Course Description  

MATH 498 is a one-hour required course for seniors completing their mathematics degree. The course is used to assess the student’s independent thinking skills and ability to write and present formal mathematics. The course has a director who oversees the course, but each student will work individually with a faculty member on a project.

Director  

Dr. David K. Neal  
TCCW 315  
745-6213  
david.neal@wk.edu  
http://www.wku.edu/~david.neal/

Office Hours  

MWF 10:20 – 11:30; TR 1:00 – 2:20; or by appointment.

Requirements of the Student  

1. Maintain regular contact with your supervising faculty member and make regular progress on your project according to a timetable presented by your supervising faculty member.

2. Submit, on schedule, a 7–11 page paper on the topic or problem that you have chosen with your supervising faculty member. The paper will be read by two other faculty members who may offer suggestions for revision. The student will be allowed to make these revisions before the final draft is graded.

3. Give a 20–25 minute presentation of your paper at a departmental colloquium. (A presentation made at a conference may be substituted for the departmental colloquium if there are an adequate number of faculty members at the conference to grade your performance.)

4. Turn in a copy of the final version of your paper to the course director.

5. Students should attend the (on-campus) presentations of the other students in the course.
Method of Evaluation

The student’s written paper and oral presentation will be evaluated by a committee composed of three mathematics faculty members which includes the student’s supervisor.

The paper will be graded on (i) its organization, (ii) presentation of mathematical material, (iii) demonstration of mathematical reasoning and problem solving, (iv) readability, grammar, and style, and (v) level of difficulty. The faculty members will grade each of these parts on a scale of 0 (unacceptable) to 4 (excellent). The final grade on the paper will be the average of all scores on all parts. Evaluation of the paper will be based on the following set of expectations:

Organization

a. The paper includes a title page and a bibliography in the standard scientific format.

b. The main body of the paper is from seven to eleven (single-spaced) pages and is typeset with an appropriate word processor and equation editor. (Exceptions in length can be made if the supervising faculty member feels that it is necessary.)

c. The paper begins with an introduction that describes the material to be presented, clearly states the objectives of the paper, and explains any special techniques to be used by the author.

d. Following the introduction, the paper has an identifiable body that focuses on the main points with logical and clear transitions between them.

e. Bibliographic and equation number references are cited throughout the paper as appropriate.

f. The paper contains a conclusion that, as appropriate, describes specific applications, related problems, or directions for future development.

Presentation of Mathematical Material

a. The paper includes all necessary definitions as well as a description of all terms or background results that are cited.

b. The paper includes appropriate examples that illustrate the key concepts.

c. Results and exposition flow in a logical order.

d. All results, statements, definitions, theorems, and proofs are accurate.

Mathematical Reasoning and Problem Solving

a. Student demonstrates a clear understanding of the material/problem being presented.

b. Student draws upon his/her accumulated knowledge of a variety of mathematical ideas to explain/solve their topic/problem.

c. Student demonstrates the ability to work independently.

d. Student is able to relate the topic/problem to other mathematical ideas they have encountered in their course work.
Readability, Grammar, and Style

a. The paper should be readable by a fellow mathematics major who has completed the foundation core MATH 126, 227, 327, 307, 310, 317, and some other 400-level mathematics course.

b. There should be distinction between concepts and results that should be known to readers versus those that require review or some introduction and development.

c. Spelling, punctuation, and grammar must be correct.

d. Equations, figures, and tables should be properly inset and numbered for reference.

Level of Difficulty

The material should be appropriately challenging given the student’s mathematical background and coursework.

The presentation will be graded on (i) its structure, (ii) engagement of the audience, (iii) demonstration of mathematical comprehension and problem-solving ability, (iv) style, and (v) level of difficulty. The faculty members will grade each of these parts on a scale of 0 (unacceptable) to 4 (excellent). The final grade on the presentation will be the average of all scores on all parts. Evaluation of the oral presentation will be based on the following set of expectations:

Structure

a. The presentation should begin with an introduction that describes the material to be presented, clearly states the objectives of the presentation, and states any special techniques to be used by the speaker.

b. Following the introduction, the presentation should have an identifiable body that focuses on the main points with logical transitions between the key ideas.

c. As appropriate, the speaker identifies specific applications, related questions, or directions for future development.

d. The presentation should be from 20 to 25 minutes in length followed by a question and answer period.

Engagement of Audience

a. The presentation should be delivered in such a way as to assure its understanding by the audience.

b. The speaker should assume that the listeners have solid mathematical reasoning skills and have been exposed to the ideas of calculus and the fundamentals of logic, sets, and proofs. The presenter should not assume that members of the audience have any specific detailed background on the subject matter.

c. The speaker should provide appropriate review or development of any specific background necessary for understanding the material in the presentation.

d. The speaker may use note cards, overhead transparencies, and other forms of support as appropriate, but should speak to members of the audience as opposed to reading the paper.
e. The speaker should maintain eye contact during the presentation and should make an effort to include everyone in the audience.

f. The speaker should invite questions and comments, specifically at the conclusion of the presentation, and the speaker should treat all questions and questioners with respect.

**Demonstration of Mathematical Comprehension and Problem-Solving Ability**

a. If the presentation is to communicate an overview of the entire topic through a selection of definitions and theorems, then the speaker should explain the central concepts and results formally and accurately, and should provide appropriate examples to illustrate them.

b. If the presentation is to communicate an overview of the whole topic, but the mathematical treatment is more informal, then the speaker should introduce central concepts and results through examples and informal statements designed to stimulate intuitive understanding.

c. If a formal proof is part of the presentation, then the speaker should demonstrate a clear understanding of the way that definitions and prior results are applied in the course of the proof.

d. The speaker should respond appropriately and correctly (within the scope of the student’s research) to questions during the question and answer period.

e. The speaker should identify, in the course of the presentation, the key issues of their topic/problem and the steps they took to resolve those issues.

**Style**

a. The speaker should speak clearly and loudly enough for all audience members to hear.

b. The presentation should be delivered with sufficient clarity and professionalism so that the main points can be understood by most audience members.

c. The presenter should use adequate technology in the presentation. PowerPoint presentations with elaborations on the blackboard are encouraged.

**Level of Difficulty**

The material should be appropriately challenging given the student’s mathematical background and coursework.

Grading for the paper and presentation will adhere to the guidelines:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
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<tr>
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<tr>
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<td>excellent</td>
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The course grade will be determined by the average of the paper and presentation scores according to the following scale:

<table>
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<tr>
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<td>A</td>
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