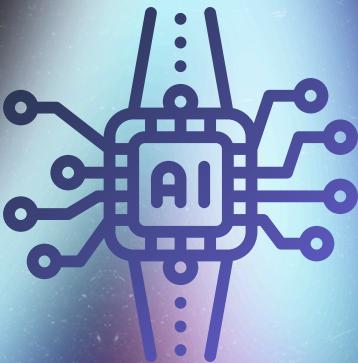


The ultimate



# Artificial Intelligence Study guide

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# Introduction

Learn how to be part of the AI era.

Artificial Intelligence is a challenging topic, and mastering it requires determination. If you are reading this, however, I want you to know that you already took the first step. This study guide will build a complete road map for anyone learning AI, from pre-requisites to more advanced topics.

In my journey of independently learning AI, I did much research and came across tons of materials; some were good, others not that much... and I selected the best of the best for you. I'll tell you everything that needs to be learned and, for each topic mentioned in this guide, specific materials (courses, books, websites, and more) will be referenced with links for easy access along with quick explanations for each of the subjects that one needs to convert in order to dive into artificial intelligence.

Every single topic covered here will reference free materials, so you can complete your learning journey cost-free. However, alternative resources will also be mentioned, some of them being paid and mostly made available through the Coursera platform. Why am I mentioning this? Well, there is a trick to getting access to Corusera's products for free with high probability, and I will tell you how to do this in Appendix A at the end of this book. Not only that, I'll teach you how to get free access to textbooks, so you do not want to miss that.

Having that said, I should also tell you that this guide will be presented via three main “fronts”. In the “foundations” section, we will cover topics that lay the fundamental basis of AI: math and data science. Next, the section “First steps in AI” will indicate the way towards your initial contact with artificial intelligence and cover topics like regression and classification algorithms, different use cases of AI along with their algorithms, coding, and more. Finally, “Mastering AI” will shed light on your next steps for diving deeper into more complex models and applications. Let’s go into it!

# Foundations

Math, data science, and algorithms.

Math, data science, and algorithms are the basis of AI, what “makes the magic happen”. Within math, 3 subjects are essential: calculus, probability/statistics, and linear algebra. Now, I'll present you my selection of the best materials for each of the mentioned areas.

## Math

### Calculus

Both resources are from MIT OpenCourseWare and contain video lectures, lecture notes, problem sets, and exams. By the way, the lectures are recordings from the actual lectures offered at MIT!

- Single variable calculus
  - <https://ocw.mit.edu/courses/18-01-single-variable-calculus-fall-2006/>
- Multivariable calculus
  - <https://ocw.mit.edu/courses/18-02-multivariable-calculus-fall-2007/>

### Linear Algebra

Also from MIT OpenCourseWare, this course is taught by the legendary professor Gilbert Strang.

- Linear Algebra
  - <https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010/>

## Probability and Statistics

To gain a very solid foundation in probability, I'd recommend this playlist, which is a collection of Harvard classes:

- [https://www.youtube.com/watch?v=KbBOFjPgOmw&ab\\_channel=HarvardUniversity](https://www.youtube.com/watch?v=KbBOFjPgOmw&ab_channel=HarvardUniversity)

Then, statistics can be tackled with this amazing course from MIT (again, on MIT OpenCourseWare):

- <https://ocw.mit.edu/courses/18-650-statistics-for-applications-fall-2016/resources/lecture-1-introduction-to-statistics/>

## Bonus: All-in-one course

This Coursera course from Luis Serrano (a famous educator in this area) teaches math for Artificial Intelligence, so it can be an interesting option if you want something faster and more focused on applications for AI. Also, it will teach you calculus, linear algebra, and probability/statistics. Even though it is paid, you can possibly get it for free or discounted by following Appendix A. Here it is:

- <https://www.coursera.org/specializations/mathematics-for-machine-learning-and-data-science>

## Data Science

This FreeCodeCamp course is pretty accessible and will introduce to many important topics in Data Science :

- [https://www.youtube.com/watch?v=ua-CiDNNj3O&ab\\_channel=freeCodeCamp.org](https://www.youtube.com/watch?v=ua-CiDNNj3O&ab_channel=freeCodeCamp.org)

If you want to gain more knowledge on data analysis and become a true data master, I'd check this other course from FreeCodeCamp (it's long, I know, but totally worth it):

- [https://www.youtube.com/watch?  
v=PSNXoAs2FtQ&ab\\_channel=freeCodeCamp.org](https://www.youtube.com/watch?v=PSNXoAs2FtQ&ab_channel=freeCodeCamp.org)

# First Steps in AI

Let's build your first models.

