

Webinar on Accessible Dissertations with Mathematics

(last update 11:22am 7 April 2026)

Notes

These notes were prepared for the 7 April 2026 UL Lafayette Graduate School Webinar on creating an accessible version of a dissertation containing mathematical content.

Introduction

Since we have limited time to implement this procedure for the Spring 2026 deadlines, we will discuss a reasonably straightforward method that does not require you to install any new software. We are aiming for a document that is reasonably accessible.

We will use the *L^AT_EXML* conversion program developed by people at NIST.

The process is tedious. But, for the most part, it is not particularly hard.

You cannot create an accessible pdf directly from LaTeX

There are several projects underway to create an accessible pdf from a *L^AT_EX* source. All of these are experimental and, to my knowledge, yield results that are worse than non-accessible.

I was optimistic that this approach might now be possible. However, after extensive experimentation with the newest version of the tag-pdf package in *LuaL^AT_EX*, I found that the mathematical content in the resulting pdf could not be read by one of the most widely used screen readers, NVDA.

Do not be deceived, it is easy to create a pdf with mathematical content that will pass as accessible with accessibility validators. Unfortunately, as is widely stressed by those in the know, passing a validator does not imply that the file is accessible!

Conversion of LaTeX code to html with MathML

First let's go through the basics of preparing for and making the conversion of a section of your document such as a chapter.

1. Create a directory (folder) for each chapter, e.g., "Chpt1only_conversion".
2. Within the "Chpt1only_conversion" directory create a subdirectory, e.g., "Chpt1_only_files".
3. Copy and paste your "chapter1.tex" file and all related image files (all files called by "chapter1.tex") into "Chpt1_only_files".
4. Edit the "chapter1.tex" file you created in the previous step as follows.
 - a. You first need to replace ALL of the lead-in material before the first word of your Chapter 1 content. We need a more basic setup that does not use the ga-tech-thesis class and does not use the ULL-style style file. (If you are not at UL Lafayette, you need to replace the analogous thesis specific material in the same way.)
We will use the `amsart` document class.
 - b. The boiler plate provided below, see NEW LEAD-IN MATERIAL which is posted at the end of this list, combines `usepackage` commands and Personal Shortcuts from two dissertations I used when developing these instructions. You can edit this material by removing packages you do not use or just leave them in. You should add your shortcuts here, too. **(I will post a chapter template on my web page.)**
 - c. You also need to add "`\end{document}`" at the end of the file if it is not already there.
 - d. Save this modified version of "chapter1.tex".
5. Go up one level from the current "Chpt1_only_files" directory to the parent "Chpt1only_conversion" directory. Now create a zip file of the "Chpt1_only_files" directory. We will submit this to the online *L^AT_EXML* converter.
6. [Follow this link to open the *L^AT_EXML* web page at "math.nist.gov/~BMiller/LaTeXML/"](https://math.nist.gov/~BMiller/LaTeXML/)
7. Click on the *L^AT_EXML* editor link (you should bookmark this webpage for subsequent conversions).
8. Select Upload & Convert in the top band on the page. This is where we get the conversion!
9. Drag and drop (or use the browse option) the zip file "Chpt1_only_files.zip" you created earlier. The converter will start working. Be patient and wait for the "Converted! Download" message to appear at the bottom. Now click download, save the zip file it provides, and unzip it. The files in this zip file are the ones we need!
10. Open the html file that *L^AT_EXML* created and see how well the conversion went. Don't worry about styling! All we need for now is an error free conversion. We can style the html later as needed. There may be red snippets of code (you will need to remove the offending material from the tex file (depending on details you may be able to just remove it from the html file). There may be some

“sort of orange” highlights indicating errors or incompatible code in your tex file. These must be fixed in the tex file so that you can try a new conversion.

11. Find the parts that did not convert correctly.
 - a. Your references to papers will still be in preliminary (pre \BibTeX form. We will discuss this later. Same page links will work!
 - b. Hopefully, the errors will be mostly due to “bad” *L^AT_EX* coding. That is, due to the use of deprecated or incompatible *T_EX* or *L^AT_EX* command forms which are easy to fix.
 - c. The conversion will work better if you use up-to-date *L^AT_EX* coding. Avoid unbracketed commands, e.g., use “ $\frac{a}{b}$ ”.
 - d. Avoid plain *T_EX* commands.
 - e. Check your images, figures, and tables. Tables can be especially problematic depending on how clean your *L^AT_EX* code is!
 - f. We will handle the bibliography and preliminaries (Title page and front matter) separately as the process for these is a bit different.

