

Senior Theses

The Department of Mathematical Sciences encourages math majors to fulfill the Upper-Division Writing Requirement by writing a senior thesis (M 499).

Students who plan to write a senior thesis should select a research topic during their Junior year. The best way to do this is to approach a professor with whom you would like to work and ask for suggestions of possible research topics. A one-credit independent study (Junior Honors Project, M 392) is usually offered in the fall semester to help students explore a research topic and write a senior thesis proposal.

Writing a senior thesis improves students' writing skills as they produce polished mathematical documents that they can share with pride. Revision and resubmission of drafts following the advisor's comments are required. All senior theses are assessed using the Assessment Rubric included on the following pages.

For more information, please contact Professor George McRae (MA 310, 243-2502).

Senior Thesis Assessment Rubric

Department of Mathematics Indiana University Southeast

The Senior Thesis is intended to be a paper that demonstrates a student's ability to learn mathematics on his or her own, and to be able to write in a manner which both demonstrates his or her understanding of the mathematics and clearly communicates the mathematics to the intended audience. The Senior Thesis will be evaluated on the mathematical content and on the writing, according to the criteria detailed below. To be judged to be satisfactory, the Senior Thesis must meet all of the criteria below for satisfactory performance; to be judged excellent, the Senior Thesis must also meet the criteria below for excellence in each category. (This rubric was adapted from a model produced at Southern Oregon University's Mathematics Department.)

Mathematical content:

Research problem: The thesis should be written on a mathematical problem, theorem or other mathematical topic of sufficient interest and depth to merit treatment in a Senior Thesis. The thesis should follow a research plan that is sound, feasible and appropriate to the research problem.

Excellent: The thesis has a clear, focused statement of a research problem or topic, and the research problem is interesting and of a level appropriate to a senior mathematics major. The research plan is well-thought-out.

Satisfactory: The statement of research problem may lack some clarity or focus, or the research problem may be of less interest though at a level appropriate to a senior mathematics major. The research plan is adequate to address the research problem.

Unsatisfactory: The statement of the research problem is missing or confused, or the research problem is uninteresting or trivial. The research plan is inadequate or missing.

Thoroughness: The thesis should address the research problem in a convincing and thorough manner.

Excellent: The thesis will demonstrate an accurate understanding of the research problem, and it will demonstrate a convincing thoroughness of research. In particular, the thesis should cite a sufficient number of sound, peer-reviewed sources. (While useful, sources on the world-wide web are not generally peer-reviewed and should not be relied upon to the exclusion of peer-reviewed books or periodicals.)

Satisfactory: The thesis will demonstrate a largely accurate understanding of the research problem. The research may be less than convincing in its thoroughness, citing an insufficient number of sound, peer-reviewed sources, but it will reach essentially the same conclusions as would be

reached by a convincing and thorough research effort.

Unsatisfactory: The thesis fails to demonstrate an accurate understanding of the research problem, and inadequate research (insufficient sources or sources of poor quality) results in erroneous, misleading or missing conclusions.

Depth: The thesis should demonstrate a real understanding of the mathematics inherent in the research problem.

Excellent: It is clear from the thesis that the student has a good, working knowledge and understanding of the mathematics he or she is discussing. For example, if a technique for solving a certain type of equation is being discussed, it must be clear that the student can operate the technique on his or her own. The mathematics must be at a level appropriate to a senior thesis.

Satisfactory: The mathematical content of the thesis is generally correct but displays some minor confusion or lack of clarity, while the student demonstrates a working knowledge of most of the mathematics. The mathematics is at the level expected of a senior but may be somewhat insubstantial.

Unsatisfactory: The thesis betrays a lack of understanding of the mathematics under discussion. The mathematics is trivial, incorrect or incomplete; in particular, if proofs of theorems would be appropriate, these are missing or garbled.

Writing:

Organization: The thesis is organized in a clear and coherent manner.

Excellent: The thesis has a clear organization that effectively develops the central idea. There is an introduction including a clear statement of the research problem and outline of the research method. The development of arguments through the paper is clear and logically organized, and the conclusion is apt. The thesis does not ramble nor are there awkward or unexpected transitions.

Satisfactory: The thesis is organized with an introduction which includes a statement of the research problem and outline of the research method, but the organization lacks some clarity or is not completely logical. There is some rambling or awkward or unexpected transitions. There is a conclusion to the thesis which summarizes what has been accomplished.

Unsatisfactory: The thesis has no clear organization; the thesis lacks an introduction or the introduction does not indicate the research problem; the introduction does not introduce the research method. The development of the central idea is confused or unclear. There are no transitions – the thesis appears to be disconnected sections that have been juxtaposed. There is no conclusion to the thesis summarizing what has been accomplished.

Clarity: The thesis must be clearly written; the mathematical content in particular must be clear to the intended audience.

Excellent: Choice of voice is appropriate for mathematical writing; word use is precise and accurate; and the writing is lively and reads well. The mathematical content is clear, and it is clear from the writing that the student has a correct and complete understanding of the mathematical content of the thesis. Assertions are clearly stated and well-supported.

Satisfactory: Word use is sometimes inexact or imprecise or the writing is mechanical or plodding. The writing is generally clear but is sometimes confused or hesitant; the student appears to have an understanding of the mathematical content that is largely correct but not completely so. Most assertions are generally clear and are given support.

Unsatisfactory: The thesis is hard to read or follow; words (particularly technical terms) are used incorrectly; or sentences are incomplete or broken. The writing is confused or hesitant, or betrays a serious lack of understanding of the mathematical content. Assertions are made without support, or are incorrect. The thesis lacks detail.

Use of sources: References and citations must be clear and correct, and the use of information from other sources must be clear and responsible.

Excellent: References and citations are correct and complete; it is clear what information from other sources is integrated into the thesis, and it is clear where that information came from.

Satisfactory: References and citations are complete and generally correct but it is not always clear exactly what information from other sources is integrated into the thesis.

Unsatisfactory: References and citations are not complete or have errors that prevent the reader from knowing the source of cited information. It is unclear what information from outside sources is integrated into the thesis.

Conventions: The thesis must be grammatically correct and properly formatted.

Excellent: There are no faults in spelling, punctuation and sentence construction. The thesis is formatted in an appropriate and professional manner. The care in proofreading and formatting has strengthened the development of the central idea of the thesis.

Satisfactory: The thesis is formatted in an appropriate manner and there are few faults in spelling, punctuation and sentence construction. A lack of thoroughness in proof reading has not seriously marred the thesis nor confused the development of the central idea.

Unsatisfactory: The thesis is marred by numerous errors of grammar, spelling, punctuation or sentence construction. Formatting is not appropriate for a senior thesis. A lack of proof reading has confused the development of the central idea of the thesis.