Slight Changes to CMSC 250 (Discrete Math)

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What is CMSC 250


Course Goals:

1. To teach students proof technique and how to prove simple things.
2. To teach students math that will be useful in later courses.
Why Talk About This?

The Changes to CMSC 250 are slight and do not need formal approval. However:

1. Faculty should know what are in the basic courses anyway.
2. Might affect what some of the upper level courses can assume.
Topics we hope to make mandatory

1. Big-$\mathcal{O}$-notation. Goes well with quantifiers. Anecdotal evidence from summer 351 says it has been terrifically useful. Helpful for other courses (420? Others?)


3. More combinatorics. Perms and Combs already done; provided more depth during Spring 2017 (Binomial Theorem, Pascal’s Triangle and comb proofs.) Helpful for other courses (351, 451. Others?)

4. Probability- including Bayes Theorem. Helpful for CMSC 320 (Data Science), CMSC 422 (Machine Learning), Others?

5. NOT a panacea. Only claiming good that they would have seen this material. Example: not suggesting 351 takes Big-$\mathcal{O}$-notation out.
Topics that we propose to be optional

1. Proof Systems (modus ponens, tollens, etc.)
2. Countability and Uncountability (that will now always be done in CMSC 452- Theory of Comp.)
3. Relations (Transitive, Symmetric, Reflexive)
4. Functions (1-1, onto, bijections)
5. Flexibility which topics to cover. Likely will cover some of them. More important is to make room for mandatory topics on prior slides.
Syllabus and Comments

1. Prop logic, Truth Tables, Circuits. **Optional:** Proof systems.
2. Pred logic, quantifiers, $O$-notation as an example of quantifiers. **Optional:** Proof systems.
3. Proof techniques: Direct Proofs, Contradiction, Induction (this is the largest topic). Embedded in this item: **Elementary Number Theory** (parity, divisibility, modular arithmetic, Prime Factorization theorem). (**Optional:** fast algorithms for $a^n \pmod m$ and other mod operations, very basic crypto.)
5. Probability, Conditional Probability, Bayes Theorem.
6. **Optional:** Functions, 1-1, onto, bijections.
7. **Optional:** Relations, reflexive, symmetric, transitive.