Governor's School for the Sciences – Summer 2006

Math 251 – Matrix Algebra I

MTWRF 1:30-4:30 in Ayres 314 (lecture) & Ayres 015 (computer lab)

Professor: Dr. Chuck Collins

To contact me:

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

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

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

By email `collins@utk.edu` or `ccollins@math.utk.edu`

By FAX: 974-6576

Assistant: Eliza Martin

Email: `emartin7@utk.edu`

Course Goals:

Develop computational skill and conceptual understanding of linear algebra and its applications.

Course Resources:

Textbook: *Elementary Linear Algebra with Applications, 9th ed.*, by Howard Anton and Chris Rorres, Wiley Publishing, 2005.

Software: We'll be using MATLAB, a wonderful environment for studying matrix algebra. It is installed in the lab and is available also on computers in The Commons, Humanities and Presidential. If you are interested, it is available for purchase at the UT Computer Store for $99. Another option is Octave, a program with similar functionality available under the GNU license.

Handouts: Each day you'll get a copy of the *Math Mole*, a newsletter with some (hopefully) interesting content and an outline for the day. There will be other handouts covering homework and other topics in matrix algebra.

Web Resources: I try to keep an up-to-date webpage `http://www.math.utk.edu/~ccollins/GS2006` containing a class schedule, copies of handouts and other resources associated with the class.

Class Work:

Homework: (30%) There are three components of homework:

- Computational work. There will be a list of problems for each section we cover of basic computations. These will not be collected, but there will be a short quiz over the material the day after we cover the section.
- Deeper work. There will be a few deeper (conceptual) questions handed out each day. These should be written up and turned in the next day.
- Computerized work. There will be a collection of problems to be done and graded on the computers in the lab.

Exams: (40%) On June 20, 27, July 5 and 11 we'll have a 1-hour quiz based on the previous week's work. They will be based on the homework and class lectures.

Application Projects: (15%) There will be 20 or so application projects to choose from to work out during lab time. You'll need to do a total of 15 of them including the ones we do together as a class.

Final Project: (15%) Working alone or with a classmate, you'll get to develop some application of linear algebra. This project includes a short writeup and an in-class presentation.

Extra Credit: There will be ample opportunities for extra credit for doing the daily puzzles, participating in class contests and other activities. Extra credit points (up to 100) will be added to your raw homework score.

Grades: The grading scale is 90% for an A, 85% for a B+, 80% for a B, etc. Earning at least 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.

Course Outline: This is what I expect to cover, for the details of what is covered, see the class webpage.

1. Systems of Linear Equations & Matrix Algebra (Chap. 1)
2. Determinants (Chap. 2)
3. Vector Spaces (Chap. 3, 4, 5, 6)
4. Linear Transformations (Chap. 4, 8)
5. Eigenvalues & Eigenvectors (Chap. 7)

Class Policies and Expectations

Classroom Behavior: Besides the rules of GSS 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.

Cellphones: If it rings, you sing. Class choice.

Computer Lab Behavior: When we are in the computer lab you should be working on material related to this class. Do not IM, surf the web, or read email while you are doing this work. If you want to work on other GSS assignments, you must complete your GSS-Math work first. If you have completed all your work, or during a break, you can read email or surf the web. Please follow both UTs rules and common sense in your use of this computer time and resource.

Out-of-Class Expectations: You should schedule regular times daily to work on this material. Read the sections we are covering in the book before class, 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. If you are confused in class, ask me or Eliza to clarify. If you are still confused after asking, ask again. If you are confused outside of class, you can read the book, especially if there are worked examples or written out explanations, you can look over your class notes and exercises, and you can talk to other students. Make sure you write down the clarification. 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 your work to be your own. 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.

Obviously on quizzes and exams, you must do your own work.

Calculators: You can use a calculator of any type on most work. Some work will be designated 'Calculator Free' so you should practice some of the work by hand.

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 will be arranged.