1 Compilation

Note that I will be manually compiling throughout this discussion. I highly recommend using the XƎLₐₐₐₐₐₐₐₐₐₑTeX compiler, although note that some packages can conflict and require the use of pdfLₐₐₐₑTeX. For my own case, many of my discipline-specific packages require XₐₐₑTeX, and unless you really have a good reason, I would suggest doing the same.

One thing to bear in mind is that XₐₐₑTeX is already UTF-8 enabled, so do not call inputenc when using it.
2 Preamble

2.1 Basic Boilerplate

\documentclass{article}
\usepackage{fontspec}
\setmainfont{EB Garamond}

\begin{document}
Test of \LaTeX\ with Unicode! Matthäuspassion
\end{document}

2.2 Opinionated Boilerplate

\usepackage{xltextra}
\usepackage{graphicx}
\usepackage{multirow}
\usepackage[margin=2cm]{geometry}

2.3 Multi-Language

\usepackage{polyglossia}
\newfontfamily{\armenianfont}[Scale=0.9]{DejaVu Serif}
\setotherlanguage{armenian}
\setmainlanguage{english}

2.4 Discipline Specific

\usepackage[pstricks, pst-xkey, pst-jtree, expex, qtree]
\usepackage{amsmath, amsthm, amsfonts, stmaryrd}

3 Macros

Throughout this workshop we will be defining (or in some cases redefining) custom commands and environments to make our lives easier.
3.1 Custom Commands
As an example of what I mean, in my own writing I might need to use special characters that are most easily typeset using a particular package. Rather than constantly typing the full command, I can define a custom command that does exactly what I want in significantly fewer keystrokes.

\newcommand{\ipa}{\textipa}
\newcommand{\uu}{{\small \textipa{0}}}
\newcommand{\uun}{{\small \textipa{\~{0}}}}

3.2 Custom Environments
Moreover, I might want to have a specific formatting in my document that requires the repetition of a set of environments nested in one another. I can again make my life a lot easier by defining a custom environment that does exactly this.

\newenvironment{mybox}[1]
  {\begin{center}
  #1\[1ex]
  \begin{tabular}{|p{0.6\textwidth}|}
  \hline
  \end{tabular}
  \begin{center}
  \end{center}
  {\\
  \hline
  \end{tabular}
  \end{center}
}
\renewenvironment{itemize}{\begin{center}\em}{\end{center}}
\begin{mybox}{Title of the Box}
  This is some stuff in a box!
\end{mybox}
\begin{itemize}
  Testing!
\end{itemize}
4 Font and Color

4.1 Basic Case
\usepackage{xcolor}
This is some {\color{red} red text!}
\pagecolor{black}
\color{white}

4.2 More Advanced
\usepackage[dvipsnames]{xcolor}
\definecolor{mycolor1}{rgb}{0.858, 0.188, 0.478}
\definecolor{mycolor2}{RGB}{219, 48, 122}
\definecolor{mycolor3}{cmyk}{0, 0.7808, 0.4429, 0.1412}
\definecolor{mycolor4}{HTML}{00F9DE}
\definecolor{mycolor5}{gray}{0.6}
\colorlet{LightRubineRed}{RubineRed!70!}
\colorlet{mycolor}{green!10!orange!90!}
\colorbox{red}{some text}

4.3 Even More Advanced
\usepackage{framed} % framed, shaded, leftbar
\usepackage[all]{tcolorbox}
\usepackage{xcolor}
\colorlet{shadecolor}{orange!15}
\theoremstyle{definition} % dep: amsthm
\newtheorem{exer}{Exercise}
\newtheorem{defn}{Definition}
\newtheorem{diag}{Diagram}
\newtheorem{dirn}{Direction}
This is an example definition!

4.4 Package tcolorbox

```latex
\begin{myjs}
function SomeClass(obj) {
  this.name = obj.name;
  this.surname = obj.surname;
}

var instantiate = new SomeClass({
  name: 'Jonathan',
  surname: 'Crum'
});
\end{myjs}
```
5 Tables

5.1 Basic Case

\begin{tabular}{|l|l|l|l|}
\hline
foo & bar & bash & blah \\
\hline
blah & bar & meh & meh \\
\hline
phlegm & lorem & ipsum & dolor \\
\hline
\end{tabular}

5.2 New Customs

\newcommand{\hl}{\hline}
\newcommand{\twor}[1]{\multirow{2}{*}{#1}}
\newcommand{\clv}[2]{\cline{#1}\cline{#2}}
\newcommand{\twoc}[1]{\multicolumn{2}{c |}{#1}}

5.3 Cleaned Up

\begin{tabular}{| c | c | c | c | c |}
\hline
\twor{foo} & \twor{bar} & bash & & blah \\
\clv{1-1}{3-4}
\twor{blah} & & \twoc{meh} \\
\hline
phlegm & lorem & ipsum & & dolor \\
\hline
\end{tabular}

6 Minipages

\begin{minipage}[t]{0.45\textwidth}
\end{minipage}
7 Math Typesetting

There are a few ways of entering the mathematics environment...

\begin{itemize}
\item \textbf{\texttt{\textbackslash [ <block> \} \textbackslash ( <inline> \} }} \texttt{\textbackslash $ <block> \$ \$ \$ <inline> \$}
\end{itemize}

7.1 Basic Case

A set \( \mathcal{S} \) in \( \mathbb{R}^n \) is said to be convex if
\[
\mathbf{x}_1, \mathbf{x}_2 \in \mathcal{S} \implies \lambda \mathbf{x}_1 + (1-\lambda) \mathbf{x}_2 \in \mathcal{S} \quad \text{for all} \quad 0 < \lambda < 1
\]

