

## Restructuring MAT22AL (Linear Algebra Computer Laboratory) Website

PreTeXT, XML, HTML, CSS, and Python

Davis, CA

April 2021 - Present

- Currently working under UC Davis Professor Ali A. Dad-del
  - Restructuring MAT22AL (Discrete Mathematics Computer Laboratory) coursework website through front-end development tools including PreTeXT, HTML, CSS, and Python
- Built web applications in an agile and iterative way using agile methodologies and Git/Github

### Week 1

Davis, CA

UC Davis

21 April 2021: 10 hours

- Utilized **Git Bash** for compiling through this command line: `xsltproc/xsltproc.exe mathbook/xsl/pretext-html.xsl test.xml`
- Utilized **Visual Studio Code** for coding **XML**, **HTML**, **CSS**, and **Python** files
- While working with **PreTeXT** and **XML**, I noticed how the formatting is nearly identical to a book. Every number below “Front Matter” represents a chapter, and the front matter precedes the main text of a book
  - **ERROR BUG LOG:** I am having difficulties changing the label of Front Matter to the rather ideal “Course Information.” I believe Front Matter cannot be changed
  - **ERROR BUG LOG:** For some reason, I am not able to utilize the bold tags to bold keywords such as “MAT 22AL”, “MAT 22A” and “MATLAB.”

The picture below the ordering of LAB Assignments from 1-10. An abstract of the class is provided, alongside the title of the class and the professor’s name who is teaching the course. The buttons of UP, NEXT, and PREV work according to their function.

$\Sigma$  **MAT22AL: Linear Algebra Computer Laboratory**  
Professor Ali A. Dad-del

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10 LAB 10 (Extra Credit)

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🔗 MAT 22AL (Computer Laboratory For Linear Algebra) is a one-unit course for students enrolled in MAT 22A (Elementary Linear Algebra). The labs offered in this course are designed to help linear algebra students in two areas: First, the use of computers in computations related to linear algebra. Second, enhance students’ understanding of basic concepts and ideas of linear algebra for MAT 22A students. These labs are not self-contained. They should be used as a supplement for an Elementary Linear Algebra course. For each lab, there is a list of prerequisite topics, which need to be studied before doing the labs using any standard textbook. A little basic knowledge about working with computers is helpful. The labs are designed to use MATLAB. No familiarity with MATLAB is required. MATLAB command will be introduced gradually.

Front Matter ▶

1 LAB 1 ▶

2 LAB 2 ▶

- Made improvements to sections and understood the mechanics of PreTeXT a lot more through trial and error.
  - Fixed the first bug and learned the differences in XML and PreTeXT compared to other front-end tools.
  - **ERROR BUG LOG:** I am having difficulties adding an image or pdf to the designated section.
    - Ex: Lab1.pdf -> Section Lab1



# MAT 22AL: Linear Algebra Computer Laboratory

Professor Ali A. Dad-del, TA Zhiqian Du

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## MAT 22AL: Linear Algebra Computer Laboratory

Professor Ali A. Dad-del

University of California - Davis


daddel@math.ucdavis.edu

TA Zhiqian Du

University of California - Davis

simdu@ucdavis.edu

April 21, 2021


**MAT 22AL** (Computer Laboratory For Linear Algebra) is a one-unit course for students enrolled in **MAT 22A** (Elementary Linear Algebra). The labs offered in this course are designed to help linear algebra students in two areas: First, the

*The picture below demonstrates the use of `<alert>` to bold. I confused it with `<b>` or `<bold>` from HTML/CSS.*

**MAT 22AL** (Computer Laboratory For Linear Algebra) is a one-unit course for

The picture below demonstrates the use of png files from the original pdf files.


Course Information	22A students. These labs are not self-contained. They should be used as a supplement for an Elementary Linear Algebra course. For each lab, there is a list of prerequisite topics, which need to be studied before doing the labs using any standard textbook. A little basic knowledge about working with computers is helpful. The labs are designed to use <b>MATLAB</b> . No familiarity with MATLAB is required. MATLAB command will be introduced gradually.
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	<p>MATH 22AL: Computer Lab For Linear Algebra Dr. Daddel</p> <p><b>Course Description:</b> MATH 22AL is an online course, with one Mandatory meeting at the beginning of the quarter which is announced in campus class schedule. Due the COVID-19 pandemic this mandatory session is Recorded and is available to enrolled student. You can do the LABS on your computer by following the instructions on each lab.</p> <p><b>Required work:</b> There are 9 assignments, each due 5:00 PM on due date of the Labs. Please check the due dates on course website.</p> <p><b>Grading:</b> To receive a pass you need to complete, submit and pass at least 8 labs. Also having 7 Pass and 2 Bairy Pass will be a passing grade for the course.</p> <p><b>There are no midterms or final.</b> Each lab needs about two hours of work, this time might vary depending on how fast you work on computer and how prepared you are in terms of Linear Algebra concepts. No late assignment will be accepted</p> <p><b>Prerequisite:</b></p> <ul style="list-style-type: none"> <li>• Have taken Linear Algebra or taking it concurrently.</li> <li>• Having Basic knowledge about working with computers.*</li> </ul> <p>* A little of basic knowledge about working with computers is helpful. You need to know how to log in a Unix machine and use an editor (vi, pico, ...). If you have a Campus Computer Account and check your e-mail, you are probably using a Unix machine. The labs are designed to use MATLAB. No familiarity with MATLAB is required. MATLAB commands will be introduced gradually.</p> <p><b>Registration and Enrollment :</b> you must</p> <ol style="list-style-type: none"> <li>1. Be enrolled in a section of MAT 22A (concurrently this quarter) and in a section of MAT22AL via SISWEB.</li> <li>2. Registered on line by visiting the following web page to obtain your username and Password <a href="http://www.math.ucdavis.edu/comp/class-accts">http://www.math.ucdavis.edu/comp/class-accts</a></li> <li>3. Have your user name and your password with you when going to the first lab meeting.</li> </ol> <p><b>Where to get help:</b></p> <ul style="list-style-type: none"> <li>• Your MATH 22AL Instructor will be holding Zoom office hours on Tuesday and Thursday 10 AM -12PM to answer your questions.</li> </ul>

