Machine learning is a very popular topic, and it is increasingly being used in a huge variety of applications. However, the material is also very challenging because it brings together a larger number of ideas from computer science, mathematics, and statistics. Unfortunately, due to the popularity of the topic we typically have a few students register for the course who do not yet have the appropriate background. These students not only hurt themselves because they struggle with the high workload in the course, but they also hurt the experience of the other students since significant class time ends up being spent on material that should be specified as prerequisites. While it is hard to add formal prerequisites to graduate courses because people come from such different backgrounds, we need to establish that everyone in the class has a common background.

First, it is strongly recommended that you take CPSC 340 first before taking CPSC 540. CPSC 340 and 540 are roughly being treated as a full-year course, so I’m going to assume that all students in the class know the material covered in the current version of CPSC 340 (and will not be reviewing most of this material). Further, note that the current version of CPSC 340 will be a more challenging than previous years, due to the added multivariate calculus prerequisites. Note that the Coursera course is not an adequate replacement for CPSC 340, and students who have only had prior exposure to machine learning through Coursera will not be prepared for CPSC 540.

Besides 340, below I give a list of courses (and important related topics) that I would ideally like a CPSC 540 student to take either before or simultaneously with CPSC 540:

- A linear algebra course like Math 221 (linear systems, eigenvalues).
- A probability course like Math 302 (conditional probability, expectations).
- A multivariate calculus course like Math 200 (gradients, optima).
- A scientific computing course like CPSC 302 (numerical solution of linear systems, condition number).
- An algorithms and complexity course like CPSC 320 (big-O notation, NP-hard problems).
- A statistical inference course like STAT 305 (linear regression, maximum likelihood estimation).

Note in particular that we will use a lot more computer science in 540 than we did in 340. I understand that many highly-motivated students will be able to succeed in the course while missing some of these prerequisites. However, if you are missing multiple prerequisites, then it’s very likely that you should take the background courses rather than trying to learn the above material at the same time as the (already challenging) material from CPSC 540. (Students who were missing multivariate calculus or algorithms and complexity in particular have commented that the course is too challenging.)

As a check that all students registered in the class have a background that is reasonably close to the above, all students registered in the course must fill out the next two pages of this document describing how they fulfill the prerequisites (courses taken, topics covered, grades achieved, industry/research experience, etc.), and the form should be e-mailed to me along with relevant transcripts (unofficial copies are ok). If you are a CPSC or EECE student, this can be done in the first week of classes. For students in other departments, this needs to be done before you can register for the course.
1  Linear algebra

2  Probability

3  Multivariate calculus
4 Scientific computing

5 Algorithms and complexity

6 Statistical inference

7 Machine learning