

# Governor's School for the Sciences – Summer 2008

Math 300 – Introduction to Abstract Mathematics

MTWRF 1:30-4:30 in Ayres 104

**Professor:** Dr. Chuck Collins

**To contact me:**

In Person: in my office: Ayres 312B. I'll usually be in my office in the morning

By Phone: 974-4269 (my office), 974-2461 (math office, leave message)

By Note: mail box (Ayres 120), on office door (Ayres 312B)

By email: collins@utk.edu (BEST)

**Assistants:**

Ellie Abernethy abernethy@math.utk.edu

Tim Weatherall weather@utk.edu

**Course Goals:** By the end of this course you should be able to

1. In terms of logic ...
  - (a) Identify the logical structure of a statement and evaluate whether it is true or not.
  - (b) Manipulate statements using the laws of logic.
  - (c) Construct logical variations of a statement (negation, contrapositive, etc.)
2. In terms of definitions and notation ...
  - (a) Recall precise definitions of common mathematical objects or characteristics.
  - (b) Identify the use of a definition and apply the definition to rewrite a statement in both directions (i.e. from the term to its characteristics and from the characteristics to the term)
  - (c) Create and rewrite statements using appropriate mathematical terminology and notation.
3. In terms of proofs ...
  - (a) Evaluate a proof as to whether or not it is valid.
  - (b) Given a Theorem, identify the possible proof techniques that may be used to prove this theorem.
  - (c) Given the idea or sketch of a proof, write it in proper English as a valid proof.
  - (d) Given a Conjecture, determine whether or not it is likely true.
  - (e) Given a Theorem, prove that it is true.
4. Overall... Say you worked hard but had fun.

**Course Resources:**

**Textbook:** *How to Prove it: A Structured Approach*, 2nd ed., by Daniel J. Velleman, Cambridge Univ. Press, 2006.

**Handouts:** Each day you'll get a copy of the *Math Mole*, a newsletter with some (hopefully) interesting content. Other material will be distributed as needed.

**Web Resources:** I try to keep an up-to-date webpage <http://www.math.utk.edu/~ccollins/GS2008> containing a class schedule, copies of handouts and other resources associated with the class.

## Class Work:

**Homework: (30%)** Exercises and proofs will be assigned daily. These problems will be done in class or as homework, due in class or by the next class period. Some will be written up to turn in, some you'll do on the board and some you'll evaluate as a group. A big part of the learning in this class will come from self and peer assessment of your work. There will be clear guidelines given as to what is expected.

**Quizzes: (10%) (Almost)** Daily short comprehensive quizzes over definitions and examples.

**Exams: (40%)** Two (2) inclass exams primarily focusing on proofs. Scheduled for Monday, June 23th, and Monday, July 7th.

**Portfolio: (10%)** A notebook of about 20 specified proofs developed over the course. Can be reviewed several times before the final evaluation.

**Final Project: (10%)** Working individually or with a partner you will explore some topic in mathematics and write up a 3-5 page report. Will include some new (to you) mathematics. Precise details and guidelines will be given later.

**Extra Credit: (up to 5%)** Opportunities include primarily the Math Mole problems. Others will be announced later.

**Grades:** The grading scale is 90% for an A, 85% for a B+, 80% for a B, etc. Earning the minimum percentage will guarantee you the given grade. I may choose to lower the cutoffs, but don't depend on it. This is summer and an elective course, and I don't want the grades to be a punishment for you (or for me), so I will give you plenty of chances to maximize your grade through selective re-dos and extra credit. It will be up to you to take advantage of these opportunities.

## How To Succeed:

1. This material takes time to understand and absorb. Some parts may come quick for you; some may come slow. To be successful, don't quit.
2. Everything in this course builds on or leads to other things in this course. For success you need to really understand each part. As you work through the material keep these two questions in mind: "What does this word/phrase/statement mean?" and "Why is that so?". To be successful, know the answers to these questions.
3. This course requires precision and thus you must be sharp. To be successful, get and give constructive feedback from/to others.

## Class Policies and Expectations:

**Classroom Behavior:** Besides the rules of GSSE and the common rules of good behavior, I expect you to come to class prepared to do your best work, to encourage others to do their best work, and to fully participate in the class.

**Out-of-Class Expectations:** You should schedule regular times daily to work on this material. You should keep up with the daily work, and take time to review and really learn the material. You should seek help if you need it and give help if asked.

**In Case of Trouble:** This course should be challenging and that means at some time(s) you will be confused or frustrated. If this happens in class, ask me, Ellie or Tim to clarify. If you are still struggling, talk to one of us again. If it happens outside of class, try reading the book, looking over your notes and talking to classmates. When you get past this point, make note of what you learned. Do not let things go as in the end you are responsible for learning as much of the material as possible.

**Group Work/Cheating:** I expect the final version of any work that you submit with only your name on it to be your own work. I also encourage you to talk with other students in the class. You may ask other students questions about topics from class, and you can discuss the problems in general. However, once you start writing out a solution you must do it without any help (i.e. no copying). If I suspect any offense, you'll get a warning the first time. If it continues, both parties will get 0s on the suspected work. More serious offenses will be dealt with on a case by case basis in consultation with Dr. Kovac.

**Late Work/Makeups:** Late work will not be accepted (it can count as a re-do if the assignment allows). This is to encourage you to schedule your time well and keep up with the material. If you are sick or otherwise displaced, makeup work can be arranged.