NEW LEAD-IN MATERIAL

Below you will find the NEW LEAD-IN MATERIAL referred to in the list above. This can be trimmed but KEEP amsart document class and KEEP (with your information) the title, author, and date part.

```
\documentclass[12pt]{amsart}
\usepackage[T1]{fontenc}
\usepackage{helvet}
\usepackage{savesym}
\usepackage{hyperref}
\hypersetup{%
    %pdfborderstyle={/S/U/W 1},
    bookmarksopen=true,%
    %citebordercolor=black,%
    colorlinks=true,%
    citecolor=[rgb]{0.235, 0.271, 0.678},
    linkcolor=black,%
    urlcolor=black,%
    pdfborder={0 0 0}%
}
\usepackage{amsmath,amssymb,latexsym,float,epsfig}
\usepackage{subcaption}
\usepackage{booktabs}
\usepackage{mathtools,breqn,amsmath}
\usepackage{amssymb}
\usepackage{bm}
\usepackage{tikz}
\usepackage{etoolbox}
\usepackage{enumitem}
\usepackage{epstopdf}
\usepackage{listings}
\usepackage{amsthm}
\usepackage{enumerate}
\usepackage{pdfscape}
\usepackage{ragged2e}
\usepackage{tocloft}
\usepackage{indentfirst}
\usepackage[shortcuts]{extdash}
\usepackage{csquotes}
\usepackage[labelfont=bf]{caption}
\allowdisplaybreaks
%% Personal Shortcuts
% You will need to type these as \cspm{}
\newcommand{\cspm}{\textsc{cspm}}
\newcommand{\cdpm}{\textsc{cdpm}}
\newcommand{\etal}{\emph{et al.}}
\newcommand{\wh}{\widehat}
\newcommand{\wt}{\widetilde}
\newtheorem{remark}{Remark}
\newcommand{\bQ}{\mathbf{Q}}
\newcommand{\bH}{\mathbf{H}}
\newcommand{\bs}{\mathbf{s}}
```

```

\newcommand{\bx}{\mathbf{x}}
\newcommand{\bSigma}{\mbox{\boldmath$\Sigma$}}
\newcommand{\bsigma}{\mbox{\boldmath$\sigma$}}
\newcommand{\sig}{\sigma}
\newcommand{\bone}{\mathbf{1}}
\newcommand{\bI}{\mathbf{I}}
\newcommand{\bzero}{\mathbf{0}}
\newcommand{\bxi}{\mbox{\boldmath$\xi$}}
\newcommand{\bbeta}{\mbox{\boldmath$\beta$}}
\newcommand{\diag}{\rm {diag}}
\newcommand{\btai}{\mbox{\boldmath$\tau$}}
\theoremstyle{definition}
\newtheorem{definition}{Definition}
\newtheorem{lemma}{Lemma}
\newtheorem{theorem}{Theorem}
\title{Chapter 1: Introduction} % PUT YOUR TITLE HERE *
\author{Your Name} % PUT YOUR NAME HERE *
\date{}
\begin{document}
\maketitle

```

Repeat this process

You will need to repeat this process for each chapter, for the appendix or appendices, and for the biosketch. To ready the *L^AT_EX ML* converter for a new conversion, simply refresh the page and it will return to input mode.

Creation of the bibliography html page

For this semester we will use a brute force method to get an acceptable bibliography. We are going to create an html file by hand!

First we need to get your bibliography into a numbered form. We will use the SIAM format to make this easier. If you can get this to work with a different numbered format that is OK, too. We need to numbers so we can fix the cite codes in the html.

First we need to run a simple LaTeX and BibTeX sequence of compiles. First create a tex file like this (use whatever name you used for your bib file)

```

\documentclass{amsart}
\begin{document}
\nocite{*}
\bibliographystyle{siam}
\bibliography{bibliography}
\end{document}

```

Save the file you created as “MyBibliographyOnly.tex” (or whatever you want, I just need a name for the next part of the process.) Now we need to compile this 4 times as follows

1. run pdfLaTeX on MyBibliographyOnly
2. run BibTeX on MyBibliographyOnly (this may spawn an error code, just click OK and continue)
3. run pdfLaTeX on MyBibliographyOnly
4. run pdfLaTeX on MyBibliographyOnly

Now we get to the tedious part.

