

## Math for Art and Business Students on the Web

Dr. Shakir Manshad  
General Studies DABCC  
smanshad@nmsu.edu

Dr. Amal Mostafa  
Mathematical Department NMSU  
ammostaf@nmsu.edu

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### Abstract

Recognizing the need to take mathematics beyond the classroom walls and beyond traditional boundaries, WebCT and Web page programs are used to design Math Appreciation (Math 210) and matrices and Linear Programming (Math 230) courses in which students have the option of entering interactive web based materials instead of attending lectures. Putting courses on the web is not always clear. Our interpretation involves more than putting a syllabus and assignment sheet on the web (of course these steps are appropriate for all courses). Faculty at DABCC has available WebCT, which is helpful in establishing a web based course. WebCT will easily manage student identities and work records, provide chat rooms and other forms of web communications, as well as display web pages that are uploaded to it.

This presentation also explores the technologies and instructional techniques that allow distance learning to be performed in a meaningful manner. Teaching mathematics to non math major students is arguably the greatest responsibility of most mathematics departments. This talk presents topics, projects, web activities, and problems used in a mathematics course developed over the past five years for liberal arts students and business students. Designers' observations about the process and plans for the future will be discussed.

### Introduction

It is widely acknowledged that a majority of students emerge from our schools and colleges with, at best, the ability to manipulate with formulas and recall of procedures for solving particular problems and with a negative attitude towards mathematics. Calls for changing the way mathematics is taught at the post-secondary level is well-documented (American Association for Advancement of Science [ [AAAS](#) ], 1989; American Mathematical Association for Two-Year Colleges [ [AMATYC](#) ], 1995; Mathematical Sciences Education Board [ [MSEB](#) ], 1993; National Research Council [ [NRC](#) ]; 1991).

In our Math Appreciation course at DABCC, we revise the curriculum to help students with health majors to pass the entrance test to nursing program, which also includes technology component (graphing calculators and other software), and the Internet. The Internet was to serve as a vehicle of communication between the instructor and the students, students themselves, as well as between the instructors.

The use of technology in instruction should further alter both the teaching and the learning of mathematics. Students can explore additional examples, perform independent investigations, or complete assignments effectively for online math classes and computer software independently. Calculators and computers with appropriate software transform the mathematics online math classes into a laboratory much like the environment in many science classes, where students use technology to investigate, conjecture, and verify their findings.

### **Communicating ideas:**

Communicating ideas in a visual format using interactivity via the Internet is increasingly important for developmental students. Learn how Internet-enhanced math students work through interactivity, color, graphics and animation.

Communication with the instructor is available through e-mail or in person at the instructors Office Hours. Students are encouraged to come in for short lectures or test preparation if they need that level of support.

WebCT and Web Page is online 24 hours per day, 7 days per week. You can use its bulletin board or email to post questions about your homework or other aspects of the class and then return later to see if answers have been posted. You can let us know about some fun things you've done on the web. You can check it prior to each class to see if the instructor has posted notices that you should read. And, you can get your homework, test scores, and final grade.

### **Technology:**

Computer technology is changing the ways we taught online mathematics courses; consequently, the content of mathematics programs and the methods by which mathematics is taught are changing. Students must continue to study appropriate mathematics, content, and they also must be able to recognize when and how to use computers effectively when doing mathematics. Mathematics teacher should be able to appropriately use a variety of computer tools such as spreadsheets, Geometer's Sketchpad (GSP), PowerPoint, Maple, Scientific Workplace, Scientific Word and Scientific Notebook, in the mathematics online classes. Keeping pace with advances in technology will enable mathematics teachers to use the most efficient and effective tools available.

- Spreadsheets make significant mathematical models from diverse applied areas accessible and understandable to students in the college. A computer is used to demonstrate how to create these models together with animated graphic visualization using a spreadsheet.
- Geometer's Sketchpad (GSP) is a software package that has been used extensively in Geometry classes since 1990. The latest version of GSP has some exciting new developments that make it a great tool for use in other courses. The latest version of this award-winning mathematics visualization environment features enhanced support for algebra and calculus as well as geometry; a full set of formatting tools for mathematical notation and styled text; a more flexible user interface for greater ease of use; built-in Web integration; and many, many other enhancements.

- Using PowerPoint in teaching Mathematics online. Address the needs of visual learners by effectively using PowerPoint with color, animation, graphics, and layering.
- Creating Mathematical Documents for the Web. Maple, Scientific Workplace, Scientific Word and Scientific Notebook provide a variety of the ways to put files containing mathematics on the web. Also the use of PDF files to display course information.

### **Chapter Notes:**

The students taking the course vary in their major as well as in their motivation to take the course. The mathematical background of students enrolled in Math courses are generally fairly weak, even after successfully completing the prerequisite.

The first step in the process of developing lecture notes was to outline the content of the course, determine the number of meeting times during the term, class tests, and review sessions. The next step was to develop the lessons. We decided that the average length of lessons would be about seven to ten pages of typed material, which translated into week lecture time.

The lecture notes were typed in Microsoft Word and saved in PDF format. The first document was used as a base data file, the second was uploaded on the WebCT. In creating the PDF document there were several logistic problems with numerous graphics inserted into the document, such as mathematical equations, drawings, and graphs.

### **Assessment:**

The assessment of students is always a challenge, and this challenge is compounded when the primary medium for a course is accomplished via distance learning. Should testing be done online? If so, what percent of the student's grade should be based upon online assessment? How do you test a student who lives 100+ miles away from campus? What qualifies an individual as an acceptable proctor? Are unproctored exams appropriate? Are there different rules for different courses? How are exams sent to students and returned to instructors? How are exam results and feedback given to the students?

As mentioned above, we have developed the survey to gather information about students' attitude towards teaching and learning environments, and towards mathematics and computers.

### **Future plans:**

We believe the courses developed so far have been successful, and we plan to continue refining the existing material as well as to develop additional activities and tests. It is our goal to substitute some of the existing in-class tests with the on-line tests, to add the group projects, and to include requirements for students' use of the white board. The WebCT tool has a superb feature to support the previously mentioned activities. In order to address concerns about academic dishonesty, we might schedule a supervised, on-line exam in one of the computer labs.

## References

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Assessment Techniques for Distance Learning

AMATYC 2002 Conference Phoenix, Arizona Friday, November 15, 2002