



# Getting TensorFlow Developer Certified Curriculum

All of [Daniel Bourke's](#) (me) notes and curriculum for passing the TensorFlow Developer Certification exam.

Why get TensorFlow developer certified? Fun. Plus it gives me something to work towards and a reason to study.

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**Date I started:** @May 11, 2020

**Date I got certified:** @Jun 2, 2020

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## To do

- ☒ ~~Read through TensorFlow Developer Certification Handbook~~
- ☒ ~~Setup curriculum with study materials~~
- ☒ ~~Go through TensorFlow in Practice Specialization on Coursera~~
- ☒ ~~Read Hands-on Machine Learning with Scikit-Learn, Keras & TensorFlow~~
- ☒ ~~Watch first 3 lectures of MIT Introduction to Deep Learning~~
- ☒ ~~Setup local machine with PyCharm and ensure TensorFlow runs locally~~
- ☒ ~~Get TensorFlow Certified~~

## Resources

- [TensorFlow Developer Certificate Homepage](#)
- [TensorFlow Developer Certification Handbook](#) (all the criteria for passing the exam)
- [TensorFlow Developer Certification Environment Setup](#) (how to set your computer up for the exam)
- [TensorFlow in Practice Specialization on Coursera](#)
- [Hands-On Machine Learning with Scikit-Learn, Keras & TensorFlow 2nd Edition](#)
- [MIT Introduction to Deep Learning](#)
- [PyCharm quick start](#) (the exam uses PyCharm)

**Note:** For paid resources, affiliate links have been used. This doesn't change the price of the resource but if you do happen to purchase one, I will receive a portion of the payment, money I use towards creating resources like this.

## Minimum requirements


If you're looking to get TensorFlow Developer Certified, I'd recommend the resources above as the minimum requirements.


But if you're completely new to machine learning, I suggest you check out my article [5 Beginner Friendly Steps to Learn Machine Learning](#). You might want to also consider taking the [Zero to Mastery Machine Learning course](#) (the course I created to specifically answer the question, "I want to learn machine learning, where do I start?").

Once you've got some experience with machine learning, then come back to this page to prepare for the certification.


## Notes

Various notes I took whilst studying (public) and during the exam (private).

 [\[Book\] Hands-on Machine Learning with Scikit-Learn, Keras & TensorFlow Notes](#)

 [\[Course\] TensorFlow in Practice on Coursera Notes](#)





- Not sure why but whenever I submit a programming assessment on Coursera, it doesn't pass the grader even though the code works... not to worry. I'm interested in the materials.

 [\[Course\] MIT Introduction to Deep Learning Notes](#)

## Curriculum

The following chart tracks my progress through the various study materials leading up to the exam. Try changing between the various views. If you're creating your own version of this, you'll probably want to drag all of the items from the 'Completed' section to the 'Not started' section.

### Curriculum (try changing the views)

|  Name            |  Due date |  Last edited |  Link                                                                                                                                                |
|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">Go through environment setup for taking the TensorFlow Developer Certification Exam</a> | @May 29, 2020                                                                                | @Jun 13, 2020 9:41 PM                                                                           | <a href="https://www.tensorflow.org/site-assets/downloads/marketing/cert/Setting_Up_TF_Developer_Certificate_Exam.pdf">https://www.tensorflow.org/site-assets/downloads/marketing/cert/Setting_Up_TF_Developer_Certificate_Exam.pdf</a> |
| <a href="#">Go through PyCharm Getting Started Video Series</a>                                     | @May 29, 2020                                                                                | @Jun 13, 2020 9:41 PM                                                                           | <a href="https://www.jetbrains.com/pycharm/learning-center/">https://www.jetbrains.com/pycharm/learning-center/</a>                                                                                                                     |
| <a href="#">Enrol and Pass the TensorFlow Developer Certification Exam</a>                          | @Jun 3, 2020                                                                                 | @Jun 13, 2020 9:41 PM                                                                           |                                                                                                                                                                                                                                         |
| <a href="#">MIT Deep Learning Lectures</a>                                                          | @May 30, 2020                                                                                | @Jun 13, 2020 9:41 PM                                                                           | <a href="http://introtodeeplearning.com/">http://introtodeeplearning.com/</a>                                                                                                                                                           |
| <a href="#">MIT Deep Learning TensorFlow Lab</a>                                                    | @May 28, 2020                                                                                | @Jun 13, 2020 9:41 PM                                                                           | <a href="https://github.com/aamini/introtodeeplearning/blob/master/lab1/Part1_TensorFlowLab">https://github.com/aamini/introtodeeplearning/blob/master/lab1/Part1_TensorFlowLab</a>                                                     |

