Module	**Advanced Deep Learning**
Code	MSLS_V5_9
Degree Program	Master of Science in Life Sciences (MSLS)
ECTS Credits	3
Workload	90h: 30h Lecture (2 Lessons/W), 30h Exercises (2 Lessons/W), 30h Self-study
Module Coordinators	**Name** Dr. Claus Horn **Phone** +41 (0)58 934 51 47 **Email** claus.horn@zhaw.ch **Name** Dr. Martin Schüle **Phone** +41 (0)58 934 55 74 **Email** martin.schuele@zhaw.ch **Address** ZHAW Zürcher Hochschule für Angewandte Wissenschaften Life Sciences and Facility Management Schloss 1 CH-8820 Wädenswil
Lecturers	• Dr. Claus Horn • Dr. Martin Schüle
Entry Requirements	Attending the modules “Neural Networks and Deep Learning” and “Machine Learning and Pattern Recognition” is mandatory.
Learning Outcomes and Competences	Familiarity with basic programming in Python is required. Familiarity with Keras/Tensorflow is an advantage. Most exercises will be in PyTorch/Keras/Tensorflow. After completing the module, students will be able to: • use and implement deep learning models in PyTorch/ Keras/Tensorflow • display an advanced understanding of deep learning theory • apply deep sequence models to text and time series data • understand the advantages of generative models • understand and develop models in probabilistic deep learning • recognize possible application areas of reinforcement learning • reflect the usage and impact of advanced deep learning in a context of applications in computational life sciences

Module Content	The module covers the following topics: 1. General Introduction to Advanced Deep Learning 2. Introduction to PyTorch/ Keras/Tensorflow 3. Advanced sequence modeling 4. Generative models 5. Probabilistic deep learning 6. Advanced NLP 7. Reinforcement learning 8. Data challenge: industry challenges
Teaching / Learning Methods	The module will consist of lectures and practical exercises. In addition to lectures, students will be required to self-study selected topics. Students will work in groups on a data challenge and present their results to the class at the end of the course.
Assessment of Learning Outcome	• Preparatory Exercises: 10% • Exercises during the course: 40% • Data challenge: 50%
Bibliography	Pointers to literature will be provided on our online leaning platform.
Language	English
Comments	–
Last Update	15.02.2022