitted. These commands are `\tableofcontents`, `\titlepage`, `\part`, `\theindex`, `headings` and the related commands.