| Name                                                                                                                                                           | Due date      | Last edited           | Link                                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u><a href="#">Hands-On Machine Learning Book (2nd edition).</a></u>                                                                                           | @May 30, 2020 | @Jun 13, 2020 9:41 PM |                                                                                                                                                                         |
| <u><a href="#">TensorFlow in Practice on Coursera Part 4 — Sequences, Time Series and Prediction in TensorFlow</a></u>                                         | @May 30, 2020 | @Jun 13, 2020 9:41 PM | <a href="https://www.coursera.org/learn/tensorflow-sequences-time-series-and-predicti">https://www.coursera.org/learn/tensorflow-sequences-time-series-and-predicti</a> |
| <u><a href="#">MIT Deep Learning 2 — Sequence Modelling</a></u>                                                                                                | @May 28, 2020 | @Jun 13, 2020 9:41 PM |                                                                                                                                                                         |
| <u><a href="#">TensorFlow in Practice on Coursera Part 3 — Natural Language Processing in TensorFlow</a></u>                                                   | @May 23, 2020 | @Jun 13, 2020 9:41 PM | <a href="https://www.coursera.org/learn/natural-language-processing-tensorflow">https://www.coursera.org/learn/natural-language-processing-tensorflow</a>               |
| <u><a href="#">MIT Deep Learning 3 — Deep Learning for Computer Vision</a></u>                                                                                 | @May 16, 2020 | @Jun 13, 2020 9:41 PM |                                                                                                                                                                         |
| <u><a href="#">TensorFlow in Practice on Coursera Part 2 — Convolutional Neural Networks in TensorFlow</a></u>                                                 | @May 16, 2020 | @Jun 13, 2020 9:41 PM | <a href="https://www.coursera.org/learn/convolutional-neural-networks-tensorflow">https://www.coursera.org/learn/convolutional-neural-networks-tensorflow</a>           |
| <u><a href="#">MIT Deep Learning 1 — Intro to Deep Learning</a></u>                                                                                            | @May 14, 2020 | @Jun 13, 2020 9:41 PM |                                                                                                                                                                         |
| <u><a href="#">TensorFlow in Practice on Coursera Part 1 — Introduction to TensorFlow for Artificial Intelligence, Machine Learning, and Deep Learning</a></u> | @May 13, 2020 | @Jun 13, 2020 9:41 PM |                                                                                                                                                                         |

| Aa Name                                                                      | 📅 Due date    | 🕒 Last edited         | 🔗 Link |
|------------------------------------------------------------------------------|---------------|-----------------------|--------|
| <a href="#">Create review notes in relation to the criteria for the exam</a> | @May 29, 2020 | @Jun 13, 2020 9:41 PM |        |

## TensorFlow Developer Certification Exam Requirements

Read the following two handbooks multiple times before the exam.

- TensorFlow Candidate Handbook: [https://www.tensorflow.org/site-assets/downloads/marketing/cert/TF\\_Certificate\\_Candidate\\_Handbook.pdf](https://www.tensorflow.org/site-assets/downloads/marketing/cert/TF_Certificate_Candidate_Handbook.pdf)
- TensorFlow Developer Certification Environment Setup: [https://www.tensorflow.org/site-assets/downloads/marketing/cert/Setting\\_Up\\_TF\\_Developer\\_Certificate\\_Exam.pdf](https://www.tensorflow.org/site-assets/downloads/marketing/cert/Setting_Up_TF_Developer_Certificate_Exam.pdf)

### Criteria (taken from **TensorFlow Candidate Handbook**)

The exam tests students in their ability to solve problems by building models using TensorFlow 2.x.

