

Jeff Anderson's Learn MATLAB Playlists

Below is a list of YouTube playlists that I created as supplementary materials for my ENGR 11 course. You can find these, and many other additional resources, that I provide to my students on our course homepage:

<http://www.appliedlinearalgebra.com/blog/for-students/welcome-to-engr-11>

I provide links to both the playlists and the individual videos found within. I also show the length of each video. Finally, the column labeled "Complete" is a great place to track your progress through these videos. I recommend that you track the amount of time you spend watching each video in that column. If you are writing all lines of code for yourself, taking notes and struggling in productive ways in each video, I bet that you'll spend more time than the length of each video (my bet is that the ratio is somewhere between 2 and 4: you'll spend 2X – 4X the amount of time watching each video than the length of the video itself).

The best way to figure out how long it takes you to watch this content is to track your work. If you get in this habit early in the class, you'll collect a lot of data to help guide your guesses about how long it takes you to watch these videos and take notes on the content. One of the most difficult aspects of learning in college is [accurately predicting how much time it takes to learn](#) material. By systematically tracking your progress, you'll build insights into that larger question.

UNIT 1: INTRODUCTION TO PROGRAMMING IN MATLAB

[The MATLAB Desktop](#)

ENGR 11, Unit 1, Lesson 1 : 10 Videos = 2 hr, 35 min, 29 sec

Video Title	Length	Complete
1. Engineering 11 Interview with Sydney Tomaneng	41m, 53s	
2. Play with the MATLAB Desktop	7m, 14s	
3. How to show the virtual keyboard?	3m, 18s	
4. How to use the command window in MATLAB?	9m, 27s	
5. How to define variables in MATLAB?	8m, 31s	
6. How to perform basic arithmetic in MATLAB?	13m, 05s	
7. How to use MATLAB's built-in functions?	20m, 53s	
8. How to define scalar variables in MATLAB?	17m, 24s	
9. What are the rules for MATLAB variable names?	14m, 56s	
10. How to manage variables in MATLAB's Workspace?	18m, 44s	

[Script Files](#)

ENGR 11, Unit 1, Lesson 2 : 7 Videos = 2 hrs, 2 min, 25 sec

Video Title	Length	Complete
1. What is the MATLAB Toolstrip?	13m, 43s	
2. How to connect with MATLAB's online community?	9m, 41s	
3. What are MATLAB script files?	27m, 15s	
4. What are features of a good algorithm?	6m, 16s	
5. How to draw flowchart diagrams?	13m, 23s	
6. How do I comment my MATLAB script files?	15m, 23s	
7. How to change current folder in Command Window	30m, 07s	

8. [How to save time when documenting your code?](#)

6m, 30s

[Create Arrays](#)

ENGR 11, Unit 1, Lesson 3 : 6 Videos = 1 hr, 27 min, 33 sec

Video Title	Length	Complete
1. How to create column vectors in MATLAB?	10m, 28s	
2. How to create row vectors in MATLAB?	8m, 22s	
3. How to create row vectors using the colon operator?	13m, 49s	
4. How to create row vectors the using linspace function	18m, 01s	
5. How to define matrices in MATLAB?	17m, 49s	
6. How to address individual entries of a matrix?	18m, 49s	

[Play with Arrays](#)

ENGR 11, Unit 1, Lesson 4 : 6 Videos = 1 hr, 31 min, 38 sec

Video Title	Length	Complete
1. How to use colon notation to address arrays	24m, 49s	
2. How to create zeros, ones, or identity matrices?	6m, 57s	
3. How to use the transpose operator	15m, 37s	
4. How to add or delete entries in an existing matrix	8m, 34s	
5. How to define block matrices	17m, 43s	
6. What are built-in functions for handling matrices?	17m, 53s	

[Logical Data](#)

ENGR 11, Unit 1, Lesson 5 : 8 Videos = 1 hr, 34 min, 14 sec

Video Title	Length	Complete
1. What is the logical data class?	18m, 47s	
2. What is a logical scalar?	7m, 41s	
3. What is a logical vector?	11m, 55s	
4. What is a logical matrix?	7m, 10s	
5. How can we accurately refer to the size of logical data?	4m, 27s	
6. What is the logical NOT operator?	10m, 03s	
7. What is the logical AND operator?	19m, 15s	
8. What is the logical OR operator?	14m, 48s	

