The aim of this course is to convey in-depth knowledge about advanced functional MR techniques for imaging of the central nervous system. After an introduction regarding the selection of pulse sequences for state-of-the-art morphological neuro MRI, diffusion, perfusion and spectroscopy will be covered. During the last decade, these techniques have matured and are now frequently incorporated into daily clinical work. Furthermore, significant progress in the development of refined techniques such as diffusion tensor imaging has been made during the last few years. The course will offer an overview of present methodology as well as promising new methods in the field using a mixture of lectures and small group exercises. We are happy to welcome you to this course in Cairo, Egypt, where European experts in the field will be given the opportunity to share their knowledge with you.
Learning objectives

Morphological Neuro MRI
- Fast and ultrafast pulse sequences for Neuro MRI
- Clinical use of different pulse sequences for specific morphological neuro applications

Diffusion (DWI)
- Basic mechanisms
  - Water self-diffusion
  - Isotropic diffusion
  - Anisotropic diffusion
- The ADC concept
- Pulse sequences and acquisition techniques
- Diffusion tensor imaging
- Introduction to axonal fibre tracking and q-space imaging
  - Pitfalls, practical issues, implementation

Perfusion (pMRI or PWI)
- Basic Physiology
- Dynamic Susceptibility Contrast (DSC) methods
  - Pulse sequences
  - Modelling, implementation and pitfalls
  - Convolution and deconvolution
  - Advanced modelling, heterogeneity, leakage correction
- Other perfusion techniques

Clinical applications of DWI and pMRI (PWI)
- Stroke
- Tumor
- Infection/inflammation
- Dementia
- Trauma

MR Spectroscopy (MRS)
- Basic principles
- Sequences for proton spectroscopy
- Postprocessing
  - Metabolite quantification
  - Time domain methods
  - Frequency domain methods
- Quality Control and Artifacts
- Clinical aspects
  - Interpretation
  - Pitfalls
  - Applications