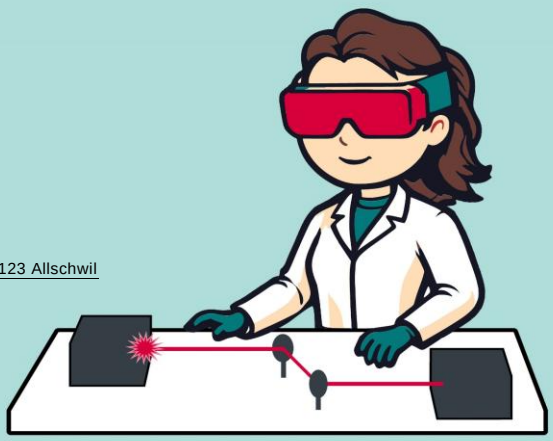
University of Basel

Department of Biomedical Engineering

University of Basel, Department of Biomedical Engineering, Hegenheimermattweg 167C, 4123 Allschwil



**Thesis Proposal– Biomedical Engineering**

## Deep Learning-Based Detection of Dental Defects Using Multimodal imaging

Early and accurate detection of dental caries, cracks, and calculus is essential for effective prevention and minimally invasive treatment, yet it remains a significant challenge in modern dentistry. Traditional diagnostic methods, such as visual inspection and X-ray radiography, are widely used but are limited in resolution. Optical techniques have the potential to provide high-resolution images noninvasively. In this study, we plan to use integrated Optical Coherence Tomography (OCT) and autofluorescence imaging to analyze extracted teeth. We also aim to apply advanced image processing methods for feature extraction and automatic defect detection.

**Task description:**

- Acquisition of the OCT + Fluorescence images
- Developing deep learning method for feature extraction
- Testing and Validation

**Your Profile:**

- You are pursuing a master's degree in biomedical engineering, physics, computer science, or a related discipline
- Experience in scientific programming (preferably Python)
- Basic knowledge of optics
- Experience with image processing is a plus

Apply to this project by e-mail with subject "MT-1261" to eric.freiermuth@unibas.ch with the following documents:

- **CV**
- **Diplomas and Course Transcripts**

**Supervisor**

Eric Freiermuth (PhD student)
Dr. Arsham Hamidi

University of Basel
Department of Biomedical Engineering
Hegenheimermattweg 167C
4123 Allschwil, Switzerland

Dr. Ferda Canbaz
Head of Center for intelligent optics (CIO)
T +41 61 207 754 67
Ferda.canbaz@unibas.ch