Now, it's time to actually code your first AI models and algorithms. To do so, Python is by far the most used programming language, so if you want to learn it (or refresh your knowledge), you can use this free Harvard course:

- <https://cs50.harvard.edu/python/2022/>

After that, you will be capable of learning and applying the main algorithms, concepts, and models of AI using Python in this (also free!) Harvard course:

- <https://cs50.harvard.edu/ai/2024/>

After this general introduction to AI, you can dive deeper into more specific areas, depending on your interests. Personally, I think that machine learning is a wonderful next step, and I recommend this course on Coursera (by Andrew Ng):

- <https://www.coursera.org/specializations/machine-learning-introduction>

# Mastering AI

Things now are getting advanced.

To begin with, I'd take a look at this Coursera course (also by Andrew Ng), on deep learning:

- <https://www.coursera.org/specializations/deep-learning>

By now you will be knowledgeable about several concepts of AI and ML. To harness those, you also deeply learn the main tools used in this area. In this course, you can learn TensorFlow, a widely used ML Python framework:

- <https://www.youtube.com/watch?v=tPYj3fFJGjk&pp=ygUWdGVuc29yZmxvdyBmdWxsIGNvdXJzZQ%3D%3D>

Now, if you are interested in computer vision, this is helpful:

- <https://www.youtube.com/watch?v=tPYj3fFJGjk&pp=ygUWdGVuc29yZmxvdyBmdWxsIGNvdXJzZQ%3D%3D>

Finally, if generative artificial intelligence models are among your interests (like ChatGPT), this is the place to go:

- [https://www.youtube.com/watch?v=IA3WxTPXqQ&ab\\_channel=freeCodeCamp.org](https://www.youtube.com/watch?v=IA3WxTPXqQ&ab_channel=freeCodeCamp.org)

# Appendix A

Get paid resources for free.

As promised, this appendix will teach you how to (without breaking any rules) get free or discounted access to paid resources. More specifically, I will show you how to use the Coursera platform to do so. In this case, we will use the financial aid feature from the mentioned website. Do the following:

1. Access the page of the course or specialization you want. Then, click on the underlined text called “Financial aid available”. For instance:

The screenshot shows the Coursera platform interface for the 'Mathematics for Machine Learning and Data Science Specialization'. At the top, there's a header with the specialization name and a 'Specialization - 3 course series' section. Below that is a box for '4.6 ★ (1,751 reviews)' with 'Beginner level' and '3 months at 5 hours a week'. A 'Flexible schedule' button and a 'View all courses' link are also present. The main content area features a course card for 'Mathematics for Machine Learning and Data Science'. It includes a 'Taught in English' icon, '22 languages available', and a note about content being untranslatable. An 'Instructor: Luis Serrano' icon is shown. A prominent blue button says 'Enroll for Free Starts May 7'. Below it, a yellow bar indicates 'Financial aid available' with a magnifying glass icon. The course has 67,473 already enrolled students. At the bottom, there are tabs for 'About', 'Outcomes', 'Courses', and 'Testimonials', along with a 'What you'll learn' section containing two bullet points: 'A deep understanding of the math that makes machine learning work' and 'Statistical techniques that empower you to get more out of your data'.

2. In the pop-up (if one appears) select the desired course and hit “Continue to application”.

3. Now, you just need to complete the application, filling in the required information. If you set the field “Amount you can pay” to \$0, there is a good chance that you get the course for free. Also, keep in mind that Coursera tends to offer more aid for situations that indicate more need (such as low income) and interest (such as well-written explanations).

After that, the application might take some time (around 15 days) to be processed and (hopefully) approved. Until this time, you can get anticipated access to most of the content of the courses by using the feature “audit course”. Well, I hope that helps you get the most out of this guide; while this strategy can face variations in terms of success, it worked all the times I tried it and is worth trying.

As a bonus, I will also indicate a useful resource for those who like learning via textbooks (or who just enjoy reading): Library Genesis. They are a platform that makes several books from a wide variety of styles (both technical and non-technical) available for download, completely for free. This is the link:

- <https://libgen.li/>

# What's next?

After following this guide, you will be ready to enter the AI world and have the tools to learn any new concepts that you would like. From now on, I strongly recommend two things. First, always keep learning and improving your skills by taking other courses, reading books, practicing, or any other method you'd like. When doing so, it might also be helpful to come back to this guide and look for materials on the platforms/channels linked here (MIT OpenCourseWare, Coursera, FreeCodeCamp, and others).

Secondly and even more importantly, put your knowledge into practice with projects and exercises. Come up with a problem you would like to solve with AI and try to figure out how you can take what you've learned and produce software solutions.

Having that said, I hope you enjoyed this guide.