

Introduction to
Research Seminar:
getting students to read, write,
and talk about mathematics

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The problem

Student's senior theses were of low quality.

The solution

Teach the students more about how to write a math paper and give a math talk before they do their senior thesis.

The course

Students learn to:

- read math independently
- write mathematical papers in $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$
- speak about math

Course format

- 2 credit hour course, meets one day a week
- each student presents every class
- techniques for writing, reading and speaking discussed in class
- three substantial writing assignments
- reading assignments for each class
- public presentation related to a final paper
- choose senior thesis topic by end of course

Presentations

- Fact from the Harvey Mudd Math Fun Fact website
- Homework problems from the Heart of Mathematics
- Fundraiser idea with expected value, presented as to a general audience
- Summary of a chapter from the Heart of Mathematics
- "Research proposal" for final paper
- Proof from paper that was read for class
- Substantial proof from Calculus
- Induction proof
- Public presentation on final paper topic

Techniques discussed

- Writing in $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$
- Using library resources including JSTOR and ERIC
- Finding a math topic
- Reading a math paper
- Writing a math paper

Papers

- A job application including essay (idea from Annalisa Crannell)
- Summary of chapter from Heart of Mathematics
- Final paper

Successes, stumbling blocks, and persistent questions

- Students presentations improved
- Students learned \LaTeX
- Proof from paper went badly
- Writing quality has varied
- Difficult to make sure students read critically
- Is there a good book for undergraduate math writing?
- What is a reasonable set of expectations of the students?
- Does this really need to be a separate course?