Logical Play

ENGR 11, Unit 1, Lesson 6 : 11 Videos = 1 hr, 33 min, 42 sec

Video Title	Length	Complete
1. What is the form of a logical operator?	10m, 58s	
2. What are compatible sizes for logical operators?	18m, 43s	
3. What is the logical XOR operator?	9m, 21s	
4. How to combine logical operations?	8m, 22s	
5. What are equivalent propositions?	6m, 31s	
6. What are relational operations?	11m, 43s	
7. How to test for equality?	9m, 57s	
8. How to test inequality relationships?	4m, 59s	
9. How to use the isa function?	12m, 59s	
10. What are special logical operators?	9m, 13s	
11. How to test the state of MATLAB entities?	4m, 22s	
12. How does logical indexing work?	6m, 55s	

For Loops

ENGR 11, Unit 1, Lesson 7 : 5 Videos = 1 hr, 16 min, 23 sec

Video Title	Length	Complete
1. How to use for loops in MATLAB?	25m, 15s	
2. How to use for loops with vectors?	18m, 30s	
3. How to code a dot product algorithm?	7m, 12s	
4. How to code scalar-vector multiplication?	12m, 56s	
5. How to code an axpy operation?	12m, 25s	

If Statements

Engr 11, Unit 1, Lesson 8 : 4 Videos = 1 hr, 17 min, 30 sec

Video Title	Length	Complete
1. How to write an if statement?	25m, 11s	
2. How to write an if/else statement?	28m, 53s	
3. How to use if, elseif, else statements?	12m, 43s	
4. What is logical short circuiting?	10m, 39s	

Function Files

ENGR 11, Unit 1, Lesson 9 : 3 Videos = 1 hr, 50 min, 44 sec

Video Title	Length	Complete
1. What are function files?	29m, 19s	
2. How to code a scalar-vector multiplication function?	47m, 44s	
3. How to code a function that copies one vector into another?	33m, 41	

Step 1 of Program Development	ENGR 11, Unit 2, Lesson 1 : 9 Videos = 1 hr, 51 min, 13 sec
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Video Title	Length	Complete
1. The Program Development Process	10m, 16s	
2. How to do matrix column vector multiplication using linear combinations	18m, 51s	
3. Example of matrix column vector multiplication using linear combinations	14m, 25s	
4. How to do matrix column vector multiplication using dot products?	14m, 57s	
5. Example of matrix column vector multiplication using dot products	12m, 36s	
6. How to do row vector matrix multiplication using linear combinations	12m, 08s	
7. Example of row-vector matrix-multiplication using linear combinations	11m, 27s	
8. How to do row-vector-matrix multiplication using dot products	13m, 29s	
9. Example of row-vector-matrix-multiplication using dot products	13m, 15s	

Steps 2 and 3 of Program Development	ENGR 11, Unit 2, Lesson 2 : 6 Videos = 1 hr, 46 min, 44 sec
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Video Title	Length	Complete
1. What is the relationship between matrix-vector multiplication and matrix partitions?	9m, 28s	
2. Do we really need four types of matrix vector multiplication	25m, 34s	
3. How to code matrix-column-vector multiplication using axpy operations?	20m, 45s	
4. How to code matrix-column-vector multiplication using dot products?	17m, 10s	
5. How to code row-vector-matrix multiplication using linear combinations?	17m, 16s	
6. How to code row-vector-matrix multiplication via dot products?	16m, 23s	

Steps 4 of Program Development	ENGR 11, Unit 2, Lesson 3 : 7 Videos = 2 hour, 10 min, 49 sec
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Video Title	Length	Complete
1. Towards creating a general matrix-vector multiplication function	12m, 36s	
2. Produce specifications for general matrix-vector multiplication function	11m, 42s	
3. Document our general matrix-vector multiplication function	10m, 17s	
4. How to code a function for general matrix-vector multiplication?	43m, 25s	
5. How to code an outer product operation?	18m, 33s	
6. How to code matrix-matrix addition?	9m, 25s	
7. How to code a rank-1 update?	10m, 41s	

UNIT 3: INTRODUCTION TO NUMERICAL ANALYSIS

[Unsigned Integers](#)

ENGR 11, Unit 3, Lesson 1: 7 Videos = 3 hour, 01 min, 27 sec

Video Title	Length	Complete
0. How does integer division relate to the floor function?	20m, 24s	
1. What are unsigned integers?	6m, 36s	
2. What are unsigned decimal numbers?	31m, 12s	
3. What are unsigned binary numbers?	28m, 59s	
4. What are unsigned hexadecimal numbers?	19m, 53s	
5. How many digits do we need to represent unsigned integers?	34m, 24s	
6. How does the floor function relate to integer division?	20m, 25s	
7. Convert an integer from decimal to binary	39m, 52s	