1. Open the “MyBibliographyOnly.pdf” file you just created and highlight the bibliography pages (don't include the title.)
2. Paste the bibliography pages selection into a blank file. Use an editor from which you know how to create an ASCII file. The editor you normally use for *L^AT_EX* is fine.
3. Remove the page numbers from the midst of your bibliography entries.
4. Remove the line breaks so that each reference has its own line. It is easiest if your editor does not wrap lines, but, if it does wrap just be sure the hard line feeds are gone!
5. Paste the code `` at the start of each reference. Provided there is no `[` in any of your references, you can search and replace `[` by `[`.
6. Change the `` on the first reference to `<ul style="list-style-type: none;">`
7. Add `` on the line after your last reference.
8. Here's a snippet to show what I mean

```

<ul style="list-style-type: none;">
<li>[1] K. Abdollahnezhad and A. A. Jafari, “Testing ...
</li><li>[2] M. Abramowitz and I. A. Stegun, Handbook ...
</li><li>[3] W. Albers and P. L’ohnberg, “An approximate ...

```

- [4] E. N. Aplin, D. W. Green, J. W. Evans, ...
 -
 -
9. Save this file as an ASCII (plain text) file named "bibliography.html."
10. Now we need to add some html boiler plate at the top and the bottom of "bibliography.html."

(I will post the bibliography template on my web page.)

At the top paste this (insert your name where it says "your name.")

```
<!DOCTYPE html><html lang="en">
<head>
<meta http-equiv="content-type" content="text/html; charset=UTF-8">
<title>Bibliography</title>
<link rel="stylesheet" href="LaTeXML.css" type="text/css">
<link rel="stylesheet" href="ltx-article.css" type="text/css">
<link rel="stylesheet" href="ltx-amsart.css" type="text/css">
<link rel="stylesheet" href="ltx-listings.css" type="text/css">
<meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no">
</head>
<body>
<div class="ltx_page_main">
<div class="ltx_page_content">
<article class="ltx_document ltx_authors_1line ltx_leqno">
<h1 class="ltx_title ltx_title_document">Bibliography</h1>
<div class="ltx_authors">
<span class="ltx_creator ltx_role_author">
<span class="ltx_personname">your name</span></span>
</div>
At the end paste or type this
</article>
</div>
</div>
</body>
</html>
```

(I will post the bibliography template on my web page.)

Creating and converting the preliminaries section

This time we will combine the information from several files into a single *L^AT_EX* file and then convert that to html using the method we did for your chapters, appendices, and biosketch.

A template (this one has the optional dedication, epigraph, and list of figures)

Don't worry about the "dots" I used as section headings to get spaces. They don't look too bad and their presence allows us to avoid more complex html coding for now.

```
\documentclass[12pt]{amsart}
\usepackage[T1]{fontenc}
\usepackage{helvet}
\usepackage{savesym}
\usepackage{hyperref}
\hypersetup{%
  %pdfborderstyle={/S/U/W 1},% underline links instead of boxes
  bookmarksopen=true,%
  %citebordercolor=black,%
  colorlinks=true,%
  citecolor=[rgb]{0.235, 0.271, 0.678},
  linkcolor=black,%
  urlcolor=black,%
  pdfborder={0 0 0}%
}
\usepackage{amsmath,amssymb,latexsym,float,epsfig}
\usepackage{subcaption}
\usepackage{booktabs}
\usepackage{mathtools,breqn,amsmath}
\usepackage{amssymb}
\usepackage{bm}
```

```

\usepackage{tikz}
\usepackage{etoolbox}
\usetikzlibrary{arrows.meta, positioning}
\usepackage{enumitem}
\usepackage{epstopdf}
\usepackage{listings}
\usepackage{amsthm}
\theoremstyle{definition}
\newtheorem{definition}{Definition}
\newtheorem{lemma}{Lemma}
\newtheorem{theorem}{Theorem}
\newtheorem{corollary}[theorem]{Corollary}
\newtheorem{proposition}[theorem]{Proposition}
\newtheorem{example}{Example}[section]
\newtheorem{remark}{Remark}[section]
\allowdisplaybreaks
\title{Your Dissertation Title}
\author{Your Name}
\date{}

\begin{document}
\maketitle

\vspace{30 pt}
\section*{.}

\begin{center}
\noindent
A Dissertation Presented to the Graduate Faculty\\
In Partial Fulfillment of the Requirements for the Degree\\
Doctor of Philosophy
\end{center}

\section*{.}

\begin{center}
\noindent
University of Louisiana at Lafayette\\
Spring 2026
\end{center}

\section*{Approved}

\begin{center}
\noindent
Name1 name2, Chair\\
Department of Mathematics\\
\\
Name1 name2\\
Department of Mathematics\\
\\
Name1 name2\\
Department of Mathematics\\
\\
Mary Farmer-Kaiser\\
Dean of the Graduate School
\end{center}

\section*{Abstract}

The problem I consider is very interesting.

\section*{dedication}
\textit{This dissertation is dedicated to my cat}

