

**Morehead State University**  
**Department of Mathematics and Computer Science**  
**MATH 631 (Fall 2010)**

\*\*\*\*\*

**Instructor:** R. Duane Skaggs, PhD  
**Email:** [d.skaggs@moreheadstate.edu](mailto:d.skaggs@moreheadstate.edu)

**Office:** LA 204E  
**Phone:** 1.606.783.2848

**Office Hours:** Online

**Catalog Description**

**MATH 631. Problem Solving for the Elementary Teacher.** (3 – 0 – 3); I, II, III.  
*Prerequisite:* restricted to students certified or seeking certification to teach at the elementary or middle school level. An activity oriented course designed for the elementary teacher in curricular materials and problem solving.

**Course Description**

The primary objective of MATH 631 is to make proficient problem solvers of the students. This course is designed to fulfill the Kentucky New Teacher Standards. The emphasis is on problem solving and will require the use of concepts from number theory, arithmetic, algebra, geometry, coordinate systems, probability, and statistics. Some review and discussion of these topics may be required to develop the tools and skills needed in the course. All of these topics are included in current elementary mathematics texts.

**Required text**

K. Johnson, T. Herr, and J. Kysh, *Crossing the River with Dogs: Problem Solving for College Students*, Key College Publishing, ISBN 1-931914-14-1. The course assignments will cover parts of each of the 17 chapters, as well as some material from the Appendix. You will be expected to read the text and work problems on your own.

**Grading**

Your grade will be based on fifteen assignments (most of which contain five questions) and problem discussions, a research paper, and a two-part final exam. The individual assignments constitute 60% of your course grade, the paper represents 10%, and each part of the final exam counts as 15%. The traditional 60-70-80-90 grade scale will be in effect.

**Homework**

You will be expected to discuss the problems on the Discussion Board on Blackboard. **Do not give away answers to the questions;** rather, offer suggestions on how to best think about the problems. In other words, once you have figured out how to do a problem you can try to help other students discover the answers for themselves.

Assignments do not have to be completed immediately; they can be saved and returned to at a later time. Assignments are *self-paced*, with new assignments generally becoming available once you have received at least 80% on the preceding assignment. Some

assignments require an *average* score of 80% on the preceding assignment and some require a high score of 100% on the preceding assignment. These details are clearly posted with each assignment.

### **Research Paper**

The research paper is a 7 – 9 page paper (not including cover page or bibliography). Some articles will be provided on Blackboard. These articles involve *opinions* about good teaching, particularly as related to teaching mathematics, but do not contain any supporting research.

There are three primary components of the research paper. First, compare and contrast *Lockhart's Lament* and *In Defense of Mindless Rote*. As part of this you should provide summaries of each, with clear indication of the main points conveyed by each author. You should discuss similarities and differences, both between the goals of the different authors as well as the teaching styles and techniques they suggest. Second, provide an analysis of *Lockhart's Lament* and *In Defense of Mindless Rote*. Use additional research, such as refereed journal articles or books, to support or contradict the opinions of each of the authors. Third, conclude with your own opinions about how best to teach mathematical concepts. Again, journal or book sources should be used to support your case.

Note that neither of the first two components of the paper should include your own opinions. In these two portions, you are reporting on the work (and opinions) of others. The third portion is the place for you to state and defend your opinions.

The entire paper should be well organized, carefully cited (both in the paper and in a list of references), and should avoid plagiarism, poor grammar, spelling mistakes, etc. You should use at least five *academic* sources **in addition** to the ones given here. If you are unsure whether a particular source is appropriate, then be sure to ask.

Feel free to discuss ideas related to the paper on the Discussion Board, or privately via email with me. Again, any ideas or comments of others should be cited in the paper.

### **Americans with Disabilities Act**

In compliance with the ADA, all students with a documented disability are entitled to reasonable accommodations and services to support their academic success and safety. Though a request for services may be made at any time, services are best applied when they are requested at or before the start of a semester. To receive accommodations and services, the student should immediately contact the Disability Services Coordinator in 223 Allie Young at 606.783.5188.

### **Teacher Education Statement**

*“Community Engagement: A Light To and From the Mountains” The Professional Education Unit in the Department of Mathematics and Computer Science at Morehead State University delivers rigorous, high quality programs and courses that prepare professionals informed by NCTM and MAA standards - preparing professionals to*

*improve the schools, quality of life, and the communities in which they live and serve. This statement is not only the strategic mission for the department, but it also incorporates the conceptual framework that guides its activities.*

### **Overall Course Structure**

MATH 631 incorporates the following KY Teacher Standards:

1. Coherent Instructional Design with clear learning expectations for all students (S1, NCTM Curriculum and Teaching)
2. A learning climate that enables students to use communication skills as they sharpen their problem solving skills and actively acquire new knowledge (S2, NCTM Learning, EPBS Theme of Closing the Achievement Gap)
3. High expectations for learning and using multiple representations to address diverse learning styles (S3, NCTM Equity, EPBS Theme of Diversity)
4. Multiple ways of assessment and self-assessment (S4, S5, and S8, NCTM Assessment, EPBS Theme of Assessment)
5. Use of technology to support teaching and learning (S9, NCTM Technology, EPBS Theme of Use of Technology).

Note: S1 - S9 refer to specific KY Teacher Standards; included are also cross references to NCTM Principles for School Mathematics and the Kentucky Education Professional Standards Board Themes (EPBS).

### **Learning Goals**

Learning goals of MATH 631 integrate the following National Council of Teachers of Mathematics (NCTM) standards. Students will:

1. Build new mathematical knowledge through problem solving. (POS 2.12)
2. Select and use various types of reasoning and methods of proof (POS 2.12)
3. Communicate mathematical thinking coherently and clearly to peers, professors, and others (POS 2.8, 2.12, KAEM Goal 1)
4. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole. (POS 2.7, 2.8, 2.11, 2.12)
5. Use of multiple representations to model and interpret physical, social, and mathematical phenomena (POS 2.11, 2.12, KAEM Goal 2)

Kentucky's Academic Expectations included in the Program of Studies (POS) and the goals for Kentucky Academic Expectations for Mathematics (KAEM) are referenced. These goals are connected to the core content for the Kentucky Commonwealth Accountability Testing System (CATS) which align the Core Content for Mathematics Assessment Version 4.1 with the American Diploma Project mathematics benchmarks.