### Skills checklist

#### (1) Build and train neural network models using TensorFlow 2.x

Best resources (see above for links):

- Part 1 of the TensorFlow in Practice Specialization
- Chapters 10, 11, 12, 13 of the Hands-on Machine Learning Book (2nd edition)
- MIT Intro to Deep Learning Lecture 1

You need to understand the foundational principles of machine learning (ML) and deep learning (DL) using TensorFlow 2.x.

You need to know how to:

- ☐ Use TensorFlow 2.x.
- ☐ Build, compile and train machine learning (ML) models using TensorFlow.
- ☐ Preprocess data to get it read for use in a model.
- ☐ Use the models to predict results.
- ☐ Build sequential models with multiple layers.
- ☐ Build and train models for binary classification.
- ☐ Build and train models for multi-class classification.
- ☐ Plot loss and accuracy of a trained model.
- ☐ Identify strategies to prevent overfitting, including augmentation and dropout.
- ☐ Use pretrained models (transfer learning).
- ☐ Extract features from pre-trained models.
- ☐ Ensure that inputs to a model are in the correct shape.
- ☐ Ensure that you can match test data to the input shape of a neural network.
- ☐ Ensure you can match output data of a neural network to specified input shape for test data.
- ☐ Understand batch loading of data.
- ☐ Use callbacks to trigger the end of training cycles.
- ☐ Use datasets from different sources.
- ☐ Use datasets in different formats, including json and csv.

- ☐ Use datasets from `tf.data.datasets`.

## **(2) Image classification**

Best resources (see above for links):

- Part 2 of the TensorFlow in Practice Specialization
- Chapter 14 of the Hands-on Machine Learning Book (2nd edition)
- MIT Intro to Deep Learning Lecture 3

You need to understand how to build image recognition and object detection models with deep neural networks and convolutional neural networks using TensorFlow 2.x. You need to know how to:

- ☐ Define Convolutional neural networks with `Conv2D` and pooling layers.
- ☐ Build and train models to process real-world image datasets.
- ☐ Understand how to use convolutions to improve your neural network.
- ☐ Use real-world images in different shapes and sizes.
- ☐ Use image augmentation to prevent overfitting.
- ☐ Use `ImageDataGenerator`.
- ☐ Understand how `ImageDataGenerator` labels images based on the directory structure.

## **(3) Natural language processing (NLP)**

Best resources (see above for links):

- Part 3 of the TensorFlow in Practice Specialization
- Chapter 16 of the Hands-on Machine Learning Book (2nd edition)
- MIT Intro to Deep Learning Lecture 2

You need to understand how to use neural networks to solve natural language preprocessing problems using TensorFlow. You need to know how to:

- ☐ Build natural language processing systems using TensorFlow.
- ☐ Prepare text to use in TensorFlow models.
- ☐ Build models that identify the category of a piece of text using binary classification.
- ☐ Build models that identify the category of a piece of text using multi-class categorization.
- ☐ Use word embeddings in your TensorFlow model.
- ☐ Use LSTMs in your model to classify text for either binary or multi-class categorization.
- ☐ Add RNN and GRU layers to your model.
- ☐ Use RNNs, LSTMs, GRUs and CNNs in models that work with text.
- ☐ Train LSTMs on existing text to generate text (such as songs and poetry).

## **(4) Time series, sequences and predictions**

Best resources (see above for links):

- Part 4 of the TensorFlow in Practice Specialization
- Chapter 15 of the Hands-on Machine Learning Book (2nd edition)
- MIT Intro to Deep Learning Lecture 2

You need to understand how to solve time series and forecasting problems in TensorFlow. You need to know how to:

- ☐ Train, tune and use time series, sequence and prediction models.
- ☐ Prepare data for time series learning.

