



Module	Deep Learning
Code	V5_13
Degree Programme	Master of Science in Life Sciences (MSLS)
ECTS Credits	3 ECTS
Workload	60 h: ca. 28 h contact lessons; 14 h guided exercises; 18 h self-study
Module Coordinator	<p>Name Dr. Martin Schüle</p> <p>Phone +41 (0)58 934 57 84</p> <p>Email martin.schuele@zhaw.ch</p> <p>Address ZHAW Zürcher Hochschule für Angewandte Wissenschaften Life Sciences and Facility Management Schloss 1 CH-8820 Wädenswil</p>
Lecturers	Dr. Martin Schüle
Entry Requirements	<p>The course “Introduction to Neural Networks” or equivalent.</p> <p>The course requires a solid background in mathematics, as usually taught at the Bachelor’s level, especially in:</p> <ul style="list-style-type: none"> • statistics • probability theory • basic linear algebra <p>The module and associated practical exercises will be taught using Python and Tensorflow. Familiarity with basic programming in Python is required.</p>
Learning Outcomes and Competences	<p>The objective of the module is to provide the students with a working knowledge of current artificial neural network (ANN) and deep learning (DL) techniques and apply them to problems in the field of life sciences.</p> <p>After completing the module, students will be able to:</p> <ul style="list-style-type: none"> • Judge on the advantages and disadvantages of different ANN and DL architectures and corresponding applications • Adapt and apply suitable ANN and DL techniques to problems in life sciences • Learn about new methods in the field on their own • Reflect the usage of ANN and DL in a life sciences context

Module Content	<p>The module covers the following topics:</p> <ul style="list-style-type: none"> • Judge on the advantages and disadvantages of different ANN and DL architectures and corresponding applications • Adapt and apply suitable ANN and DL techniques to problems in life sciences • Learn about new methods in the field on their own <p>Reflect the usage of ANN and DL in a life sciences context</p> <ul style="list-style-type: none"> • Basics of ANN: Perceptron, Multilayer Perceptron, backpropagation • Basics of DL: Introduction to Tensorflow, optimizers, regularization methods • Specific DL models: Autoencoder, CNN, RNN, LSTM, attention models • Case studies in life sciences
Teaching / Learning Methods	<ul style="list-style-type: none"> • Lectures ~30% • Guided exercises ~20% • Self-study ~50%
Assessment of Learning Outcome	<ul style="list-style-type: none"> • Project work during the semester (40%) • Final exam (written) (60%)
Bibliography	<p>Lecture notes will be provided. Important additional literature will be provided on Moodle.</p>
Language	English
Comments	The module is coordinated with the module “Machine Learning and Pattern Recognition”, “Introduction to Neural Networks”, and the module “Advanced Deep Learning”.
Last Update	27.02.2025