<table>
<thead>
<tr>
<th>Module title</th>
<th>Tensorflow for Applied Machine Learning</th>
</tr>
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<tbody>
<tr>
<td>Module code</td>
<td>tba</td>
</tr>
<tr>
<td>Level</td>
<td>Bachelor (B.Sc.)</td>
</tr>
<tr>
<td>Hours per week</td>
<td>4</td>
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<tr>
<td>ECTS credits</td>
<td>5</td>
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<tr>
<td>Duration</td>
<td>3 weeks</td>
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<tr>
<td>Module instructor</td>
<td>Dr. Viet-Trung Tran Assistant Professor, Hanoi University of Science and Technology, Vietnam</td>
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<tr>
<td>Lecture type</td>
<td>Regular lecture, on line consultations, in-class exercises</td>
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<tr>
<td>Prerequisite(s)</td>
<td>Good academic standing</td>
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<tr>
<td>Grading</td>
<td>Coursework</td>
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**Objectives**
- Understand Machine Learning and Artificial Neural Networks
- Understand Tensorflow Concepts and its Dataflow Graphs
- Understand Recurrent Neural Networks (RNNs)
- Understand Convolutional Neural Networks (CNNs)
- Code and Employ Linear and Logistic Regression
- Code and Employ Image Classification
- Code and Employ Neural Language Model
- Code and Employ Neural Machine Translation

**Content**
- Artificial Neural Networks
  - Perceptrons and sigmoid activation function
  - Loss function
  - Gradient descent algorithm
  - Backpropagation
- Overview of Tensorflow
  - Graphs and sessions
  - Operations
  - Eager execution
  - Tensorboard
  - Variable sharing
- Linear and Logistic Regression
  - Reading datasets
  - Converting data to tensor
  - Loss function and optimizers
  - Dropout
- Image Classification
  - Example: MNIST and Imagenet datasets
  - Convolutional neural network
- Neural Language Model
  - Distributed representations of words
  - Recurrent neural network
  - Next word prediction
- Neural Machine Translation
  - English – German translation
  - Seq2Seq model
  - Attention mechanisms

Ps.
- This module will provide students with knowledge of Tensorflow and applied machine learning.
- All class assignments will be in Python. The students will be fine if they have programing experience in a different language.
- The students will have hands-on experiences on the whole process of data preparation, model definition, model training, troubleshooting and optimizing in order to solve real-world problems: image classification, neural language model, and neural machine translation

**Textbook/teaching material**
- Andrew Ng. Deep learning specialization. [https://www.deeplearning.ai/](https://www.deeplearning.ai/)

Note: this is not the official course descriptor according to the “Studien- und Prüfungsordnung” (SPO)