- ☐ Understand Mean Average Error (MAE) and how it can be used to evaluate the accuracy of sequence models.
- ☐ Use RNNs and CNNs for time series, sequence and forecasting models.
- ☐ Identify when to use trailing versus centred windows.
- ☐ Use TensorFlow for forecasting.
- ☐ Prepare features and labels.
- ☐ Identify and compensate for sequence bias.
- ☐ Adjust the learning rate dynamically in time series, sequence and prediction models.

## Resources allowed

You may use whatever learning resources you would learning use during your ML development work.

## Exam environment

You take the exam through the PyCharm IDE and a TensorFlow Exam plugin. I will look into this the closer I get to the exam. For now, time to study and prepare.

To get familiar with PyCharm, go through the [PyCharm getting started series](#).

## Log

A daily update of progress.

- @Jun 2, 2020: Started, setup and passed the exam!
- @Jun 1, 2020: Getting PyCharm setup on my local machine, making sure it can run TensorFlow correctly and going over study notes for the exam.
- @May 28, 2020: Going through MIT's intro to deep learning/TensorFlow lab as final round of study, setting up and making sure PyCharm works on my machine.
- @May 27, 2020: Finished TensorFlow in Practice specialization on Coursera.
- @May 26, 2020: Finished reading hands-on ML book, completed week 3 part 4 of TensorFlow in Practice: LSTMs and RNNs for time series data.
- @May 25, 2020: Read 1-hour of hands-on ML book, completed week 2 part 4 of TensorFlow in Practice: deep learning for time series data.
- @May 23, 2020: Read 1-hour of hands-on ML book, watched MIT recurrent neural network lecture.
- @May 22, 2020: Read 1-hour of hands-on ML book, finished week 1 of part 4 TF in practice: introduction to time series.
- @May 21, 2020: Read 1-hour of hands-on ML book, up to chapter on generative models (autoencoders and GANs), not sure how relevant these are to the developer certification but going to finish the book (I'm most excited about the deployment part). Finished week 4 part 3 of the TF in practice specialization (this wraps up the section on NLP/text processing).
- @May 20, 2020: Read 1-hour of hands-on ML book (looks like 20 pages is about my average per hour, I'm a slow reader), worked through week 3 part 3 of TF in practice specialization (sequence models).
- @May 19, 2020: Read 1-hour of hands-on ML book (approx 20ish pages), worked through week 2 part 3 of TF in practice specialization (word embeddings).
- @May 18, 2020: Read 1-hour of hands-on ML book, worked through week 1 part 3 of TF in practice specialization (turning text into numbers for Natural Language Processing)
- @May 16, 2020: Watched MIT deep learning lecture on deep computer vision, read through 1-hour of hands-on ML book
- @May 15, 2020: Read 1-hour of hands-on ML book, finished week 3 part 2 & week 4 part 2 of TF in practice (transfer learning & multi-class classification). Now onto part 3: Natural Language Processing.

- @May 14, 2020: Read 1-hour of hands-on ML book, finished week 2 part 2 of TF in practice (image augmentation).
- @May 13, 2020: Read 1-hour hands-on ML book, finished week 1 part 2 of TF in practice.
- @May 12, 2020: Read 2-hours of hands-on ML book, watched 1st MIT Introduction to Deep Learning video, finished week 4 of part 1 of TF in practice.
- @May 18, 2020: Read 2-hours of hands-on ML book, finished week 3 of part 1 of TF in practice.
- @May 13, 2020: Read 2-hours of hands-on ML book, finished week 2 of part 1 of TF in practice.
- @May 12, 2020: 2-hours of hands-on ML book.
- @May 11, 2020: 2-hours of hands-on ML book, finished week 1 of part 1 of TF in practice.

## Questions

If you have any questions about the above, feel free to leave a comment (button in top right), or reach out via [email](#).

<https://link.medium.com/40oblTuHC9>