The esg8022pset class*

Jason Gross
jgross@mit.edu

March 13, 2011

1 Introduction

The esg8022pset class provides a template for ESG class PSets.

It is set up so that there is one master file, which contains both problems and solutions. It might look something like

```
\documentclass{esg8022pset}
\begin{preamble}
\usepackage{amsmath}
\end{preamble}

\classname{\LaTeX}
\semester{Spring 2011}
\problemsetnumber{0}
\duedate{Today}
\psettitle{\LaTeX}

\begin{document}

\begin{problem}{Example Problem}
  Learn \LaTeX.
\end{problem}
\begin{solution}
  Read \emph{The Not So Short Introduction to \LaTeXe}
\end{solution}

\end{document}
```

If this file is called `example.tex`, then typesetting this file would create two new .tex files (a problems file called `example_Problems.tex`, and a solutions file called `example_Solutions.tex`), as well as a typeset version of the problems file. To get a typeset solutions file, you will need to typeset the `example_Solutions.tex`

*This document corresponds to esg8022pset ?, dated ?.

file.[1] If you pass the option `makesolutionspdf` to this document class, and run latex with `\write18` enabled, you will also get a pdf of the solutions file.

2 Usage

I give the usage and specification of every macro defined. I give bugs when I know them (please email me if you find other bugs, or have fixes for the bugs I list). I sometimes give extra description or justification.

`\duedate` Usage: `\duedate{`⟨*date*⟩`}`
Specification: The ⟨*date*⟩ is used as the due date.

`\problemsetnumber` Usage: `\problemsetnumber{`⟨*number*⟩`}`
Specification: The ⟨*number*⟩ is used as the problem set number.

`\semester` Usage: `\semester{`⟨*semester*⟩`}`
Specification: The ⟨*semester*⟩ is used as the semester of the class.

`\classname` Usage: `\classname{`⟨*name*⟩`}`
Specification: The ⟨*name*⟩ is used as the name of the class.

`\readingassignment` Usage: `\readingassignment{`⟨*assignment*⟩`}`
Specification: The ⟨*assignment*⟩ is used as the reading assignment. If it's empty, or if this command is not called, no reading assignment is shown.

`\problemsettitle` Usage: `\problemsettitle{`⟨*title*⟩`}`
Specification: The ⟨*title*⟩ is used as the problem set title.

`problem` Usage: `\begin{problem}[`⟨*number*⟩`]{`⟨*description*⟩`}`
Specification: The ⟨*number*⟩ is used as the problem number, and defaults to the current section number (and is automatically incremented). The ⟨*description*⟩ is used as the problem title/description. This command typesets a problem, which is written both the this file, the problems tex file, and the solutions tex file.

`solution` Usage: `\begin{solution}`
Specification: Typesets the solution to a problem in the solution tex file.

`ForProblems` Usage: `\begin{ForProblems}`
Specification: Inserts code into only the problem set file.

`ForSolutions` Usage: `\begin{ForSolutions}`
Specification: Inserts code into only the solutions file.

`ForPSet` Usage: `\begin{ForPSet}`
Specification: Inserts code into both the problems and solutions file.

3 Options

```
1 \newboolean{esg8022pset@solutions}\newboolean{esg8022pset@problems}
2 \newboolean{esg8022pset@pdfproblems}\newboolean{esg8022pset@pdfsolutions}
3 \DeclareOption{problems}{\setboolean{esg8022pset@problems}{true}\setboolean{esg8022pset@solutio
4 \DeclareOption{solutions}{\setboolean{esg8022pset@problems}{false}\setboolean{esg8022pset@solut
5 \DeclareOption{makeproblemspdf}{\setboolean{esg8022pset@pdfproblems}{true}}
6 \DeclareOption{makesolutionspdf}{\setboolean{esg8022pset@pdfsolutions}{true}}
```

[1] I am still trying to figure out how to get two pdfs (or dvis, etc.) out of a single .tex file. When I figure out how to do this, typesetting the solutions file separately will not be necessary.

```
\DeclareOption{makeallpdfs}{\setboolean{esg8022pset@pdfproblems}{true}\setboolean{esg8022pset@p
\ProcessOptions\relax
\LoadClass[notitlepage,11pt,twoside,letterpaper]{article}
\RequirePackage[margin=1in]{geometry}
```

