Master Thesis: *Multimodal multi-entity classification of bone tumours*  
(thesis for Computer Science or Mechanical Engineering students)

**Abstract**

Early diagnosis of musculoskeletal tumours is crucial for successful therapy and treatment. The sooner a potential malignant growth is detected, the more effective the next steps in therapy and the better a prognosis usually becomes. The rarity of musculoskeletal tumours, potentially inexperienced clinicians with this certain entity, as well as unspecific anamnesis and clinical manifestations may delay the final diagnosis. Whereas currently available imaging modalities yield considerable insights into tumour staging and grading, biopsy remains the gold standard for final diagnosis. Yet, the planning of a successful biopsy yielding sufficient material might require time aside from a high level of experience and may delay the final diagnosis even further.

The complexity in conjunction with multimodal approaches in fully grasping this disease provide a very suitable foundation for modern artificial intelligence (AI) algorithms. Not only for diagnostic purposes, but also for treatment planning or prognosis prediction, machine learning and deep learning algorithms are popular techniques in many disciplines at this time.

**Tasks**

- Analysis of sarcoma data with deep learning methodology
- Multi-entity classification
- Integrating multimodal data (imaging and tabular data)
- Coping with limited and unbalanced datasets
- Adaption to medicine specific issues with AI
- Presenting and discussing of results

**Offer**

- Very rare medical data with high potential for publication
- Highly educated & interdisciplinary environment
- Top level hardware for scientific computing
- Constant feedback from medical and computer science experts

**Prerequisites**

- Advanced knowledge of deep learning with imaging data
- Beneficial but not necessary: experience in medicine / oncology

**References**