A summary of courses at Uppsala University

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1 Courses taken

1.1 Undergraduate (kandidatprogram)

Year	Period	Courses (credits, field, advanced)
1	1	Linear Algebra and Geometry I (5) Introduction to Studies in Mathematics (5) Single Variable Calculus M (5/10) Honours Course in Mathematics (2.5/5)
	2	Scientific Computing I (5, Computer Science) Algebra I (5) Single Variable Calculus M (5/10) Honours Course in Mathematics (2.5/5)
	3	Linear Algrebra II (5) Computer Programming I (5, Computer Science) Several Variable Calculus M (5/10) Special Course in Mathematics II (2.5/5)
	4	Logic and Proof Techniques I (5) Algebra II (5) Several Variable Calculus M (5/10) Special Course in Mathematics II (2.5/5) Affine and Projective Geometry (5)
2	1	Ordinary Differential Equations I (5) Probability Theory I (5) Computer Programming II (5, Computer Science) Real Analysis (5/10)
	2	Fourier Analysis (5) Inference Theory I (5) Real Analysis (5/10)
	3	Linear Algebra III (5) Stochastics (5) Scientific Computing II (5, Computer Science) Complex Analysis (5/10)

	4	Basic Topology (5) Regression Analysis (5) Complex Analysis (5/10)
3	1	Probability Theory II (5) Functional Programming I (5, Computer Science, advanced) Differential Geometry (5/10) Multivariate Methods (5/10)
	2	Inference Theory II (5) Differential Geometry (5/10) Multivariate Methods (5/10)
	3	Scientific Computing III (5, Computer Science, advanced) Computer Intensive Statistics and Data Mining (5/10, advanced) Degree Project C in Mathematics (7.5/15)
	4	Computer Intensive Statistics and Data Mining (5/10, advanced) Degree Project C in Mathematics (7.5/15)

1.2 Master's programme

All courses in the following table are on advanced level.

Year	Period	Courses (credits, field)
1	1	Introduction to Data Science (5/10, Data Science) Theoretical Statistics (5/10) Integration Theory (5/10)
	2	Introduction to Data Science (5/10, Data Science) Theoretical Statistics (5/10) Integration Theory (5/10) Generalised Linear Models (5)
	3	Statistical Machine Learning (5, Data Science) Markov Processes (10) Bayesian Statistics (5/10)
	4	High Performance and Parallel Computing (7.5, Computer Science) Analysis of Time Series (10) Bayesian Statistics (5/10)
2	1	Advanced Probabalistic Machine Learning (7.5, Data Science) Accelerator-Based Programming (7.5, Computer Science) Data Mining (7.5, Data Science)
	2	Analysis of Categorical Data (5) Database Design II (5, Computer Science) Scientific Visualization (5, Computer Science)
	3	Degree Project E in Mathematics (15/30)
	4	Degree Project E in Mathematics (15/30)

2 Reflections

For a mathematics student who wants more computer science and software engineering, I would recommend the following courses (roughly in this order).

1. Computer Programming I and II for the basics of programming.
2. Scientific Computing I, II, and III for converting mathematical formulations into code.
3. High-Performance and Parallel Computing for understanding how computers works 'under the hood' and improving performance.
4. Functional Programming for a more mathematical approach to programming. Not as related to software engineering, but broadens the view on what programming can be.
5. Accelerator-Based Programming for GPU programming. Mostly of interest in high-performance computing, and to a lesser extent machine learning engineering.

In addition to these courses, a course focused on the practical side of software development would be very welcome. Such a course would introduce concepts and workflows such as containerization (Docker), packaging of software, version control (git/GitHub), basic terminal commands, etc. This course would preferably be given before High-Performance and Parallel Computing.

For a Master's programme, Computer Programming I and II, and Scientific Computing I and II, should be prerequisites.

The course High-Performance and Parallel Computing currently exists in two versions, a 7.5 and a 10 credit version. For the students of a Technical Mathematics programme, the 10 credit version should be strongly considered since the language in the course is C and the 10 credit course includes an introduction to C (which I did not know when applying).

I would also have liked to take the course Parallel and Distributed Programming, but unfortunately I was not able to fit it into my study schedule. This would be of interest to students highly interested in high-performance computing.