



# Oberwolfach Seminar

## Mathematics of Deep Learning

Organizers: Gitta Kutyniok, Berlin  
Philipp Grohs, Wien  
Date (ID): 14 - 20 October 2018 (1842b)  
Deadline: 15 August 2018

Motivation: Despite the outstanding success of deep learning in real-world applications, most of the related research is empirically driven and a mathematical foundation is almost completely missing. At the same time, those methods have already shown their impressive potential in mathematical research areas such as imaging sciences, inverse problems, or numerical analysis of partial differential equations. Recently, theoretical research aiming to derive a fundamental understanding of different aspects of deep learning such as expressibility, generalization, identifiability, and learning as well as improving current methodologies has been intensified. Summarizing, deep learning is a rich research area, touching various areas of mathematics and posing an exciting challenge to mathematicians. This seminar is intended to provide an introduction to the current state-of-the-art in the mathematical analysis of deep learning algorithms.

Goal: The goal is to provide an introduction into this exciting research area. We will discuss current main theoretical results, and also include practical sessions. The seminar will also include problem sessions which are intended to initiate collaborations on particular projects, as well as preparing the participants to conduct their own research in this area.

The seminar takes place at the Mathematisches Forschungsinstitut Oberwolfach. The Institute covers board and lodging. By the support of the Carl Friedrich von Siemens Foundation travel expenses can be reimbursed up to 150 EUR in average per person (against copies of travel receipts). The number of participants is restricted to 25.

### Applications including

- full name and address, incl. e-mail address
- short CV and publication list
- present position, university
- name of supervisor of Ph.D. thesis
- a short summary of previous work and interest
- title, ID and date of the intended seminar

should be sent preferably by e-mail (with attachments in pdf format) via [seminars@mfo.de](mailto:seminars@mfo.de) until 15 August 2018 to:

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