

15-816, Fall 2025

Research Projects

	Description	Due When
[80] points	Weekly Research Meetings	
[20] points	Oral Presentation	12/1, 12/3 (during class)
[50] points	Written Report	Friday, December 12th

The goal of this assignment is to give you first-hand experience using automated reasoning and satisfiability techniques to solve a concrete problem. You will conduct weekly research, deliver a 10-minute presentation, and submit a written report of approximately 10 pages.

1 Oral Presentation

Your oral presentation should be 10 minutes long, followed by 2 minutes for questions. Because several groups will present on the same day, the 10-minute time limit is strict. We encourage you to practice your talk to ensure you do not exceed it.

During your presentation, you are expected to address the following points:

Motivation: Clearly motivate the problem and explain why it is important.

Solution: Describe your proposed solution and highlight how it differs from or improves upon prior work.

Results: Present the key results that support your approach, and discuss conclusions or insights gained.

Questions: Answer questions from the audience and instructor clearly and concisely.

Slides: Use clean and focused slides. Avoid dense text and aim for one main message per slide.

Jargon: Define or explain any technical terms so the audience can follow your presentation.

Timing: Keep your talk within the 10-minute limit.

If you want feedback on your slides, you can create a private post on Piazza, and we will give you feedback.

Note that the presentation may be given by a single student, but we encourage all group members to participate by presenting different parts..

2 Written Report

Your written report should be approximately 10 pages and should clearly communicate your research problem, your approach, your methodology, and your findings. Here are some suggestions to help you produce a great report.

Introduction

- Clearly state the research problem in the opening paragraphs. Avoid vague or implicit descriptions.
- Motivate the problem by explaining its importance and the benefits of addressing it.
- Provide a high-level overview of your solution or key insight.
- Include brief “teaser results” that highlight your main findings or contributions.
- Ensure the introduction demonstrates how your work differs from existing research.

Background, Related Work, and Methodology

- Provide sufficient background so that someone that attended 15-816 can understand the problem and context.
- Summarize related work and clarify how your approach differs from or improves upon prior work.
- Describe your approach in enough detail for a reader to potentially replicate the work.
- Highlight key design decisions and justify each one with theory, data, intuition, or experimental reasoning.

Evaluation

- Select appropriate evaluation metrics and explain why they are meaningful.
- Clearly describe the experimental setup, including hardware, software, parameters, datasets, and key assumptions.
- Ensure that conclusions follow directly from the data shown in your experiments.
- When possible, evaluate the impact of individual design decisions independently.

Conclusions

- Provide a clear interpretation of your results and explain how they support your key insight or contribution.
- Offer thoughtful suggestions for future work that naturally follow from the limitations or findings of your project.

Writing Quality

- Aim for clear, direct, and concise writing. Reduce unnecessary tangents or filler text.
- Provide concrete examples and details so the reader never has to re-read a section to understand your point.
- Organize the report with clear section headings and logical flow.

- Ensure that grammar, spelling, and sentence structure do not distract from the technical content.

Manuscript Format

- Use the LIPIcs template that is used by many theory conferences including the SAT conference. The template is available at: <https://submission.dagstuhl.de/series/details/LIPIcs#author> which includes some guidelines for authors.
- Format citations and bibliography entries accordingly.
- Maintain reasonable margins and spacing; avoid overly compressed or padded formatting.
- Ensure figures are clear and readable and choose colors accessible to all readers.
- Include descriptive captions so that figures can be understood without referring extensively to the main text.

3 Hand In

Oral Presentation We will use the schedule available at <https://tinyurl.com/15816-f25-presentations>. Please submit your slides to Gradescope no later than 1 pm on the day of your presentation (12/1 or 12/3). We will merge all slides into a single presentation so that only the instructor's laptop is used, which helps minimize downtime between presenters. Since the presentation will be delivered live in class, you should be prepared to present on that day.

Written Report Please submit your final written report on Gradescope no later than 11:59pm on Friday, December 12th. The report must use the LIPIcs template and should be approximately 10-pages. This is not a strict limit, but you should avoid being significantly over or under that length.