

# Optional Reading List

We have listed out optional reading material on quantum computing, math, and programming concepts that will come up throughout the class. We recommend you familiarize yourself with these concepts, but we will cover them in more detail during the course.

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**NOTE:** We will continue to update this document. The last update was 10/5/2020.

## Quantum Resources

### ARTICLES AND VIDEOS

(1) Quantum Computing for the Very Curious, Michael Nielson

<https://quantum.country/qcvc>

(2) WIRED Guide to Quantum Computing (article + video below)

<https://www.wired.com/story/wired-guide-to-quantum-computing/>

(3) Video: Quantum Computing Expert Explains One Concept in 5 Levels of Difficulty (WIRED)

<https://www.youtube.com/watch?v=OWJCfOvochA>

(4) Video: Quantum Computers Explained – Limits of Human Technology, Kurzgesagt – In a Nutshell

<https://www.youtube.com/watch?v=JhHMJCUmq28>

(5) Video: How Does a Quantum Computer Work? Veritasium

[https://www.youtube.com/watch?v=g\\_laVepNDT4](https://www.youtube.com/watch?v=g_laVepNDT4)

(6) Qiskit Textbook (IBM online resource)

<https://qiskit.org/textbook/what-is-quantum.html>

This goes through Qiskit and Python, but is also very easy to read.

(7) IBM's official "What is Quantum Computing" site

<https://www.ibm.com/quantum-computing/learn/what-is-quantum-computing/>

This links to a couple of short videos from IBM staff talking about various aspects of QC.

**BOOKS** (At this point, these books must be purchased independently; we are working on securing PDFs of key chapters).

- ***Quantum Computing for Everyone*, Chris Bendhart.**
- **Gilbert Strang's new book: *Linear Algebra for Everyone*.**  
(<http://math.mit.edu/everyone>): For students interested in diving a bit further, this really is the ideal text. Gilbert Strang is famous for his amazing linear algebra textbooks/teachings and just published this book.
- ***Quantum Computer Science*, Mermin:** For students with a more advanced background, especially in EECS or Quantum Mechanics, this is a great textbook.
- ***Quantum Computing Since Democritus*, Scott Aaronson:** This is an advanced book, but it is valuable for students to check out because Aaronson is hilarious and really goes into a lot of interesting philosophical points about quantum computation.

## Math Resources

- **Trigonometric ratios: sin, cosine, and tangent**
  - <https://www.khanacademy.org/math/geometry/hs-geo-trig/hs-geo-trig-ratios-intro/v/basic-trigonometry>
  - <https://www.youtube.com/watch?v=snHKEpCv0Hk>
- **Multiplying matrices and vectors:**
  - **Videos:**
    - **Introduction to matrices:**  
<https://www.khanacademy.org/math/prec calculus/x9e81a4f98389efdf:matrices/x9e81a4f98389efdf:mat-intro/v/introduction-to-the-matrix>
    - **Introduction to vectors:**  
[https://www.youtube.com/watch?v=fNk\\_zzaMoSs](https://www.youtube.com/watch?v=fNk_zzaMoSs)
    - <https://www.youtube.com/watch?v=ml4NSzCQobk>
    - <https://www.khanacademy.org/math/prec calculus/x9e81a4f98389efdf:matrices/x9e81a4f98389efdf:multiplying-matrices-by-matrices/v/matrix-multiplication-intro>
    - <https://www.khanacademy.org/math/prec calculus/x9e81a4f98389efdf:matrices/x9e81a4f98389efdf:multiplying-matrices-by-matrices/v/multiplying-a-matrix-by-a-matrix>
  - **Articles:**
    - [https://www.varsitytutors.com/hotmath/hotmath\\_help/topics/multiplying-vector-by-a-matrix](https://www.varsitytutors.com/hotmath/hotmath_help/topics/multiplying-vector-by-a-matrix)
    - [https://mathinsight.org/matrix\\_vector\\_multiplication](https://mathinsight.org/matrix_vector_multiplication)
- **Probability**
  - <https://www.youtube.com/watch?v=KzfWUEJjG18>
- **Complex numbers**
  - **Introduction to Complex Numbers:**  
<https://www.khanacademy.org/math/algebra2/x2ec2f6f830c9fb89:complex/x2ec2f6f830c9fb89:complex-num/v/complex-number-intro>

## Programming Resources

**Concepts to be familiar with:** declaring variables, lists, declaring and calling a function. The course will use the programming language Python. You can use this interactive site: <https://www.learnpython.org/>

To practice, you can use this free code editor to write your code: [www.repl.it](http://www.repl.it)

- We'd recommend following these sections:
  - Introduction: [https://www.learnpython.org/en/Hello%2C\\_World%2C](https://www.learnpython.org/en/Hello%2C_World%2C)
  - Variables: [https://www.learnpython.org/en/Variables\\_and\\_Types](https://www.learnpython.org/en/Variables_and_Types)
  - Lists: <https://www.learnpython.org/en/Lists>
  - Basic Operators: [https://www.learnpython.org/en/Basic\\_Operators](https://www.learnpython.org/en/Basic_Operators)
  - Functions: <https://www.learnpython.org/en/Functions>