4 Setup

```
\ifthenelse{\boolean{esg8022pset@problems} \OR \boolean{esg8022pset@solutions}}{
}{
  \newwrite\esgpset@problemsout
  \newwrite\esgpset@solutionsout
  \newcommand{\esgpset@compilefile}[1]{\write18{pdflatex "#1"}}
  \edef\esgpset@problemsfilename{\jobname\string_Problems.tex}
  \edef\esgpset@solutionsfilename{\jobname\string_Solutions.tex}
  \newcommand{\esgpset@writetoboth}[1]{\esgpset@writetoproblems{#1}%
    \esgpset@writetosolutions{#1}}
  \newcommand{\esgpset@writetoall}[1]{\esgpset@writetoboth{#1}\esgpset@writetothis{#1}}
  \newcommand{\esgpset@writetoproblems}[1]{\immediate\write\esgpset@problemsout{#1}}
  \newcommand{\esgpset@writetosolutions}[1]{\immediate\write\esgpset@solutionsout{#1}}
  \newcommand{\esgpset@writetothis}[1]{{\edef\temp{#1}\expandafter}\expandafter\scantokens\expa
  \newcommand{\esgpset@pre@writetothis}{\gdef\esgpset@curcode{}}%\immediate\openout\esgpset@tem
  \newcommand{\esgpset@do@writetothis}[1]{\expandnext{\gappto\esgpset@curcode}{#1^^J}}%\immedia
  \newcommand{\esgpset@post@writetothis}{\expandnext{\scantokens}{\esgpset@curcode}}%\immediate

  \immediate\openout\esgpset@problemsout\esgpset@problemsfilename
  \immediate\openout\esgpset@solutionsout\esgpset@solutionsfilename

  \AtEndDocument{
    \esgpset@writetoboth{\string\end{document}}
    \immediate\closeout\esgpset@problemsout
    \immediate\closeout\esgpset@solutionsout
    \ifthenelse{\boolean{esg8022pset@pdfsolutions}}{\esgpset@compilefile{\esgpset@solutionsfile
    \ifthenelse{\boolean{esg8022pset@pdfproblems}}{\esgpset@compilefile{\esgpset@problemsfilena
  }

  \begingroup
    \esgpset@writetosolutions{%
      \string\documentclass[solutions]{esg8022pset}
    }
    \esgpset@writetoproblems{%
      \string\documentclass[problems]{esg8022pset}
    }
  \endgroup

  \newenvironment{preamble}{%
    \begingroup% Lets Keep the Changes Local
      \esgpset@pre@writetothis%
      \@bsphack
      \let\do\@makeother\dospecials\catcode`\^^M\active
      \def\verbatim@processline{\esgpset@writetoboth{\the\verbatim@line}\esgpset@do@writetothis
```

```
      \verbatim@start
  }{\@esphack\endgroup\aftergroup\esgpset@post@writetothis\relax}

  \AtBeginDocument{

    \begingroup
      \esgpset@writetoboth{%
        \string\classname{\expandafter\unexpanded\expandafter{\@classname}}^^M%
        \string\semester{\expandafter\unexpanded\expandafter{\@semester}}
      }
      \esgpset@writetoboth{%
        \string\problemsetnumber{\expandafter\unexpanded\expandafter{\@problemsetnumber}}%
      }
      \esgpset@writetoboth{%
        \string\date{\expandafter\unexpanded\expandafter{\@date}}%
      }
      \esgpset@writetoboth{%
        \string\duedate{\expandafter\unexpanded\expandafter{\@duedate}}%
      }
      \esgpset@writetoboth{%
        \string\readingassignment{\expandafter\unexpanded\expandafter{\@readingassignment}}%
      }
      \esgpset@writetoboth{%
        \string\problemsettitle{\expandafter\unexpanded\expandafter{\@problemsettitle}}%
      }
      \esgpset@writetoboth{\string\begin{document}}
    \endgroup
  }
}


\pagestyle{fancy}
\headheight 14.5pt
\fancyhead{}
\fancyfoot{}
\cfoot{\thepage\space of \pageref{LastPage}}

\let\@seccntformat\@gobble

\AtBeginDocument{
  \begingroup
    \def\@headerextra{%
      \xifblank{\@problemsettitle}{}{%
        (\@problemsettitle)\space
      }%
    }%
    \ifthenelse{\boolean{esg8022pset@problems}}{%
      \edef\@cheader{Problem Set \@problemsetnumber\space\@headerextra - Problems}
    }{
      \ifthenelse{\boolean{esg8022pset@solutions}}{
```

```
        \edef\@cheader{Problem Set \@problemsetnumber\space\@headerextra - Solutions}
      }{
        \edef\@cheader{Problem Set \@problemsetnumber\space\@headerextra - Problems}
      }
    }
  \expandafter\endgroup
  \expandafter\chead\expandafter{\@cheader}
  \begingroup
    \bf \let\@oldtextsc=\textsc
    \renewcommand{\textsc}[1]{{\fontencoding{T1}\selectfont\@oldtextsc{#1}}}%
    \begin{center}%
      {\noindent
        \textsc{Massachusetts Institute of Technology} \par}%
      {\noindent  Experimental Study Group \par}%
    \end{center}%
    {\noindent  \@classname, \@semester \par}%
    \begin{center}%
      {\noindent \Large
        Problem Set \@problemsetnumber
        \ifthenelse{\boolean{esg8022pset@solutions}}{% \OR \NOT \boolean{esg8022pset@problems}{
          \space Solutions%
        }{}%
      \par}%
      \xifblank{\@problemsettitle}{}{%
        {\noindent \Large \@problemsettitle\par}%
      }%
    \end{center}%
    {\noindent Due: \@duedate}%
    \xifblank{\@readingassignment}{}{%
      \\\\
      {\noindent Reading: \@readingassignment \par}%
    }%
  \endgroup
  \global\let\duedate\relax
  \global\let\problemsetnumber\relax
  \global\let\semester\relax
  \global\let\classname\relax
  \global\let\readingassignment\relax
  \global\let\problemsettitle\relax
  \global\let\@duedate\relax
  \global\let\@problemsetnumber\relax
  \global\let\@semester\relax
  \global\let\@classname\relax
  \global\let\@readingassignment\relax
  \global\let\@problemsettitle\relax
}
```

