MATH 125A – MATHEMATICAL LOGIC (4 UNITS)

COURSE OVERVIEW

SUMMARY

Math 125A is an upper division math logic course aimed for math majors. There is strong overlap between this logic course and Philos 140A, which is the equivalent course in the philosophy department, though this course is much more proof-based. This class lays the mathematical groundwork for a lot of the logical systems (propositional and first order) mathematicians use, as well as the theorems that logicians should know with regards to those logical systems.

PREREQUISITES

Math 113 (math113.html) or consent of instructor

In general, this prerequisite isn't strictly enforced, and is only helpful for a portion of the course. It is more important to have some mathematical maturity and some background in logic (something along the lines of Philos 12A)

TOPICS COVERED

- Propositional Logic
  - Language, truth assignments, proof system, implication and compactness
- First order logic
  - Syntax (terms, formulas, free/bound variables)
  - Semantics (Formulas, structures, satisfaction relation)

    - Soundness and Completeness
- Isomorphism between first order structures
- Substructures, elementary substructures
- Tarski's Criterion
- Orders, Dense orders
- Lowenheim-Skolem Theorem
- Godel Completeness theorem (First order logic)
- Henkin Property
- Craig Interpolation Theorem
- Compactness Theorem

WORKLOAD

COURSEWORK

- Weekly homeworks (graded on completion, not accuracy)
- 1 midterm
- Final

TIME COMMITMENT

3 hours of lecture a week, no discussion. Expect to spend a lot of time on the homeworks (maybe up to 5-7 hours+ per homework, including professor office hours), and possibly even more time reviewing/revising the material.

CHOOSING THE COURSE

WHEN TO TAKE

Generally, this class is taught by Professor Slaman, who does not require extremely rigorous proofs for the homeworks. Some background or experience with proofs is ideal, so the best time for this course is either junior or senior year. This course is only offered in the fall.

WHAT NEXT?

This course is relatively self-contained and terminal (at the undergraduate level), at least within the math department. Those who would like to learn more about logic should take relevant classes in the Philosophy department.

ADDITIONAL COMMENTS AND TIPS

This course is not extremely useful for chemists, in terms of applications. To be fair, it's also not extremely useful for many mathematicians. You should only take this course if you're interested in logic and don't really care about how it may apply to other fields.

Expect this class to operate very much like other upper division math classes. That is to say that lectures are not entirely necessary, and the course is aimed for independent learners. There generally is only one professor teaching the course, with no GSIs, so expect not a lot of structure support. Professor Slaman generally teaches this class. He is relatively popular and known for his generous grading and helpfulness during office hours. He is a bit of a quiet lecturer so try to get a seat near the front of the class if you want to hear him well.

Homeworks in this class are much more difficult than the exam, though they are graded on completion. It is definitely helpful to have some background in propositional logic and first order logic systems, though it is not necessary. In terms of the math knowledge required, the main thing that you need to know from MATH 113 is homomorphisms and isomorphisms, but most of the time, the professor does not assume a lot of prior knowledge in previous math courses (other than notation).

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lang=en) students/peer-
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