Week 2  
UC Davis

Davis, CA  
29 April 2021: 10 hours

- Utilized **Git Bash** for compiling through this command line: `xsltproc/xsltproc.exe mathbook/xsl/pretext-html.xsl test.xml`
- Utilized **Visual Studio Code** for coding **XML**, **HTML**, **CSS**, and **Python** files
- Had an extremely time-consuming problem as I could not create subsections under the header, constantly compiling with warnings
  - The solution was to change the format from article to book
    - PreTeXt gives two formats (article and book)
- Changed the order of the chapters (Blue margin)
  - Created sections under the chapters to match Professor's examples
  - Course information is without the abstract
  - Cut-down unnecessary <p>
  - **ERROR BUG LOG:** Cannot use the provided TeX files provided by professor. Spent a lot of time doing research on utilizing the files on the lab section.

The picture below demonstrates the major changes to the user interface.



# MAT 22AL: Linear Algebra Computer Laboratory

Professor Ali A. Dad-del, TA Zhiqian Du

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1 LAB 1

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Content and Objectives

Starting LAB

Instruction

Saving, Editing and Submitting your work

More on the topics covered

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## Chapter 1 LAB 1

Welcome to **Lab 1** of the Linear Algebra Computer Laboratory course. Below are a few resources to look at in order to start and complete this lab.

1.1 Notes


1.2 Content and Objectives

1.3 Starting LAB

1.4 Instruction

1.5 Saving, Editing and Submitting your work

1.6 More on the topics covered



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## MATH 22AL: Computer Lab For Linear Algebra

Dr. Daddel

**Course Description:** MATH 22AL is an online course, with one Mandatory meeting at the beginning of the quarter which is announced in campus class schedule. Due the COVID-19 pandemic this mandatory session is Recorded and is available to enrolled student. You can do the LABS on your computer by following the instructions on each lab.

**Required work:** There are 9 assignments, each due 5:00 PM on due date of the Labs. Please check the due dates on course website.

**Grading:** To receive a pass you need to complete, submit and pass at least 8 labs. Also having 7 Pass and 2 Bairy Pass will be a passing grade for the course.

**There are no midterms or final.** Each lab needs about two hours of work, this time might vary depending on how fast you work on computer and how prepared you are in terms of Linear Algebra concepts. No late assignment will be accepted

**Prerequisite:**

- Have taken Linear Algebra or taking it concurrently.
- Having Basic knowledge about working with computers.\*

\* A little of basic knowledge about working with computers is helpful. You need to know how to log in a Unix machine and use an editor (vi, pico, ...). If you have a Campus Computer Account and check your e-mail, you are probably using a Unix machine. The labs are designed to use MATLAB. No familiarity with MATLAB is required. MATLAB commands will be introduced gradually.

**Registration and Enrollment :** you must

- Be enrolled in a section of MAT 22A (concurrently this quarter) and in a section of MAT22AL via SISWEB.
- Registered on line by visiting the following web page to obtain your username and Password  
<http://www.math.ucdavis.edu/comp/class-accts>
- Have your user name and your password with you when going to the first lab meeting.

**Where to get help:**

- Your MATH 22AL Instructor will be holding Zoom office hours on Tuesday and Thursday 10 AM -12PM to answer your questions.
- You may attend his office hours as he will announce it by e-mail.
- There are a few Videos of different steps of using computer from Mandatory session, which are available in course website. Click on Late enrollment.


The picture below demonstrates the major changes to the user interface.

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Late Enrollment	Late Enrollment		
Resources	Resources		

- Utilized **Git Bash** for compiling through this command line: `xsltproc/xsltproc.exe mathbook/xsl/pretext-html.xsl test.xml`
- Utilized **Visual Studio Code** for coding XML, HTML, CSS, and Python files

- As I attempt for hours to understand LaTeX and pdfs, there has been a problem for the tool to read pdf files. I switched the pdf files to pngs and separated them into their own respective categories, as well as reformatting Labs 1 and 2

The picture below demonstrates the major changes to the user interface.



