

# Introduction to biostatistics and machine learning

Olga Dethlefsen, Eva Freyhult, Bengt Sennblad, Payam Emami, Julie Lorent

2020-09-22



# Contents

<b>Preface</b>	<b>5</b>
<b>1 Preliminary Mathematics for Statisticians</b>	<b>7</b>
1.1 Mathematical notation, sets, functions, exponents and logarithms	7
1.2 Differentiation . . . . .	7
1.3 Integration . . . . .	7
1.4 Functions of more than one variable and partial derivatives . . .	7
1.5 Integration in higher dimensions . . . . .	7
1.6 Vectors and Matrices . . . . .	7
<b>2 Introduction to R and R Studio</b>	<b>9</b>
2.1 R . . . . .	9
2.2 R Studio . . . . .	9
<b>3 Probability theory</b>	<b>11</b>
<b>4 Linear regression</b>	<b>13</b>
4.1 Simple regression . . . . .	13
4.2 Multiple regression . . . . .	13



# Preface

This “bookdown” book contains teaching and learning materials prepared and used during “Introduction to biostatistics and machine learning” course organised by NBIS, National Bioinformatics Infrastructure Sweden. The course is open for PhD students, postdoctoral researcher and other employees in need of biostatistical skills within Swedish universities. The course is geared towards life scientists wanting to be able to understand and use basic statistical and machine learning methods. It also suits those already applying biostatistical methods but who have never gotten a chance to reflect on or truly grasp the basic statistical concepts, such as the commonly misinterpreted p-value.

More about the course <https://nbisweden.github.io/workshop-mlbiostatistics/>



## Chapter 1

# Preliminary Mathematics for Statisticians

- 1.1 Mathematical notation, sets, functions, exponents and logarithms
- 1.2 Differentiation
- 1.3 Integration
- 1.4 Functions of more than one variable and partial derivatives
- 1.5 Integration in higher dimensions
- 1.6 Vectors and Matrices





## Chapter 2

# Introduction to R and R Studio

### 2.1 R

### 2.2 R Studio



## Chapter 3

# Probability theory



## Chapter 4

# Linear regression

### 4.1 Simple regression

### 4.2 Multiple regression