Summary
This course will focus on the practical implementation of artificial neural networks (ANN) using the open-source TensorFlow machine learning library developed by Google for Python.

Content
This course will focus on the practical implementation of artificial neural networks (ANN) using the open-source TensorFlow machine learning library developed by Google for Python. After a brief introduction to deep neural networks, the course will focus on the use and functionality of TensorFlow, and how it can be used to build models of different complexity for different types of optical imaging applications. Models will range from simple linear regression to convolutional neural networks (CNN) for image classification and mapping. The course will be assessed through coursework and group projects where the students will apply TensorFlow to specific machine learning applications.

Keywords
Deep learning, TensorFlow, Artificial neural networks, Imaging

Learning Prerequisites
Required courses
Proficiency in Python, basic optics

Recommended courses
MICRO-567 Optical Wave Propagation

Important concepts to start the course
Python familiarity, linear systems, basic optics

Learning Outcomes
By the end of the course, the student must be able to:

• Choose A computational imaging model
• Structure The database for training artificial neural networks
• Implement Artificial neural networks using the TensorFlow machine learning library.

Teaching methods
1 hour/week lecture
1 hour/week interactive artificial neural network development for selected problems

Expected student activities
Attend lectures weekly
Attend exercise sessions
Participate in a class project
Turn in homework every two weeks

Assessment methods
Homeworks
Project report

Resources
Bibliography
Tensor flow

Notes/Handbook
Class notes will be posted on Moodle