

Description of bachelor projects in clinical medicine - 15 ECTS

Bachelor projects in clinical medicine take place at five different research centers. The centers cover diverse research areas, each described below. To inquire about the possibilities for a 15 ECTS research project at a given center, please send a mail to the listed contact person.

Research centers and their research areas:

Department of Molecular Medicine (MOMA):

The advent of high-throughput molecular profiling techniques, in particular Next Generation Sequencing, has made it possible to study and understand the molecular underpinnings of disease at unprecedented depth. At the Department of Molecular Medicine (MOMA), we use these techniques to study and develop precision medicine solutions, primarily, for cancer. We have a large focus on development of liquid biomarkers derived from blood and urine and their use for early cancer detection. We also do extensive bioinformatic data analysis on existing large cancer genomics data sets, which allow us to identify common molecular patterns across thousands of patients. New techniques are translated into the clinical setting and evaluated in clinical trials. A bachelor project at MOMA will introduce the students to ideas and fundamentals of precision medicine and potentially of large-scale data analysis. For more information, see <https://moma.dk/research>.

Contact person: Prof. Jakob Skou Pedersen, mail: jakob.skou@clin.au.dk

Department of Clinical Epidemiology (DCE):

Epidemiology is the study of determinants of diseases in human populations. Clinical epidemiologists apply epidemiologic principles to investigations of patients with a given disease: patterns of diagnosis, treatment, recovery, and prognosis (the so-called '5 Ds': Discomfort/Dissatisfaction, Disease, Disability or Death).

Some examples of research questions addressed by clinical epidemiology are:

- How accurate is a diagnostic test in distinguishing healthy and diseased persons?
- Does screening for cancer prolong cancer survival?
- Will treating a pregnant woman with antidepressants harm the fetus?
- Do risks of side effect of an anticoagulant depend on age, sex, other treatments?
- What are predictors of survival among patients who undergo hip fracture surgery?
- Can statins prevent recurrence of breast cancer?

Students completing their bachelor's thesis at the Department of Clinical Epidemiology will learn and apply in a supervised setting basic vocabulary and principles of epidemiology and biostatistics: prevalence, incidence rate, relative risk, odds ratio, survival analysis. For more information, see <https://kea.au.dk/>.

Contact person: Prof. Vera Ehrenstein, mail: ve@clin.au.dk

Center of Functionally Integrative Neuroscience (CFIN):

The Center of Functionally Integrative Neuroscience (CFIN) studies normal brain function and physiology as well as the pathophysiology of brain disorders. The center is highly interdisciplinary, including researchers from medicine, biology, molecular biology, physics, statistics, engineering, neuroscience, and psychology. The work is translational, as we experiment in molecular biology labs, conduct in vivo optical imaging, magnetic resonance spectroscopy (MRS) and imaging (MRI), and behavioral testing in animal models, and perform magnetoencephalography (MEG), EEG, MRI, MRS, and transcranial magnetic stimulation (TMS) in normal volunteers and patients with brain disorders; all to improve our understanding of the human brain and brain disorders. The main research areas include brain physiology, diagnostics of e.g. dementia, stroke, amyotrophic lateral sclerosis (ALS) but also include consciousness research, language, retino-cortical signaling, the interactions between visceral and brain functions, visual perception, and rehabilitation. The center also has a strong focus on method development computational models of brain function, neurotransmission, and methods development within MRI, MEG, image processing and data visualization. For more information, see <https://cfin.au.dk>.

Contact person: Asso. Prof. Brian Hansen, mail: brian@cfin.au.dk.

Center for Music in the Brain:

Music is experienced, performed and shared by people in all societies, ages and social groups. Recently, neuroscientific interest in music has increased dramatically as modern brain imaging techniques have provided researchers the means to investigate the living human brain at work. The Danish National Research Foundation's Center for Music In the Brain (MIB) is an interdisciplinary research center aiming to address the dual questions of how music is processed in the brain and how this can inform our understanding of fundamental principles behind brain functioning in general. With a strong foundation in music practice and theory at the highest level and a focus on the clinical application of music, MIB combines neuroscientific, musicological and psychological research in music perception, action, emotion and learning with the potential to test prominent theories of brain function and to influence the way we play, teach, use and listen to music. For more information, see <https://musicinthebrain.au.dk/>.

Contact person: Asso. Prof. Bjørn Petersen, mail: bjorn.petersen@clin.au.dk.

Danish Center for Mindfulness:

The Research Unit of the Danish Center for Mindfulness, Aarhus University is dedicated to performing high quality, methodologically rigorous research to investigate the impacts of mindfulness on health, and the underlying mechanisms. Primarily, we investigate the effectiveness and the mechanisms of implementing the evidence-based programs Mindfulness Based Stress Reduction (MBSR), Mindfulness Based Cognitive Therapy (MBCT), Compassion Cultivating Training (CCT) and the school programme ".b" as health promoting and preventive

(primary, secondary and tertiary) strategies in our society. For more information, see <https://mindfulness.au.dk/en/>.

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