

Intermediate category theory reading group: syllabus

Semester 1, 2025–2026

This will be an intermediate category theory reading group. Rough prerequisites are an understanding of limits and colimits, adjunctions, and representables and the Yoneda Lemma. However, the first session will be an overview of these prerequisites, and thorough experience with all of them is not required. We will begin the semester by working through chapters 5 and 6 of Emily Riehl’s *Category Theory in Context* [1], which cover monads and Kan extensions respectively. The book is available gratis online at the following URL.

<https://math.jhu.edu/~eriehl/context/>

After finishing *Context*, we will switch to a more free-form approach. Likely, each week someone will bring a shard of category theory to present, perhaps a paper, result, or just an interesting concept. Concepts likely to appear include higher categories and topoi. We might specialise to a particular topic if there is desire and agreement within the group. There is a wealth of literature to choose from, both papers and books: we will not run out of topics to cover. There are many experienced category theorists in the faculties at various Scottish universities whom we can ask for advice and guidance.

We will have one two-hour meeting per week. Times are to be confirmed. Meetings will be in hybrid format, available in-person and online. All interested, regardless of institution or department, are welcome to attend. I stand firmly in opposition to all bigotry, and I will do all within my power to make this group inclusive, supportive, and accessible.

Discussion about the group, and sharing of hybrid links, will primarily happen in the Zulip group. Please send me an email if you do not have the link to join the group. If you have any questions about the group, please contact me, Maia Woolf (she/her), the current primary organiser, at maia.woolf@ed.ac.uk.

An approximate plan for the meetings is as follows. It is subject to change as we go on, depending on how things go, and people’s interests. Each item is a week, and the numbers at the end refer to sections in the text. We will assign presenters for each week at the first meeting or as we go along; I will present for the first week.

1. Recap of prerequisites
2. Monads: 5.1–5.2
3. Monads: 5.3–5.4

4. Monads: 5.5–5.6
5. Kan extensions: 6.1–6.2
6. Kan extensions: 6.3–6.5
7. *Context* overflow/recap/presented topic
8. Presented topic
9. Presented topic
10. Presented topic

References

- [1] Emily Riehl. *Category Theory in Context*, 2016. Dover Publications.