

# Mathematics for Machine Learning (14394-811)

## Study guide for 2022

### Lecturer

Prof Willie Brink

Office: General Engineering Building A311, Email: [wbrink@sun.ac.za](mailto:wbrink@sun.ac.za)

### Textbook

Deisenroth, Faisal, Ong, *Mathematics for Machine Learning*, Cambridge University Press, 2020, available online: <https://mml-book.github.io/book/mml-book.pdf>

### Schedule

The module will be presented in block form, from 17 January to 4 February 2022. Each of the 12 lectures will be about 1.5 hours in length. They will take place **Mondays and Wednesdays, 9:30am to 12:30pm** in room A403A of the General Engineering Building.

Lecture 1	Ch 2: Linear Algebra	Mon 17/1
Lecture 2	Ch 3: Analytic Geometry	Mon 17/1
Lecture 3	Ch 4: Matrix Decompositions	Wed 19/1
Lecture 4	Ch 5: Vector Calculus	Wed 19/1
<i>Assignment 1: released Mon 17/1, due Thu 20/1</i>		
<i>Quiz 1: Fri 21/1 (online)</i>		
Lecture 5	Ch 6: Probability and Distributions	Mon 24/1
Lecture 6	Ch 7: Continuous Optimisation	Mon 24/1
Lecture 7	Ch 8: When Models Meet Data	Wed 26/1
Lecture 8	Ch 9: Linear Regression	Wed 26/1
<i>Assignment 2: released Mon 24/1, due Thu 27/1</i>		
<i>Quiz 2: Fri 28/1 (online)</i>		
Lecture 9	Ch 10: Dimensionality Reduction with PCA	Mon 31/1
Lecture 10	Ch 11: Density Estimation with GMMs	Mon 31/1
Lecture 11	Ch 12: Classification with SVMs	Wed 2/2
Lecture 12	recap, discussion, questions	Wed 2/2
<i>Assignment 3: released Mon 31/1, due Thu 3/2</i>		
<i>Final test: Fri 4/2 (invigilated, on campus)</i>		

## **Mode of teaching**

The intention is to present this module in person, on campus. Even though we will follow the textbook closely, students are encouraged to attend lectures in order to maximise the learning experience. Assignments will be released and submitted electronically, quizzes will be online, and the final test will be invigilated on campus.

The module's SUNLearn page (<https://learn.sun.ac.za>) will be used for uploading lecture material, managing assignment submissions and the quizzes.

The module will be presented in English.

## **Assessment model**

A student's final mark for this module will be determined with the following weightings:

Assignment 1	15%
Assignment 2	15%
Assignment 3	15%
Quiz 1	15%
Quiz 2	15%
Final test	25%

## **Plagiarism**

In accordance with the University's policies, no form of plagiarism, cheating, or academic dishonesty will be tolerated.