



Deep Learning Foundation Syllabus

Earn confidence to solve real world problems using deep learning

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Office Hours: To be announced

Classes: Monday and Wednesday - 17:30 - 19:30

Start date: 02 March 2020

End Date: 01 April 2020

I. What to expect from the course:

Mission

Our mission with this course is to offer you a solid foundation in the subject of deep learning, develop your confidence to solve real world problems, your curiosity to keep improving and to connect your talent with exciting jobs in the industry.

Educational objectives

In this program, you will develop a strong foundation, both theoretical and practical, of deep learning. With the knowledge acquired here, you will be able to understand what neural networks are, how they learn, and how to use their power to solve real world problems. You will also be able to understand the most cutting-edge research papers on the subject, and will have the opportunity to work in exciting projects and to present your results to industry experts, who will give you valuable feedback.

II. Format and Procedures:

The deep learning foundation course is presential and will take place in Sebratec academy's headquarters. The total duration is **5 weeks**, and you will have **2 classes** for week, which will be **2 hours** long each. Expect half of the classes to be theoretical, and half of them to be practical. You will have hands on experience during the course, discussing cutting edge research material and developing your own deep learning models during our laboratory sessions.

Minimum attendance is mandatory, and you need to be present in at least 75% of the classes in order to graduate. You will also be required to submit, and be approved in a practical project to graduate. A graduation ceremony will be held at the end of the course, where we will invite industry experts to attend. If your project is approved, you will have the chance to present it to a board of industry experts to get valuable feedback from them, and even build your professional network.

III. Course Requirements:

In order to succeed in this program and to make the most of it, we **require** that candidates have significant experience with a programming language, preferably python, and **recommend** that candidates have entry level knowledge with linear algebra.

You will not be required to buy any extra material during the progress of this course. Laptops will be offered during the laboratory sessions and all of the practical exercises will be supplied by Sebratec.

IV. Grading Procedures

You will have several laboratory sessions along the course. These laboratories will not be graded, but they will serve to measure your learning, and to give you personalized feedback as the course goes on.

However, at the end of the course, you will be required to deliver a project in order to graduate. We expect you to work on this project as the course goes on, and to submit it several times to receive feedback from the teacher, until you receive an approval.

Each time you submit your project, the teacher will evaluate your work, provide feedback on what you have done and request improvements, or approve your project. Your project must be approved before the deadline for you to be eligible to submit it for the graduation committee.

Once submitted to the committee, the project must be presented in no more than 10 minutes. The committee may have people outside from Sebratec Academy. After the presentation, the project will be evaluated by the committee, and you must be approved in order to graduate.

The deadlines will be announced during the course, and projects submitted after the deadline will not be evaluated.

V. Code of conduct

By enrolling the course, you agree to abide by the following code of conduct. Students found to be acting in violation of the terms set forth may be asked to leave their program without a refund. You also agree to our Terms of Use, and, if you participate in any of our communities, the Community Code of Conduct. You further understand and agree that all decisions regarding participation, graduation, and awarding of verified certificates will be made by Sebratec Academy in its sole discretion.

You are also expected to:

- Not harass other students, visits, or members of the staff;
- When attending classes, not being late for more than 15 minutes;
- Not disturb the classes. Every student has the same right to study as you do;
- Respect the property of Sebratec Academy. That includes, but is not limited to, computers, materials, chairs, office and etc;
- Not cheat in the graded exams. Cheating is considered a very serious offense, and can result in a permanent ban from Sebratec academy;
- Not bring to class, or be in influence of alcohol, drugs;

Refusal to comply to the code of conduct can result in a warning, a removal from the classroom, a cancellation of your contract, or a permanent ban from studying in Sebratec Academy.

VI. Community code of conduct

We understand that our members represent a rich variety of backgrounds and perspectives. Sebratec Academy is committed to providing an atmosphere for learning that respects diversity. While working together to build this community we ask all members to:

- Share their unique experiences, values, and beliefs;
- Be open to the views of others;
- Honor the uniqueness of their colleagues;
- Value each other's opinions and communicate in a respectful manner;

VII. Course Schedule

(May change to accommodate guest presenters & student needs)

Schedule	Topics	Learning outcomes	Assignment
Week 1 - 2nd and 4th March 2020	Welcome, introduction, and basic neural networks.	In the first session, you will meet your peers and teacher, understand what deep learning is, the history of deep learning and how it is changing the world. You will also be introduced to perceptrons, forward and back propagation, multi-layer perceptrons. In the second session, you will be introduced to the algebra behind	Lab: The algebra behind a perceptron and training process.

		perceptrons, forward pass, loss functions and backpropagation, weights, and gradient descent.	
Week 2 - 9th and 11th March 2020	Neural networks learning process	<p>In the third session, you will learn about two basic neural network models, regression and classification, how to find good hyperparameters and what is transfer learning. You will also receive orientation about the final project.</p> <p>In the fourth session, you will have a hands on class to put in practice what you have learned in session three. Here you will build these models, play around with hyperparameters, and try different error functions.</p>	<p>Lab: Build a regression and a classification model, and fine tune your hyperparameters.</p> <p>Begin working on the final project.</p>
Week 3 16th and 18th March 2020	Feeding your neural networks with data	<p>In the fifth session, you will learn where data come from, how to gather it, how to prepare it to be used by a neural network by preprocessing and balancing it, and how to use your data to train, validate and test your neural network.</p> <p>In the sixth session, you will have a practical class focused in separating, balancing and preprocessing your datasets.</p>	Lab: Dealing with data.

Week 4 23th and 25th March 2020	Challenges faced by neural networks	<p>In the seventh session, you will learn about the challenges faced by neural networks. You will learn about underfitting and overfitting, problems caused by data and techniques to deal with these problems.</p> <p>In the eighth session, you will have a laboratory session focused on fixing overfitting using the knowledge you acquired in lesson seven.</p>	Lab: Create new data from your existing data using augmentation, and apply normalization and regularization techniques to your neural networks.
Week 5 30th March 2020 and 1st April 2020	Final project	This final week is dedicated for project reviews, office hours and orientation. You must submit your project before the deadline.	Project submission
Week 6 To be announced	Graduation		

VIII. Bibliography

Goodfellow, Ian and Yoshua Bengio and Aaron Courville. *Deep Learning*. MIT Press, 2016.

Trask, Andrew. *Grokking Deep Learning*. Manning publications, 2019.