```

```

\section*{epigraph}

\textit{"Mathematicians deal with large numbers sometimes, but never in their income."}
\\ ---Isaac Asimov, Prelude to Foundation \\

\section*{acknowledgements}

I am deeply grateful to my advisor, Dr. Name1 Name2.

\section{list of abbreviations}

\begin{tabular}{l l l}
CV & & Coefficient of Variation\\
EPA & & Environmental Protection Agency \\
NSF & & National Science Foundation \\
CPA & & Certified Public Accountant\\
NCT & & Noncentral  $t$  \\
\end{tabular}

\end{document}

```

Now let's fix the citations in you dissertation

This is another tedious chore, but, we are nearing the end!

Now that we have numbers assigned to your references, we need to get these into the html chapters (and any other section that may have citations). Get ready for the really tedious part! Find each citation “name2026ref” or whatever you used and replace it by its bracketed number [69], using the appropriate number of course.

Putting the pieces together

Now we need to collect all the pieces we have created and put these together in a form suitable for submission to the Graduate School and suitable for posting on a web page.

Remember that our goal is to have two copies of your dissertation (one with strict attention to styling requirements for print purposes and one that is accessible).

Here's what we need.

1. A pdf suitable for printing, distributing to interested parties, and submission to The Graduate School and ProQuest. This is the version that must satisfy the Graduate School formatting rules!
2. An accessible html version for submission to The Graduate School and suitable for posting on a web page of your choice. Note: You can post both the inaccessible pdf and the accessible html version on the same web page, provided you clearly indicate that you have posted two versions and that the content of the two is equivalent.

Organizing the section files in a properly structured directory

Assuming you have created all of the required pieces we are now ready to get them organized into a well structured final form.

We are going to create a directory with subdirectories for each of the pieces. We will also create a table of contents and file link index page “index.html” to serve as our online hub (home page). We will elaborate on the creation of this index page after we describe the way the pieces are arranged in their directories.

The directory structure

1. Top Level: The “MyCombinedDissertation” directory
2. The Second Level: Here we need a subdirectory for each piece of the dissertation
 - The “appendix” directory
 - The “bibliography” directory
 - The “biosketch” directory
 - The “chapter1” directory
 - ...
 - The “chaptern” (last chapter) directory
 - The “preliminaries” directory

The contents of each subdirectory

For each subdirectory corresponding to a *L^AT_EX*ML conversion (all but bibliography which is slightly different) you can copy the contents of the zip file you downloaded after your final successful *L^AT_EX*ML conversion. Important note: If there are images in the section be sure to include the directory located in this zip file, this is where the conversion html file will look for the images! That is, you can create the contents of one of these subdirectories by copying the html file, the four style files, and the directory containing all the associated files (images) from the directory produced when you extracted the files from the downloaded *L^AT_EX*ML conversion zip file.

The bibliography subdirectory is only different because it does not have an associated conversion download. Here just place the “bibliography.html” file you created along with copies of the four style sheets you just transfer into each of the other subdirectories. The style files are:

1. LaTeXML.css
2. ltx-amsart.css
3. ltx-article.css
4. ltx-listings.css

The table of contents and file links html page

Hopefully the instructions in the template file “ULLafayetteTOCandFileLinkTemplate.html” will be clear enough for you to insert your particulars. Use an editor from which you know how to create an ASCII file. The editor you normally use for *L^AT_EX* is fine. Just be careful if you are not used to editing html! You can use the nu html checker to find errors. (see information about accessing this in the Two very important resources section of this document.