`\duedate`
`\problemsetnumber`
`\semester`
`\classname`
`\readingassignment`
`\problemsettitle`

These four macros are provided by `esg8022pset.dtx` to provide information about the class assigning the pset. The information is stored away in internal control sequences. It is the task of the `\maketitle` command to use the information

provided. The definitions of these macros are shown here for information.

```
\newcommand*{\duedate}[1]{\gdef\@duedate{#1}}
\newcommand*{\problemsetnumber}[1]{\gdef\@problemsetnumber{#1}}
\newcommand*{\semester}[1]{\gdef\@semester{#1}}
\newcommand*{\classname}[1]{\gdef\@classname{#1}}
\newcommand*{\readingassignment}[1]{\gdef\@readingassignment{#1}}
\readingassignment{}
\newcommand*{\problemsettitle}[1]{\gdef\@problemsettitle{#1}}
```

4.1 Problem Environments

problem
solution

```
\newenvironment{problem}[2][]{%
  \xifempty{#1}{%
    \esgpset@writetoall{\string\section{Problem \string\thesection: \unexpanded{#2}}}%
  }{%
    \esgpset@writetoall{\string\section*{Problem #1: \unexpanded{#2}}}%
  }%
  \esgpset@writetosolutions{\string\subsection{Problem}}%
  \begingroup% Lets Keep the Changes Local
    \esgpset@pre@writetothis
    \@bsphack
    \let\do\@makeother\dospecials\catcode`\^^M\active
    \def\verbatim@processline{\esgpset@writetoboth{\the\verbatim@line}\esgpset@do@writetothis{\
    \verbatim@start
}{\@esphack\endgroup\esgpset@post@writetothis}
\newenvironment{solution}{%
  \esgpset@writetosolutions{\string\subsection{Solution}}%
  \begingroup% Lets Keep the Changes Local
    \@bsphack
    \let\do\@makeother\dospecials\catcode`\^^M\active
    \def\verbatim@processline{\esgpset@writetosolutions{\the\verbatim@line}}%
    \verbatim@start
}{\@esphack\endgroup}%
```

4.2 Problems/Solutions Environments

ForProblems
ForSolutions
ForPSet

```
\newenvironment{ForProblems}{%
  \begingroup% Lets Keep the Changes Local
    \esgpset@pre@writetothis
    \@bsphack
    \let\do\@makeother\dospecials\catcode`\^^M\active
    \def\verbatim@processline{\esgpset@writetoproblems{\the\verbatim@line}\esgpset@do@writetoth
    \verbatim@start
}{\@esphack\endgroup\esgpset@post@writetothis}
\newenvironment{ForPSet}{%
  \begingroup% Lets Keep the Changes Local
    \esgpset@pre@writetothis
```

```
    \@bsphack
    \let\do\@makeother\dospecials\catcode`\^^M\active
    \def\verbatim@processline{\esgpset@writetoboth{\the\verbatim@line}\esgpset@do@writetothis{\
    \verbatim@start
}{\@esphack\endgroup\esgpset@post@writetothis}
\newenvironment{ForSolutions}{%
  \begingroup% Lets Keep the Changes Local
    \@bsphack
    \let\do\@makeother\dospecials\catcode`\^^M\active
    \def\verbatim@processline{\esgpset@writetosolutions{\the\verbatim@line}}%
    \verbatim@start
}{\@esphack\endgroup}%
```