7.2 New Customs

\begin{itemize}
\item \texttt{\textbackslash newcommand\{y\}\{\lambda\}} \quad \% \n\item \texttt{\textbackslash newcommand\{imps\}\{-\texttt{implies}-\}} \quad \% \implies \n\item \texttt{\textbackslash newcommand\{\Rn\}\{\texttt{mathbb\{R\}}\}^{-n}} \quad \% \texttt{Math R} \n\item \texttt{\textbackslash newcommand\{\Set\}\{\mathcal{S}\}} \quad \% \texttt{Set S} \n\item \texttt{\textbackslash newcommand\{x\}\{\texttt{mathbf\{x\}}\}} \quad \% \texttt{bold x} \n\item \texttt{\textbackslash newcommand\{\tx\}[1]\{\text\{#1\}\}} \quad \% \texttt{TEXT environment}
\end{itemize}
7.3 Cleaned Up

A set $\Set$ in $\mathbb{R}^n$ is said to be convex if
\[
\x_1, \ x_2 \in \Set \implies \y\x_1 + (1 - \y) \ x_2 \\
in \Set \text{ for all } 0 < \y < 1
\]

8 Labels

This will introduce the need to do two runs of X\LaTeX to get the correct references throughout the document.

\section{Labels}
\label{sec:labels}

\begin{table}[h]
\centering
\begin{tabular}{| c | c |}
\hline
some & basic \\
info & here \\
\hline
\end{tabular}
\caption{A Table} \label{tab:mytable}
\end{table}

\vspace{0.5cm}

In this section, Section \ref{sec:labels}, we can see an example of labeling. In this case, you can see Table \ref{tab:mytable}.

9 Bibliographies

This will build on the section concerning labels by introducing the need to run Bib\TeX followed by X\LaTeX to update citations. This will get us to the final toolchain of a typical complex \LaTeX build.

Basic citation commands are fairly straightforward. You need to include an extra file, a .bib file containing Bib\TeX markup with your citations. Just about ever reference management program will be
able to export BibTeX from your already existing database.

9.1 Preamble

There are a couple of options for compiling bibliographies. My recommendation is to use settings like the following:

\usepackage[backend=biber,style=apa,sorting=nyt]{biblatex}
\addbibresource{<your_bibliography.bib>}

You must cite at least one reference in your document. To do this, you can simply add the citekey in a command like the following:

\cite{author2020} <OR> \nocite{author2020}

Then at the bottom of your document, you can simply add:

\printbibliography <OR> printbibliography[title=Your Title]

9.2 The Toolchain

Note that with the addition of BibTeX to the workflow, we now have to modify our toolchain just like we did when working with labels. The workflow for compiling citations is as follows:

Figure 1: The XƎLATEX+ BibTeX Toolchain
9.3 Annotated Bibliographies

You might find occasion to export your entire bibliography into a PDF document, say for the purposes of providing your advisor or committee a list of references. To do this, you can invoke the command \nocite{\*}.

A downside to this approach is that there is no easy way to add annotations directly into the bibliography, since it outputs the reference list as one block. There are some bibliography styles (like IEEEannot.bst) that will add an \annote key to BibTeX, but this means you have you maintain your annotations directly in the .bib file—yuck!

Luckily, we’re clever and can get around this fairly straightforwardly with a custom command.

9.3.1 New Customs

\begin{verbatim}
\newcommand{\anentry}[2]{
  \nocite{#1}
  \printbibliography[keyword={#1}, title={#2}]}
\end{verbatim}

For this, you would have to add a keyword key to each bibliography item you wish you include this way. I tend to just use the citekey. Then we can feed the command our options:

\begin{verbatim}
\anentry{author2020}{Author (2020)}
\begin{shaded}
  \begin{quote}
  \end{quote}
\end{shaded}
\end{verbatim}

Notice that we could also define a custom environment for this, taking care of the entire annotation block all at once.

To make the bibliography cleaner, I like to modify my [usepackage[...biblatex] to include an option [defernumbers=true] to suppress numbering, should it appear.

10 Graphics

10.1 Importing Graphics

% \graphicspath{ {./images/ } }
% \includegraphics[scale=1.5]{graphic}
10.2 Making Graphics

\usepackage{tikz}
\usetikzlibrary{decorations.text}

\begin{tikzpicture}[node distance = 4cm, auto]
    \node [block] (first) { (1) \LaTeX \};
    \node [block, right of=first] (second) { (2) Bib\TeX \};
    \node [block, right of=second] (third) { (3) \LaTeX \};
    \node [block, right of=third] (fourth) { (4) \LaTeX \};

    \node [file, above of=third, yshift=-1.5cm] (tex) { .tex \};
    \node [file, above of=second, yshift=-2.5cm] (bib) { .bib \};
    \node [file, below of=first, xshift=2cm, yshift=2.5cm] (aux) { .aux \};
    \node [file, below of=second, xshift=2cm, yshift=2.5cm] (bbl) { .bbl \};

    \draw [line] (tex) -| (first);
    \draw [line] (first) |- (aux);
    \draw [line] (bib) -- (second);
    \draw [line] (aux) |- (second);
    \draw [line] (second) -| (bbl);
    \draw [line] (bbl) -| (third);
    \draw [line] (bbl) -| (fourth);
    \draw [line] (tex) -- (third);
    \draw [line] (tex) -- (fourth);
\end{tikzpicture}

11 Templates

http://mrzool.cc/tex-boilerplates/
https://www.latextemplates.com/
https://www.overleaf.com/latex/templates