Why should a CS degree contain a course on discrete math

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Why should a CS degree contain a course on discrete math?

- Computing systems comprise of computing, storage and communication subsystems that are combined in multiple ways using complex usage descriptions (known as code or software) to achieve defined purposes e.g. find the square root of a number, provide real-time traffic and routing information, find the average of a set of numbers etc.
- For each such purpose, let us call it an application, a specification is provided and an inventory of resources is known (i.e. what machines, bandwidth, energy supply, time etc are available.)
- For a particular implementation of a computing system to be acceptable it must (a) correctly fulfill the application specification and (b) be able to perform its tasks within the available resources.
- *Before* a particular implementation of a computing system is adopted we must be able to rigorously verify, to the extent possible, that it meets requirements (a) and (b) above.
- Since the computing resources available to us are (generally) finite and all computing is done on domains that are finite (or countable), the mathematics of discrete sets is applicable to build rigorous arguments to justify the correctness and efficiency (req (a) and (b)) of a particular implementation.

eg: 高性能计算应用到密码学。

What should your learning goal(s) be?

There is a lot of debate about what should or should not be covered in such a class. However, the main learning goal does not relate to the topics covered:

- At the end of this class you should distrust every statement offered without proof or justification (and consequently not offer statements without proof or justification).

Rules for this class (and maybe even life in general)

- *Never* use terms like "obviously", "clearly" etc in front of your instructors or even between yourselves when discussing mathematical material (or any other material, for that matter). Argue whatever you need to. If the justification for a statement is too long, point to a place where it may be available or make some effort to ensure the listener/reader knows what the justification or proof is. **Any use of any such word that attempts to hide the absence of an argument will attract negative marking in an exam/quiz situation.**
- Don't use a "theorem" whose proof you don't know (even if you know it only in outline).
- Don't ask your TAs or instructor for clarifications. If there is an error in a tutorial, quiz or exam (there certainly will be), point it out in your answer itself and solve the question as you understand it. Sometimes your understanding will be wrong and you will lose marks for it. But what you gain in terms of learning to think independently and make decisions for yourself will be very valuable.

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