I used two methods when I did this for the example dissertations. For one I started with a copy of the table of contents details from the “DissertationName.toc” file produced by BibTeX. For the other I simply copied and pasted the table of contents details from the dissertation pdf file.

The final step in the assembly of the pieces

Now copy your modification of the “ULLafayetteTOCandFileLinkTemplate.html” you constructed as outlined in the last section to the Top Level: The “MyCombinedDissertation” directory and rename it “index.html.”

You will also need to place a copy of each of the four style files in the “MyCombinedDissertation” directory, i.e. the files:

1. LaTeXML.css
2. ltx-amsart.css
3. ltx-article.css
4. ltx-listings.css

Two very important resources

Validating html

You should verify that your html files use valid html coding. In spite of the fact that browsers will often compensate for bad coding, eventually such errors will cause trouble! The validity of your html files can be checked using the online nu html checker. [Follow this link to access the nu html checker](#)

This html checker will tell you where the errors are located by line number and give an indication of the problem, so turn on line numbers in your editor to make it easier to locate the errors. Note: When you correct one batch of errors, you will need to run the checker again on the corrected file since new errors may show up. This is especially true with invalid heading levels, since correcting one will cause an error in its subheadings. For these just change the incorrect, usually h6, heading to the one suggested.

Validating accessibility

You should also check the accessibility of your html files. You can download and install the WAVE browser add on (for Chrome, Firefox, and Edge) provided by WebAIM and then use this to check the accessibility of your html files. [Follow this link to download the WAVE browser add on](#). Our goal here is to get zero errors, a few warning are acceptable (and unavoidable with the way mathML uses tables for layout) for now.

If you don't use windows, you might need to do this on someone else's PC. It is possible to check an html file by uploading it as a file in moodle and using panorama (the smiley face tool). To do this in moodle:

1. Create a file;
2. Upload the html file, the four style sheets, and all the image files;
3. Right click on the html file and set it as the main file;
4. Save and display.

It may take some time for panorama to post the check results (try for 100% smiley face). I have done this with html files I created for my classes, but, I have not tried this with the dissertations I experimented on so I am not sure how picky panorama will be. If you can get them to pass WAVE on someone's windows PC, that is all you need!

Some errors to watch for

Here are a few things to look out for as you prepare your files for conversion and as you check the results.

I will only include some which I think may be common here. If you feel overwhelmed when you first try this, I may be able to help you get started with understanding your errors. Please email me at cberry@louisiana.edu and I will try to provide some guidance. However, I do not have enough "free time" to provide extensive help.

- Do not use "\$\$" for displayed math use "\[... \]" instead. With "\$\$" the material will look OK on the screen, but, the screen reader will not read the displayed material!
- Do not use "resizebox" (just comment these out) this will lead to serious problems in the appearance of the output (too small, too large, overwriting other text, etc)!
- Do not use "\begin{align}" for equations use "\begin{equation}"!
- If you have a table with an empty header cell you will get "empty table header error messages" in the WAVE check. You can recode "<th ...>" and "</th>" as "<td ...>" and "</td>" in the html file (Save a copy in case the following does not work for you!) I used search and replace twice: 1. replace "<th >" (with space!) by "<td >" (with space!) and 2. replace "</th>" by "</td>". You will still get warnings, but, no errors from WAVE, and it will pass the html validator check, too.
- If you modify sizing in tables you may generate html errors (run the nu html checker to find). If the checker finds negative padding (which is illegal!) then carefully search and replace each value, say "-1.2pt" by "0pt", in the html file.

Screen readers

- NVDA (Non-Visual Desktop Access) is one of the two most widely used screen readers. [Follow this link to download the NVDA screen reader \(for windows only\).](#)
- VoiceOver and TalkBack are the two most popular screen readers for mobile devices.
 - VoiceOver, Apple's built-in screen reader, is by far the most commonly used screen reader on mobile devices.
 - TalkBack is Google's screen reader and is included with all Android devices.
- JAWS (Job Access With Speech) is the most widely used screen reader. Unfortunately, it is quite expensive.

Links

[Follow this link to the Math Dept Accessibility Info Moodle Page and self-enroll](#)

[Follow this link to my web page](#)