

# MCS 548 – Mathematical Theory of Artificial Intelligence

## Syllabus

Lev Reyzin

Fall 2014

**Time and location:** T-R, 11:00am-12:15pm, Behavioral Sciences Building (BSB) 137

**Instructor:** Lev Reyzin, SEO 713, (312)-413-9576, [lreyzin@math.uic.edu](mailto:lreyzin@math.uic.edu)

**Prerequisite background:** Familiarity with the design and analysis of algorithms, basic computational complexity theory, and mathematical maturity.

**Office hours:** to be announced

**Website:** [http://homepages.math.uic.edu/~lreyzin/f14\\_mcs548/](http://homepages.math.uic.edu/~lreyzin/f14_mcs548/)

**Required textbook:** Shai Shalev-Shwartz and Shai Ben-David. *Understanding Machine Learning: From Theory to Algorithms*

**Optional textbook:** Mehryar Mohri, Afshin Rostamizadeh, and Ameet Talwalkar. *Foundations of Machine Learning*

**Topics:** MCS 548 somewhat differs in topics each time it is offered. This year it will cover the mathematical foundations of computational learning theory. Example topics include: PAC learning, agnostic learning, online learning, bandit problems, statistical queries, learning with experts, inductive inference, query learning, boosting, and support vector machines. This course is represented in the mathematical computer science prelim.

**Grading:**

- 25% take-home problem sets
- 25% research project – each student will be required to complete a small research project
- 25% in-class presentation – each student will present a research paper on a topic related to his or her research project and be expected to answer questions about it
- 25% in-class final exam

Grades may also be adjusted *slightly* upward or downward depending on class participation.

**Problem set collaboration policy:** Unless otherwise specified on an assignment, students may discuss problem sets with one another, but they should afterward write the solutions on their own. Collaborators (people you speak to about an assignment) must be named at the top of the assignment. No collaboration will be allowed on exams.

**Late work policy:** In general, late work will not be accepted. Problem sets are to be turned in by 11:00 am the day they are due, either in class or via my mailbox (on the 3rd floor of SEO). Any exceptions will be handled on a case-by-case basis.

**Disability policy:** Students with disabilities who require accommodations for access and participation in this course must be registered with the Office of Disability Services (ODS). Please contact ODS a 312/413/-2183 (voice) or 312/413-0123 (TTY).