

# Heparin Thesis

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A thesis presented for the degree of  
Bachelor of Science

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# Abstract

Insert Abstract Here. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Nam et turpis gravida, lacinia ante sit amet, sollicitudin erat. Aliquam efficitur vehicula leo sed condimentum. Phasellus lobortis eros vitae rutrum egestas. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Donec at urna imperdiet, vulputate orci eu, sollicitudin leo. Donec nec dui sagittis, malesuada erat eget, vulputate tellus. Nam ullamcorper efficitur iaculis. Mauris eu vehicula nibh. In lectus turpis, tempor at felis a, egestas fermentum massa.

# Acknowledgements

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Additionally, data used in these models was sourced from the MIMIC-II and MIMIC-III (Saeed et al. (2011)) medical databases, a project supported by the MIT Lab for Computational Physiology.

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- [Sri Kurniawan](#)
- [Matthew Guthaus](#)
- [Leo Celi](#)

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- [James Davis](#)

- Phokion Kolaitis
- Philip Strong

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# Chapter 1

## Introduction, with a citation

### 1.1 Background

This is the introduction. Quisque finibus aliquet cursus. Integer in pellentesque tellus. Duis eu dignissim nulla, a porttitor enim. Quisque vehicula leo non ultrices finibus. Duis vehicula quis sem sit amet sollicitudin. Integer neque est, pharetra et auctor vel, iaculis interdum lectus.

To include a citation to the text, just add the citation key shown in the references.bib file. The style of the citation is determined by the ref\_format.csl file. For example, in The Living Sea you can find pictures of the Calypso (???).

In neque mauris, maximus at sapien a, iaculis dignissim justo. Aliquam erat volutpat. Praesent varius risus auctor est ultricies, sit amet consequat nisi laoreet. Suspendisse non est et mauris pharetra sagittis non porta justo. Praesent malesuada metus ut sapien sodales ornare.

This is a brief outline of what went into each chapter. **Chapter 1** gives a background on *duis tempus justo quis arcu consectetur sollicitudin*. **Chapter 2** discusses *morbi sollicitudin gravida tellus in maximus*. **Chapter 3** discusses *vestibulum eleifend turpis id turpis sollicitudin aliquet*. **Chapter 4** shows how *phasellus gravida non ex id aliquet*. *Proin faucibus nibh sit amet augue blandit varius.* ->

# Chapter 2

## Literature review, with maths

### 2.1 Introduction

This is the introduction. Duis in neque felis. In hac habitasse platea dictumst. Cras eget rutrum elit. Pellentesque tristique venenatis pellentesque. Cras eu dignissim quam, vel sodales felis. Vestibulum efficitur justo a nibh cursus eleifend. Integer ultrices lorem at nunc efficitur lobortis.

### 2.2 The middle

This is the literature review. Nullam quam odio, volutpat ac ornare quis, vestibulum nec nulla. Aenean nec dapibus neque. Mathematical formula can be inserted using Latex:

$$(1) \quad f(x) = ax^3 + bx^2 + cx + d$$

Nunc eleifend (1), ex a luctus porttitor, felis ex suscipit tellus, ut sollicitudin sapien purus in libero. Nulla blandit eget urna vel tempus. Praesent fringilla dui sapien, sit amet egestas leo sollicitudin at.

Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Sed faucibus pulvinar volutpat. Ut semper fringilla erat non dapibus. Nunc vitae felis eget purus placerat finibus laoreet ut nibh.

## 2.3 Conclusion

This is the conclusion. Donec pulvinar molestie urna eu faucibus. In tristique ut neque vel eleifend. Morbi ut massa vitae diam gravida iaculis. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas.

- first item in the list
- second item in the list
- third item in the list

# Chapter 3

## System Explanation

### 3.1 Goals of System

goals here....

talk about user experience/ui design.

### 3.2 Architecture

architecture here... include a figure. Figure 3.1 shows how to add a figure. Donec ut lacinia nibh. Nam tincidunt augue et tristique cursus. Vestibulum sagittis odio nisl, a malesuada turpis blandit quis. Cras ultrices metus tempor laoreet sodales. Nam molestie ipsum ac imperdiet laoreet. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas.



Figure 3.1: RV Calypso is a former British Royal Navy minesweeper converted into a research vessel for the oceanographic researcher Jacques-Yves Cousteau. It was equipped with a mobile laboratory for underwater field research.

### 3.3 Implementation

talk about the stack, tools used etc. talk about how the tools used helped ensure rapid prototyping and good ui.

# Chapter 4

## Survey Explanation

### 4.1 Goals of Survey

what the goals of the survey were. - what did we want to learn? hypothesis how the survey was conducted. how we decided what information to ask about. what information that was logged.

### 4.2 Architecture and Implementation

talk about the stack, tools used etc. how it was implemented. user experience.

# **Chapter 5**

## **Survey Results**

### **5.1 Cumulative Results**

how many difference people took survey, specialties, time since last dosed heparin.

### **5.2 Dose differences**

how did the doses differ in part 1 and part 2 of the survey.

### **5.3 Time differences**

time difference in part 1 and part 2.

maybe add some graphs here.

## 5.4 Understanding/Confidence in Results

....

## 5.5 Other results

things that weren't expected.

other things of note

# Chapter 6

## Retrospective / Next Steps

### 6.1 Shortcomings in the Survey

errors

lack of data

### 6.2 Places for Future Research

how did the doses differ in part 1 and part 2 of the survey.

### 6.3 Implementation Differences in future version

- transfer model to device so it can do queries more quickly
- instead of static data source have real medical database
- easily interchangeable models

- better analytics

# **Chapter 7**

## **Conclusion**

Summary of work that was done, then summary of results. Then summary of places for future work.

# Appendix 1: Some extra stuff

- link to test software
  - link to source code git repos
  - screenshots and links to alternative design for testing aPTT over time
  - links to data sources/notebook of documentation
  - extended results from survey.
    - .. tables with stats like ave, std deviation etc for each patient 1-10 ..-
1. First ordered list item
  2. Another item
    - Unordered sub-list.
  3. Actual numbers don't matter, just that it's a number -1. Ordered sub-list
    - 1. Ordered sub-list -1. Ordered sub-list
  4. And another item.
  5. first item in the list
  6. second item in the list

- subitem
  - subitem
1. third item in the list
    - an entry
    - another entry
    - some sub entry without leading bullet
    - – some sub entry with leading bullet
    - another entry for another entry
      - – blablabla
      - – blublublu
    - – \* dfdf
    - – \* . also some way

## **Appendix 2: Some extra stuff**

This could be a list of papers by the author for example Also tutorials/people/stack overflow that was helpful. tom's markdown -> latex

# References

- Ghassemi, M.M. et al., 2014. A data-driven approach to optimized medication dosing: A focus on heparin. *Intensive care medicine*, 40(9), pp.1332–1339.
- Saeed, M. et al., 2011. Multiparameter intelligent monitoring in intensive care iI (mIMIC-iI): A public-access intensive care unit database. *Critical Care Medicine*, 39, pp.952–960.