

## Projectomschrijving Wetenschappelijke Stage



**Titel:** Clinical measurements of post mortem body cooling for evaluation of a new mathematical model for calculating the time of death

**Aantal weken:**

**Aanvangsdatum:**

**Naam student:**

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### Introduction

In case a forensic detective finds a dead body and it is unclear if that person became a victim of a crime or when that person died, it is necessary to determine the time since death. Hence, the determination of the time since death, and thereby the time of death, is important in forensic sciences. For determining the time since death, body temperature is an often used parameter, which was already introduced in the 19th century. Since that time many models have been developed to determine the time since death by measuring the body temperature, ranging from very simple one parameter to complex models. The physical process of cooling can be described by heat equations, which unfortunately cannot be solved analytically for a complex geometry such as a human body. However, this process can be monitored via a cooling curve: a plot of body temperature in time. Experimentally obtained cooling curves are approached in the various models. We developed a numerical model to determine the time since death. This model, so-called PHOEBE, needs to be extended to cope with realistic circumstances and validated with experimental data. We have established a collaboration with several hospitals in the Netherlands to perform validation measurements.

### Methods

The phoebe model needs refinement of the way the body shape, size and dimensions are incorporated in the model. Therefore we need a student with experience in programming in Matlab. Besides programming, we will measure post-mortem body cooling curves at various spot on and inside the body to test the PHOEBE-model. Temperature measurements will be performed with i-Temp buttons. These buttons are to record temperature data over a long time period. These measurements will be performed in corporation with the pathology department of the hospital. The final goal of this project is to get better insight in the post mortem body cooling process and to refine the PHOEBE model with that knowledge. This should lead to a model which simulates the cooling process to determine the time since death accurately. If the model has proven its success, it will be used in forensic practice.