# MAT 22AL: Linear Algebra Computer Laboratory

Professor Ali A. Dad-del, TA Zhiqian Du

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Entering Matrices

Combining Commands

Working with Entries

Diagonal Matrices

Constructing Large Matrices

Creating Vectors (1)

Creating Vectors (2)

Creating Vectors (3)

Row Operations

Saving, Editing and Submitting your work

2 LAB 2

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## 1.5 Entering Matrices

MATLAB:

University of California, Davis

Computer LAB for Linear Algebra

LAB 1 Instruction

Dr. Daddel

MATH 22AL

Lab # 1


Ways to enter a matrix in MATLAB

Press **Enter** after each type.

Note :

You need a space between the row entries and a semicolon between the rows.

Type	<code>A = [1 2 3; 3 4 5; 4 5 6]</code>	This will create a $3 \times 3$ matrix to create a 4 by 4 identity matrix.
Type	<code>B = eye(4).</code>	to create a 4 by 4 matrix with randomly generated entries distributed uniformly between 0 and 1.
Type	<code>C = rand(4)</code>	to get a 4 by 3 random matrix .
Type	<code>D= rand(4,3)</code>	to see a list of your variables.
Type	<code>who</code>	to clear the variable D .
Type	<code>clear D</code>	to see if D is cleared or not
Type	<code>who</code>	to create a 5 by 5 random matrix.
Type	<code>D=rand(5)</code>	to multiply every entry of D by 10.
Type	<code>D=10*D</code>	to get a random matrix with integer entries.
Type	<code>D=round(D)</code>	



# MAT 22AL: Linear Algebra Computer Laboratory

Professor Ali A. Dad-del, TA Zhiqian Du

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Questions

Diagonal Matrices

Symmetric and Skew Symmetric Matrices

Answer the Following Questions (2)

Solve the Linear System

Using MATLAB's Command  $X=A \setminus b$  to Solve a Linear System

Saving, Editing and Submitting your work

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## 2.11 Answer the Following Questions (2)

MATLAB:

University of California, Davis

Computer LAB for Linear Algebra

Dr. Daddel

MATH 22AL

Lab # 2

0.1 what happens if you add, subtract or multiply symmetric matrices?:

Note :

To enter transpose of a matrix A in MATLAB you need to type  $A'$ .

Recall that a matrix A is called symmetric if  $A = A'$ .

Type	<code>S + T</code>	to get a symmetric matrix.
Type	<code>S - T</code>	to get a symmetric matrix.
Type	<code>ST</code>	to get a skew symmetric matrix.
Type	<code>TS</code>	to get a skew symmetric matrix.

0.2 Answer the following questions::

- Which one of these matrices are symmetric?
- What type of matrix will we get if we add (multiply ) two symmetric matrices?
- Can we get symmetric matrices by adding two non-symmetric matrices?



- Utilized **Git Bash** for compiling through this command line: `xsltproc/xsltproc.exe mathbook/xsl/pretext-html.xsl test.xml`
- Utilized **Visual Studio Code** for coding **XML**, **HTML**, **CSS**, and **Python** files
- As I attempt for hours to understand LaTeX and pdfs, there has been a problem for the tool to read pdf files. I switched the pdf files to pngs and separated them into their own respective categories, as well as reformatting Labs 3 and some extensive renaming for the png and rearranging.
- Extensive research on formatting / making tables.

The picture below demonstrates the major changes to the user interface.

Answer the Following Questions

Diagonal Matrices

Symmetric and Skew Symmetric Matrices

Answer the Following Questions (2)

Solve the Linear System

Using MATLAB's Command  $X=A \setminus b$  to Solve a Linear System

Saving, Editing and Submitting your work

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Saving, Editing and Submitting your work

### 4 LAB 4

Notes

## 3.5 M-Files

MATLAB:

University of California, Davis

Computer LAB for Linear Algebra

Dr. Daddel

MATH 22AL

Lab # 3

### 7 M-Files

Note:

MATLAB can execute a sequence of statements stored in an ordinary text file with a `.m` extension. Because of this extension, such files are called "m-files".

One type of m-file is the function m-file.

The first line of a function m-file must define the m-file as a function, specify its name, and specify its input and output variable names. A function m-file's function name and file name must be identical.

**For example**, a function named "changerows" must be stored in a file named "changerows.m".

When a function has more than one output variable, the output variables are enclosed by brackets: for example, `[m, n] = size(A)`. If your m-file is not in the working directory (this will default to your home directory), you must specify the path to it.

Using a text editor (e.g., `pico`), create the following file and save it as `rowchange.m`

```
function rowchange(A, c, d)
display(A)
r = A(c,:);
A(c,:) = A(d,:);
A(d,:) = r;
display(A)
```

(The `display` function prints a variable to the screen.)

After saving the file, reopen MATLAB if it was not already open (do not forget to use the