APPLIED PROJECT 1: LINEAR ALGEBRAIC NODAL ANALYSIS

[Introduction to the Electronics Learning Laboratory Kit](#)

Applied Project 1, Part 1: 12 Videos = 2 hr, 5min, 3sec

Video Title	Length	Complete
1. Intro to Linear Algebraic Nodal Analysis Algorithm	2m, 19s	
2. The Electronics Learning Lab Kit	6m, 14s	
3. What is a Solderless Breadboard?	13m, 23s	
4. Introduction to Resistors	13m, 56s	
5. Introduction to DC Voltage Sources	10m, 5s	
6. Introduction to DC Current Sources	6m, 6s	
7. Our first circuit with a resistor and dc voltage source	9m, 25s	
8. How do we measure the voltage drop using a DMM?	12m, 7s	
9. Some intuition about the voltage drop across an element	14m, 55s	
10. What the heck is measurement polarity?	13m, 25s	
11. How do we measure current using a DMM?	7m, 55s	
12. Measuring circuit variables: Example 1	15m, 33s	

[Basic Concepts in Circuit Analysis, Part 1](#)

Applied Project 1, Part 2 : 6 Videos = 1hr, 41min, 45sec

Video Title	Length	Complete
1. Measuring Circuit Variables: Example 3	17m, 35s	
2. Measuring Circuit Variables: Example 5	14m, 44s	
3. Parallel and Series Circuits	11m, 11s	
4. The Canonical Circuit Element	14m, 20s	

5. The Nodes of a Circuit	14m, 13s	
6. Measuring Circuit Variables: Example 7	29m, 42s	

Linear Algebraic Nodal Analysis: Example 2	Applied Project 1, Part 3A : 16 Videos = 3hr, 44min, 39sec
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Video Title	Length	Complete
1. Linear Algebraic Nodal Analysis, Example 2: Circuit Model Verification	14m, 31s	
2. LANA Example 2, Step 1: Identify and label the entire set of nodes in our circuit	4m, 37s	
3. LANA Example 2, Step 2: Model the circuit as a directed graph	13m, 08s	
4. LANA Example 2, Step 3: Create the entire incidence matrix	7m, 43s	
5. LANA Example 2, Step 4: Create all circuit vectors	10m, 43s	
6. LANA Example 2, Step 5A: State the entire set of KVLs in node potential form	16m, 02s	
7. LANA Example 2, Step 5B: State the branch constitutive relations for the circuit	6m, 04s	
8. LANA Example 2, Step 5C: State the entire set of Kirchhoff's current laws	9m, 25s	
9. LANA Example 2, Step 6: Determine all ordinary and generalized nodes	18m, 1s	
10. LANA Example 2, Step 6 Extension Part 1	22m, 59s	
11. LANA Example 2, Step 6 Extension Part 2	22m, 55s	
12. LANA Example 2, Step 7: Ground the circuit	17m, 51s	
13. LANA Example 2, Step 8: State the grounded circuit equations	20m, 29s	
14. LANA Example 2, Step 9: Identify (non)essential nodes and supernodes	9m, 14s	
15. LANA Example 2, Step 10: Eliminate node dependencies from voltage sources	17m, 48s	
16. LANA Example 2, Step 11: State the maximally deflated circuit equation	13m, 02s	

Linear Algebraic Nodal Analysis: Example 3	Applied Project 1, Part 4 : N Videos = H hour, MM min, SS sec
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Video Title	Length	Complete
1. LANA Example 2, Step 11 Extension Part 1	20m, 02s	
2. LANA Example 2, Step 11 Extension Part 2	32m, 31s	
3. LANA Example 2, Step 11 Extension Part 3	14m, 57s	
4. LANA Example 2, Step 11 Extension Part 4	23m, 54s	

Linear Algebraic Nodal Analysis: Example 2 Extension Videos	Applied Project 1, Part 5 : 4 Videos = 1hr, 31min, 08sec
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Video Title	Length	Complete
1. LANA Example 2, Step 11 Extension Part 1	20m, 02s	
2. LANA Example 2, Step 11 Extension Part 2	32m, 31s	
3. LANA Example 2, Step 11 Extension Part 3	14m, 57s	
4. LANA Example 2, Step 11 Extension Part 4	23m, 54s	

