

MCS 548 – Mathematical Theory of Artificial
Intelligence
Fall 2025
Choosing a Project

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By 1 pm on 11/7 (but feel free to do this earlier), a proposed project idea is due by email – you may work in groups on this but are also welcome to work alone. For the project idea, write a paragraph or so describing what problem you will be attempting and include any references to the main relevant papers. Your project is subject to my approval, so if you are not sure if your idea is appropriate for this class, please talk to me in advance. I only need to receive one email per group.

The project will be an *attempt* to solve an open problem in learning theory. Places to look for problems include recent proceedings from conferences. Specifically, open problems or directions from any paper from COLT or ALT; the learning-oriented papers in STOC, FOCS, ITCS or SODA; or the theory-oriented papers from ICML, NIPS, or AISTATS. If you need guidance picking a project, please email me.

Project write-ups will be due December 5th, via Gradescope (but I will accept "late" projects until December 7th by 1pm without penalty). The final write up be a "mini-paper" and should include the problem you studied, background on the previous work, any (partial) progress on the problem and the attempts you made in solving it. Your project grade will be based on demonstrated effort and the quality of the final write-up. I expect you will spend at least 15 – 20 hours per person on this project.¹

¹Students auditing the class may also participate in doing the projects and can put in as much effort as they wish.