DRAFT

Math 385 Introduction to Mathematical Modeling

Spring Semester, 2010
Tuesday-Thursday **2:30-3:45pm** **room:**
Instructor: Jonathan Bell M/P 427
Office hours: by appointment.
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Course Prerequisites: Ma 225 (because that is the requirement in the catalog)

Text: *A First Course in Mathematical Modeling*, Fourth Edition, Frank R. Giordano, William P. Fox, Steven B. Horton, Maurice D. Weir, Brooks/Cole Pub. 2009

Course Content: Mathematical modeling is a process of applying mathematical reasoning and tools to understand some aspects of our physical, biological, social, and economic environment. Within an integrated context of case studies we will study the process of model formation. This will involve discussion of appropriate assumptions for the question being asked, types of models and simulations that can be considered, and parameter estimation, analysis, prediction, and validation aspects that come about via model building.

This course is a revised course that has not been offered in the last 15 years. Hence, it is an experiment on my part. While Math 481 (Mathematical Modeling) is also being offered this same semester, Math 385 will be more discrete dynamics based, and will employ Excel often for computational support, Math 481 is more differential equations based, and relies on Maple programming for computational needs.

Philosophy of the Course: An attempt here is to offer a mathematical modeling curriculum in a course that is not tied to calculus and differential equations. Part of the reason for this is the hope that these ideas can migrate down to lower educational levels eventually, and get students to think about the interplay of mathematical reasoning and other disciplines earlier in their educational studies. So the course is designed to incorporate constructivist principles since the course was designated a MCTP course for students in the Maryland Collaborative for Teacher Preparation program. I also have a belief that many dynamical concepts we normally introduce after a couple of years of calculus and differential equations have analogues in discrete time problems (involving difference equations) and can be introduced much earlier with the aid of computer programs.

Grading Policy: There are no exams given in this class. Grades will be determined from homework assignments and reports. Reports will be discussed and assigned in class. I generally post homework assignments on Blackboard. There will be specific due dates assigned to each report and assignment, and late submissions will not be accepted.

Learning Goals: By the end of the course you should i) learn some basics of asking appropriate questions about a given situation; ii) be able to set up, analyze, and interpret certain classes of mathematical models; iii) learn some tools that can help in analyzing mathematical models. I do not expect to turn you into professional mathematical modelers in a single course, but I hope you will come away with a level of appreciation for the activity, more knowledge of where mathematical ideas have come into play, and a critical eye concerning the limitations inherent in the activity.

Academic Conduct and Policy: Academic integrity is an important value at UMBC and I support this. The following is the official UMBC statement on academic conduct.

By enrolling in a course, each student assumes the responsibilities of an active participant in UMBC's

scholarly community in which everyone's academic work and behavior are held to the highest standards of honesty. Cheating, fabrication, plagiarism, and helping others to commit these acts are all forms of academic dishonesty, and they are wrong. Academic misconduct could result in disciplinary action that may include, but is not limited to suspension or dismissal.

To read the full Student Academic Conduct Policy, consult the UMBC Student Handbook, or go online to http://www.umbc.edu/integrity/.